

**CITY OF STORM LAKE
REGULAR COUNCIL MEETING, DUE TO
COVID-19, THIS MEETING WILL BE A
TELEPHONIC MEETING AND ONLY IN
PERSON FOR PARTICIPANTS REGARDING
THE AGENDA ITEM ~ THE PUBLIC MAY
DIAL IN TO PARTICIPATE: 1-408-418-9388
ACCESS CODE: 146 170 5214
OCTOBER 19, 2020
5:00 PM**



City of Storm Lake
PO Box 1086
Storm Lake, IA 50588
p (712) 732-8000
f (712) 732-4114

AGENDA

- A. Pledge of Allegiance
- B. Consideration of Changes in Agenda and Setting the Agenda
- C. Disclosure by City Council Members
- 1. Hear the Public
- 2. Consent Agenda
 - A. Approve Consent Agenda
 - B. Buy Local Information
 - C. SLPD City Code Enforcement Summary
 - D. Resolution No. 17-R-2020-2021 Amending Fee Resolution For Building Official and Roadway Maintenance
 - E. Motion To Approve Farmer's Market Permit Amendment Request.
- 3. Public Hearing for the 2020 Sanitary Sewer Cleaning & Televising Plans, Specifications, and Form of Contract
- 4. Approve Resolution No. 18-R-2020-2021 Awarding the Bid for the 2020 Sanitary Sewer Cleaning & Televising Plans, Specifications, and Form of Contract
- 5. Resolution No. 19-R-2020-2021 Approving Change Order No. 1 of the Tulip Lane Storm Water Improvements Project
- 6. Motion to Award A Bid To Schoon Construction, LLC, of Cherokee, Iowa for the Early Elementary Water Main Extension Project
- 7. Resolution No. 20-R-2020-2021 Setting A Public Hearing On A Proposal To Amend The City Code By Updating The National Electrical Code To The 2020 Edition.
- 8. Motion to Approve Memorandum of Understanding between the Iowa Department of Natural Resources and City of Storm Lake for the Nutrient Reduction Program
- 9. Public hearing on proposed plans and specifications, form of contract and estimate of cost for the construction of Memorial Lift Station Improvements Project
- 10. Resolution No. 21-R-2020-2021 approving the proposed plans and specifications, form of contract and estimate of cost for the construction of Memorial Lift Station Improvements Project

11. **Resolution No. 22-R-2020-2021 Approving Change Order No. 3 for Condominium Entrance Road Project**
12. **Third and Final Reading of Ordinance No. 01-O-2020-2021 amending Chapter 3-1 of Title III of the city code of the City of Storm Lake, Iowa, titled “Garbage Storage and Collection,” to revise requirements relating to the collection of garbage and its storage out of doors**
13. **Work Session Amending City Code Chapter 5-10 Property Maintenance**
14. **City Council Requested Items**
15. Adjourn

Meeting Protocol

If you wish to speak today, please:

1. To speak on an agenda item please approach the podium when that agenda item is called and upon recognition by the Mayor identify yourself by stating your name and address.
2. If your issue is not a topic on the agenda please approach the podium under the "Hear the Public" agenda item and upon recognition by the Mayor identify yourself by stating your name and address.
3. Please keep your remarks to three (3) minutes or less.
4. If you require accommodation for this meeting including but not limited to translation services, hearing assistance, or accessibility please contact the City Clerk at least four (4) hours prior to the start of the meeting.

**If you have concerns about any of the items on the consent agenda, they may be separated from the consent agenda and voted on individually.*

***Ordinances may be read at three consecutive meetings or readings may be waived and ordinances may be passed at only one or two meetings.*



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Staff Summary

10/19/2020

Agenda Item # B.



City of Storm Lake
PO Box 1086
Storm Lake, IA 50588
p (712) 732-8000
f (712) 732-4114

REPORT TO: Honorable Mayor and City Council

FROM:

SUBJECT: Consideration of Changes in Agenda and Setting the Agenda

BACKGROUND:

FISCAL IMPACT:

RECOMMENDATION:

Staff Summary

10/19/2020

Agenda Item # C.



City of Storm Lake
PO Box 1086
Storm Lake, IA 50588
p (712) 732-8000
f (712) 732-4114

REPORT TO: Honorable Mayor and City Council

FROM:

SUBJECT: Disclosure by City Council Members

BACKGROUND:

FISCAL IMPACT:

RECOMMENDATION:

Staff Summary

10/19/2020

Agenda Item # A.



City of Storm Lake
PO Box 1086
Storm Lake, IA 50588
p (712) 732-8000
f (712) 732-4114

REPORT TO: Honorable Mayor and City Council

FROM: Mayra Martinez, City Clerk

SUBJECT: **Approve Consent Agenda**

BACKGROUND: The Consent Agenda Includes:

- List of bills for approval
- King's Pointe and Sunrise Pointe disbursements for approval
- Approve the October 5, 2020 City Council Minutes
- Approve Renewal Liquor License for Lake Avenue Lounge and Hy-Vee Fast & Fresh
- Approve the Code Enforcement Summary (see staff summary)
- Resolution No. 17-R-2020-2021 Amending Fee Resolution For Building Official and Roadway Maintenance
- Motion To Approve Farmer's Market Permit Amendment Request.

FISCAL IMPACT: The City will pay the following expenditures:

- List of Bills - - \$852,428.84
- King's Pointe & Sunrise Pointe Golf Course Bills - \$140,487.36

The City will receive the following revenues:

- Liquor License Renewal - \$920.00

RECOMMENDATION: Approve Resolution No. 17-R-2020-2021 Consent Agenda

ATTACHMENTS:

Description	Type
☐ October 5, 2020 Minutes	Minutes
☐ King's Pointe and Golf Course List of Bills	List of Bills
☐ Lake Avenue Liquor Application 2020	Application
☐ Lake Avenue Liquor Report 2020	Backup Material
☐ HyVee Fast & Fresh Liquor Application 2020	Application
☐ Hy-Vee Fast & Fresh Liquor Report 2020	Backup Material

REGULAR COUNCIL MEETING, CITY OF STORM LAKE, IA., OCTOBER 5, 2020 5:00 PM. DUE TO COVID-19, THIS MEETING WILL BE A TELEPHONIC MEETING AND ONLY IN PERSON FOR PARTICIPANTS REGARDING THE AGENDA ITEM ~ THE PUBLIC MAY DIAL IN TO PARTICIPATE: 1-408-418-9388 ACCESS CODE: 146 833 2644

Present: Mayor Michael Porsch, Council Members Kevin McKinney, Dan Smith, and Jose Ibarra.
Absent: Council Members Tyson Rice and Maria Ramos.

Staff Present: City Manager Keri Navratil, Assistant City Manager David Derragon, City Attorney Phil Havens, Police Chief Chris Cole, Fire Chief Mike Jones, Water Quality Code Compliance Director Scott Olesen, Library Director Elizabeth Huff, Public Services Supervisor Scott Bonebrake, Finance Director Brian Oakleaf, City Clerk Mayra Martinez.

Media Present: The media was asked if they were present and the Times and KAYL Radio responded that they were in attendance.

Pledge of Allegiance

Agenda – Moved by Council Member Smit to approve setting the Agenda as presented. Seconded by Council Member Ibarra. Vote: All ayes with Council Members Rice and Ramos absent. Motion carried.

Disclosure by City Council Members – None at this time.

Hear the Public – None at this time.

Mayor Porsch announced the following Proclamation honoring Ruth Freese for her 13 years of service to the City of Storm Lake, Iowa with the Library. Whereas, Ruth Freese has served the City of Storm Lake from September 6, 2007 through October 7, 2020 and Whereas she has made significant contributions in a distinguished career to the City with her abilities and dedicated service; and Whereas, she has been a resource for the City Council and City Staff; and Whereas, Ruth Freese has brought credit to herself and, specifically, to the City of Storm Lake by her many accomplishments and excellent service to the residents of Storm Lake. Now, therefore, be it resolved by the City Council of the City of Storm Lake that its sincere and deep appreciation be extended to Ruth Freese along with their warmest wishes for her future.

Mayor Porsch welcomed and presented to the Council the new King's Pointe Manager Michael Chowdhury.

Consent Agenda - Moved by Council Member Ibarra to approve the Consent Agenda which includes list of bills Check #'s 75738 through 75746, 75796 through 75852, EFT #'s 1412 through 1431, DFT #'s 895 and 914, King's Pointe and Sunrise Pointe disbursements, September 21, 2020 minutes and September 25, 2020 Special minutes, renew Liquor License for Elements by K. Sorbe, and the Code Enforcement Summary . Seconded by Council Member McKinney. Roll call vote: All ayes with Council Members Rice and Ramos absent. Motion carried.

Primary Tow Service – Moved by Council Member Smith to approve the primary Tow Service agreement with Storm Lake Towing for the Storm Lake Police Department. Seconded by Council Member Ibarra. Roll call vote: All ayes with Council Members Rice and Ramos absent. Motion carried.

CDBG Housing Rehabilitation Grant – Moved by Council Member Smith to approve the grant agreement with IEDA for CDBG Housing Rehabilitation agreement. Seconded by Council Member McKinney. Roll call vote: All ayes with Council Members Rice and Ramos absent. Motion carried.

Moved by Council Member McKinney to approve the signing of Grant Administration Services for the CDBG Housing Sustainability project. Seconded by Council Member Ibarra. Roll call vote: All ayes with Council Members Rice and Ramos absent. Motion carried.

Moved by Council Member Smith to approve the agreement with Simmering-Cory for technical services related to the CDBG Housing Rehabilitation Grant. Seconded by Council Member Ibarra. Roll call vote: All ayes with Council Members Rice and Ramos absent. Motion carried.

Code of Conduct – Moved by Council Member Smith to adopt Resolution No. 15-R-202-2021 approving the Code of Conduct. Seconded by Council Member Ibarra. Roll call vote: All ayes with Council Members Rice and Ramos absent. Motion carried.

RESOLUTION NO. 15-R-2020-2021

RESOLUTION ADOPTING CODE OF CONDUCT

WHEREAS, the City of Storm Lake, has received a Community Development Block Grant from the Iowa Economic Development Authority; and

WHEREAS, the Iowa Economic Development Authority requires the City of Storm Lake to adopt a Code of Conduct in order to utilize such funds;

THEREFORE, BE IT RESOLVED, by the City Council for the City of Storm Lake, Iowa that:

Section 1: It hereby adopts and implements the attached Code of Conduct to be utilized by all officers, employees, or agents of the City engaged in the award or administration of contracts funded all, or in part, by the Community Development Block Grant Program.

Passed and adopted this 5th day of October, 2020.

Michael Porsch, Mayor

Attest:

Mayra Martinez, City Clerk

CODE OF CONDUCT

PURPOSE

The purpose of this Code of Conduct is to ensure the efficient, fair, and professional administration of federal grant funds in compliance with 2 CFR Part 200.318 and other applicable federal and state standards, regulations, and laws.

APPLICATION

This Code of Conduct applies to all officers, employees, or agents of City of Storm Lake engaged in the award or administration of contracts supported by federal grant funds.

REQUIREMENTS

No officer, employee, or agent of City of Storm Lake shall participate in the selection, award, or administration of a contract supported by federal grant funds, if a conflict of interest, real or apparent, would be involved. Such a conflict would arise when:

- a. The employee, officer, or agent;
- b. Any member of his/her immediate family;
- c. His/her partner; or

An organization which employs, or is about to employ any of the above; or, has a financial or other interest in the firm selected for award.

The City of Storm Lake's officers, employees, or agents shall neither solicit nor accept gratuities, favors, or anything of monetary value from contractors, potential contractors, or subcontractors.

FRAUD, WASTE AND ABUSE

The City of Storm Lake has zero tolerance for the commission or concealment of acts of fraud, waste, or abuse. All officers, employees, or agents shall notify the City of Storm Lake of suspected actions. Allegations of such acts will be investigated and pursued to their logical conclusion, including legal action where warranted. Concerns may be reported to the City of Storm Lake, City Hall, 620 Erie Street, Storm Lake, Iowa 50588 (712-732-8000).

REMEDIES

To the extent permitted by federal, state, or local laws or regulations, violation of these standards may cause penalties, sanctions, or other disciplinary actions to be taken against the City of Storm Lake's officers, employees, or agents, or the contractors, potential contractors, subcontractors, or their agents.

EFFECTIVE DATE

Passed and adopted this 5th day of October, 2020.

Michael Porsch, Mayor

Attest:

Mayra Martinez, City Clerk

Equal Opportunity Policy – Moved by Council Member Ibarra to approve the Equal Opportunity Policy statement. Seconded by Council Member McKinney. Roll call vote: All ayes with Council Members Rice and Ramos absent. Motion carried.

Excessive Force Policy - Moved by Council Member Smith to approve the Excessive Force Policy. Seconded by Council Member Ibarra. Roll call vote: All ayes with Council Members Rice and Ramos absent. Motion carried.

Procurement Policy - Moved by Council Member Smith to adopt Resolution No. 16-R-202-2021 approving the Procurement Policy. Seconded by Council Member Ibarra. Roll call vote: All ayes with Council Members Rice and Ramos absent. Motion carried.

RESOLUTION NO. 16- R-2020-2021

RESOLUTION ADOPTING PROCUREMENT POLICY

WHEREAS, the City of Storm Lake has received a Community Development Block Grant from the Iowa Economic Development Authority; and

WHEREAS, the Iowa Economic Development Authority requires the City of Storm Lake to adopt Procurement Policies in order to utilize such funds;

THEREFORE, BE IT RESOLVED, by the City Council of the City of Storm Lake that it agrees to adopt and implement the attached Procurement Procedures for use during the implementation and administration of the City's Community Development Block Grant Program.

Passed and adopted this 5th day of October, 2020

Michael Porsch, Mayor

Attest:

Mayra A. Martinez, City Clerk

PROCUREMENT POLICY

PURPOSE

The purpose of this Procurement Policy is to ensure that sound business judgment is utilized in all procurement transactions and that supplies, equipment, construction, and services are obtained efficiently and economically and in compliance with applicable federal law and executive orders and to ensure that all procurement transactions will be conducted in a manner that provides full and open competition.

APPLICATION

This policy applies to the procurement of all supplies, equipment, construction, and services of and for the City of Storm Lake related to the implementation and administration of the Community Development Block Grant. All procurement will be done in accordance with 2CFR Part 200 and Appendix II to Part 200.

POLICY

GENERAL PROCUREMENT PRACTICES

The City of Storm Lake will adhere to the following general procurement practices: document procurement standards; maintain oversight of contractors to ensure performance in accord with standards; avoid acquisition of unnecessary or duplicative items; encourage procurement or use of shared goods and services; use Federal excess and surplus property when feasible; encourage value-engineering clauses in construction contracts; award contracts only to responsible contractors; limit use of time and materials contracting; and use good administrative judgment to settle all contractual and administrative issues.

COMPETITION

The City of Storm Lake will provide full and open competition; prohibit use of state or local geographical preferences; develop written procedures for procurement transactions to ensure competition is not restricted; and ensure that pre-qualified lists are current.

FIVE METHODS OF PROCUREMENT

Procurement under grants shall be made by one of the following methods, as described herein: (a) micro-purchase; (b) small purchase procedures; (c) sealed bids (formal advertising); (d) competitive proposals; (e) noncompetitive proposals.

A. Micro-purchase includes the acquisition of supplies or services that do not exceed \$3,000 (or \$2,000 for acquisitions for construction subject to Davis-Bacon Act)

B. Small purchase procedures are relatively simple and informal procurement methods that are sound and appropriate for the procurement of services, supplies, or other property, costing in aggregate not more than \$150,000. If small purchase procedures are used for a procurement under a grant, price or rate quotations (minimum of 2) shall be obtained from an adequate number of qualified sources.

C. In sealed bids (formal advertising), sealed bids are publicly solicited and a firm-fixed price contract (lump sum or unit price) is awarded to the responsible bidder whose bid, conforming with all of the material terms and conditions of the invitation for bids, is the lowest in price. The sealed bids method is the required method for procuring construction.

1. In order for formal advertising to be feasible, appropriate conditions must be present, including, at a minimum, the following:

- a) A complete, adequate and realistic specification or purchase description is available.

- b) Two or more responsible bidders are willing and able to compete effectively for City of Storm Lake's business; and
- c) The procurement lends itself to a firm-fixed-price contract, and the selection of the successful bidder can be made principally on the basis of price.

2. When sealed bids are used for a procurement under a grant, the following requirements apply:

- a) A sufficient time prior to the date set for opening of bids, bids shall be solicited (publicly advertised) from an adequate number of known suppliers.
- b) The invitation for bids, including specifications and pertinent attachments, shall clearly define the items or services needed in order for the bidders to properly respond to the invitation for bids.
- c) All bids shall be opened publicly at the time and place stated in the invitation for bids.
- d) A firm-fixed-price contract award shall be made by written notice to that responsible bidder whose bid, conforming to the invitation for bids, is lowest. Where specified in the bidding documents, factors such as discounts, transportation costs, and life cycle costs shall be considered in determining which bid is lowest. Payment discounts may only be used to determine low bid when prior experience of City of Storm Lake indicates that such discounts are generally taken.
- e) Any or all bids may be rejected if there are sound documented business reasons in the best interest of the program.

D. Procurement by competitive proposals is normally conducted with more than one source submitting an offer, and either a fixed-price or cost-reimbursable type contract is awarded, as appropriate. Competitive proposals are generally used when conditions are not appropriate for the use of sealed bids. If the competitive proposals method is used for a procurement under a grant, the following requirements apply:

- 1. Requests for Proposals shall be publicized (publicly advertised), and identify all evaluation factors and their relative importance. Any response to publicized requests for proposals shall be honored to the maximum extent practical
- 2. Requests for Proposals shall be solicited from an adequate number of qualified sources.
- 3. City of Storm Lake shall have a method for conducting evaluations of the proposals received and for selecting awardees.
- 4. Awards will be made to the responsible offeror whose proposal will be most advantageous to the procuring party, with price (other than architectural/engineering) and other factors considered. Unsuccessful offerors will be promptly notified in writing.
- 5. City of Storm Lake should use competitive proposal procedures for qualification-based procurement of architectural/engineering (A/E) professional services whereby competitor's qualifications are evaluated and the most qualified competitor is selected, subject to negotiation of fair and reasonable compensation. The method, where price is not used as a selection factor, can only be used in the procurement of A/E professional services. It cannot be used to procure other types of services (e.g., administration professional services) even though A/E firms are a potential source to perform the proposed effort.

E. Noncompetitive proposals is procurement through solicitation of a proposal from only one source, or after solicitation from a number of sources, competition is determined inadequate. Noncompetitive proposals may be used only when the award of a contract is infeasible under small purchase procedures, sealed bids (formal advertising), or competitive proposals. Circumstances under which a contract may be awarded by noncompetitive proposals are limited to the following:

1. The item is available from only a single source;
2. After solicitation of a number of sources, competition is determined inadequate;
3. A public exigency or emergency exists when the urgency for the requirement will not permit a delay incident to competitive solicitation; and
4. The awarding agency (IEDA) authorizes noncompetitive proposals. (Sole source procurement for supplies, equipment, construction, and services valued at \$25,000 or more must have prior approval of the Iowa Economic Development Authority).

F. City of Storm Lake will provide, to the greatest extent possible, that contracts be awarded to qualified small and minority firms, women business enterprises, and labor surplus area firms whenever they are potential sources.

G. Any other method of procurement must have prior approval of the Iowa Economic Development Authority.

RECYCLED MATERIALS

The City of Storm Lake will procure items with the highest percentage of recycled materials practical. City of Storm Lake shall include in all request for proposals and bid documents over \$10,000 the following language: "The contractor agrees to comply with all the requirements of Section 6002 of the Resource Conservation and Recovery Act (RCRA), as amended (42 U.S.C. 6962), including but not limited to the regulatory provisions of 40 CFR Part 247, and Executive Order 12873, as they apply to the procurement of the items designated in Subpart B of 40 CFR Part 247."

CONTRACT PRICING

A. The cost plus a percentage of cost and percentage of construction cost method of contracting shall not be used.

B. The City of Storm Lake shall perform some form of cost/price analysis for every procurement action, including modifications, amendments or change orders.

PROCUREMENT RECORDS

The City of Storm Lake shall maintain records sufficient to detail the significant history of a procurement, including the rationale for the method of procurement, selection of contract type, contractor selection or rejection, and the basis for the contract price. The City of Storm Lake shall make technical specifications and procurement documents available for review upon request.

BONDING REQUIREMENTS

Bonding requirements for construction or facility improvement contracts must meet the federal minimum requirements or receive a determination that the federal interest is adequately protected.

EFFECTIVE DATE

Passed and adopted this 5th day of October, 2020.

Michael Porsch, Mayor

Attest:

Mayra Martinez, City Clerk

Anti-Displacement and Relocation Assistance Plan - Moved by Council Member Ibarra to approve the Anti-Displacement and Relocation Assistance Plan. Seconded by Council Member Smith. Roll call vote: All ayes with Council Members Rice and Ramos absent. Motion carried.

Affirmative Fair Housing Policy - Moved by Council Member McKinney to approve the Affirmative Fair Housing Policy. Seconded by Council Member Ibarra. Roll call vote: All ayes with Council Members Rice and Ramos absent. Motion carried.

Garbage Storage and Collection – Moved by Council Member Smith to approve the second reading of Ordinance No. 01-O-2020-2021 amending Chapter 3-1 of Title III of the City Code of the City of Storm Lake, Iowa, titled “Garbage Storage and Collection,” to revise requirements relating to the collection of garbage and it’s storage out of doors. Seconded by Council Member Ibarra. Roll call vote: All ayes with Council Members Rice and Ramos absent. Motion carried.

Memorial Lift Station – Moved by Council Member Ibarra to approve setting public hearing for the Memorial Lift Station Improvements project plans, specifications, and form of contract for October 19, 2020 at 5:00 pm via telephonic Council meeting. Seconded by Council Member Smith. Roll call vote: All ayes with Council Members Rice and Ramos absent. Motion carried.

Work Session – RFQ Interview Storm Lake Marina Operator – City Staff and Council Members interviewed Tom Fitzpatrick and Andy Goettsch in regard to the contract for the operations of the Storm Lake Marina.

Tom Fitzpatrick and Andy Goettsch presented to City Staff and Council Members their plans for the operations of the Storm Lake Marina.

Moved by Council Member Ibarra to direct City Staff to negotiate a contract for the Storm Lake Marina 2021 season with Tom Fitzpatrick and Andy Goettsch. Seconded by Council Member Smith. Roll call vote: All ayes with Council Members Rice and Ramos absent. Motion carried.

City Council Requested Items – None at this time

Adjourn – Moved by Council Member Ibarra to adjourn at 6:21 pm. Seconded by Council Member McKinney. Roll call vote: All ayes with Council Members Rice and Ramos absent. Motion carried.

ATTEST:

Michael Porsch, Mayor

Mayra A. Martinez, City Clerk

King's Pointe Resort

Claims Publication

From 10/1/2020 to 10/15/2020

Vendor	Description	Amount
360 Custom Designs, LLC	Supplies	\$190.00
ACCO Unlimited Corporation	Supplies	\$3,945.00
Alliant Energy	Utilities	\$54.33
Authnet Gateway	Services	\$25.00
Bomgaars Supply Inc.	Supplies	\$161.60
Cintas Corporation	Supplies	\$1,170.74
City of Storm Lake	Utilities	\$3,983.49
Color-ize	Supplies	\$2,468.01
Doll Distribution	Beverages	\$876.35
ECOLAB	Supplies	\$2,108.88
Expedia, Inc.	Services	\$1,930.23
Fintech	Services	\$56.65
Grainger	Supplies	\$259.82
GuestSupply	Supplies	\$330.60
Heartland Payment System	Services	\$9,284.24
Hermel Wholesale	Food	\$3,825.54
HyVee	Beverages	\$867.68
Johnson Brothers	Beverages	\$246.10
Julius Cleaners	Services	\$84.70
KAYL/KKIA	Advertising	\$1,087.50
KTIV Television Inc.	Advertising	\$2,925.00
Martin Brothers	Food	\$7,407.47
Mediacom	Utilities	\$472.90
Olsen Welding & Machine	Services	\$20.00
Nelson's Premix and Vet Supply	Supplies	\$24.28
Office Elements	Supplies	\$48.71
Pitney Bowes	Supplies	\$142.50
Plumbing and Heating Wholesale, Inc.	Supplies	\$55.01
Reding Gravel & Escavating Co Inc	Services	\$7.52
Rex Rimmer	Reimbursement	\$60.00
Sceptre Hospitality Resources, LLC	Services	\$2,468.95
Steve's Window Service	Services	\$120.00
Storm Lake Ace Hardware	Supplies	\$251.49
Storm Lake Rotary Club	Services	\$85.00
Storm Lake United	Services	\$20.00
Symmetry Energy Solutions LLC	Services	\$7,738.36
Sysco Iowa, Inc.	Food	\$1,057.08
Tonya Hinnars	Refund	\$220.69
UPS	Services	\$57.80
Vizergy	Services	\$1,158.45
Weigand Omega Man Payroll 10/14/20	Payroll	\$62,885.56
Weigand-Omega Man Fee- August	Agreement	\$20,304.13
		<u>\$140,487.36</u>

Applicant License Application (LC0036523)

Name of Applicant: <u>Lake Avenue Lounge 1, Inc.</u>		
Name of Business (DBA): <u>Lake Avenue Lounge</u>		
Address of Premises: <u>615 & 617 Lake Ave</u>		
City <u>Storm Lake</u>	County: <u>Buena Vista</u>	Zip: <u>50588</u>
Business <u>(712) 371-3095</u>		
Mailing <u>PO Box 573</u>		
City <u>Storm Lake</u>	State <u>IA</u>	Zip: <u>50588</u>

Contact Person

Name <u>Curtis Ellison</u>	
Phone: <u>(712) 371-3095</u>	Email <u>ecurt83@yahoo.com</u>

Classification Class C Liquor License (LC) (Commercial)

Term:12 months

Effective Date: 11/08/2019

Expiration Date: 11/07/2020

Privileges:

Class C Liquor License (LC) (Commercial)

Outdoor Service

Sunday Sales

Status of Business

BusinessType: <u>Privately Held Corporation</u>	
Corporate ID Number: <u>XXXXXXXXXX</u>	Federal Employer ID <u>XXXXXXXXXX</u>

Ownership

Curtis Ellison

First Name: <u>Curtis</u>	Last Name: <u>Ellison</u>	
City: <u>Storm lake</u>	State: <u>Iowa</u>	Zip: <u>50588</u>
Position: <u>president</u>		
% of Ownership: <u>100.00%</u>	U.S. Citizen: <u>Yes</u>	

Insurance Company Information

Insurance Company: <u>Illinois Union Insurance Company</u>	
Policy Effective Date: <u>11/08/2019</u>	Policy Expiration <u>11/08/2020</u>
Bond Effective	Dram Cancel Date:
Outdoor Service Effective	Outdoor Service Expiration
Temp Transfer Effective Date	Temp Transfer Expiration Date:

M E M O R A N D U M

TO: MAYRA MARTINEZ

FROM: CHRIS COLE

DATE: SEPTEMBER 16, 2020

REFERENCE: LIQUOR LICENSE RENEWAL
LAKE AVENUE LOUNGE
617 LAKE AVE

Discussion: Per your request I have accessed the department computer for calls of interest to the aforementioned establishment. The calls are as follows:

	9-04-2018 to 9-13-2019	9-14-2019 to 9-13-2020
INCIDENTS		
Ambulance Call	1	0
Assault	1	0
Bar Check	37	9
Business Security	1	1
City Code Enforcement	2	0
Open Door	1	1
PR/Talk/Presentation	12	1
Public Intoxication	0	1
Reckless Driver	2	0
Street Beat	2	0
Suspicious Vehicle	1	0
ARRESTS		
	none	none

Recommendation: Approval of liquor license

Applicant License Application (LE0003365)

Name of Applicant: <u>Hy-Vee, Inc.</u>		
Name of Business (DBA): <u>Hy-Vee Fast and Fresh Express</u>		
Address of Premises: <u>1260 Lake Ave. N.</u>		
City <u>Storm Lake</u>	County: <u>Buena Vista</u>	Zip: <u>50588</u>
Business <u>(515) 267-2800</u>		
Mailing <u>5820 WESTOWN PKWY</u>		
City <u>WEST DES MOINES</u>	State <u>IA</u>	Zip: <u>50266</u>

Contact Person

Name <u>Kelly Palmer</u>	
Phone: <u>(515) 267-2949</u>	Email <u>kpalmer@hy-vee.com</u>

Classification Class E Liquor License (LE)

Term:12 months

Effective Date: 11/06/2020

Expiration Date: 11/05/2021

Privileges:

Class B Wine Permit

Class C Beer Permit (Carryout Beer)

Class E Liquor License (LE)

Sunday Sales

Status of Business

BusinessType: <u>Privately Held Corporation</u>	
Corporate ID Number: <u>XXXXXXXXXX</u>	Federal Employer ID <u>XXXXXXXXXX</u>

Ownership

Randy Edeker

First Name: <u>Randy</u>	Last Name: <u>Edeker</u>	
City: <u>Urbandale</u>	State: <u>Iowa</u>	Zip: <u>50322</u>
Position: <u>CEO, President</u>		
% of Ownership: <u>0.00%</u>	U.S. Citizen: <u>Yes</u>	

Michael Jurgens

First Name: <u>Michael</u>	Last Name: <u>Jurgens</u>	
City: <u>Des Moines</u>	State: <u>Iowa</u>	Zip: <u>50312</u>
Position: <u>Vice President, Secretary</u>		
% of Ownership: <u>0.00%</u>	U.S. Citizen: <u>Yes</u>	

Jeffrey Pierce

First Name: <u>Jeffrey</u>	Last Name: <u>Pierce</u>
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City: Waukee State: Iowa Zip: 50263
Position: Asst Treasurer, Financial
Reporting
% of Ownership: 0.00% U.S. Citizen: Yes

Insurance Company Information

Insurance Company: <u>EMPLOYERS MUTUAL CASUALTY COMPANY</u>	
Policy Effective Date: <u>11/06/2020</u>	Policy Expiration <u>01/01/1900</u>
Bond Effective <u>2</u>	Dram Cancel Date:
Outdoor Service Effective	Outdoor Service Expiration
Temp Transfer Effective Date:	Temp Transfer Expiration Date:

M E M O R A N D U M

TO: MAYRA MARTINEZ

FROM: CHRIS COLE

DATE: September 17, 2020

REFERENCE: LIQUOR LICENSE RENEWAL
Hy-Vee Fast and Fresh
1260 N LAKE AVE

Discussion: Per your request I have accessed the department computer for calls of interest to the aforementioned establishment. The calls are as follows:

9-17-2019 to
9-14-2020

INCIDENTS

Alarm Response	2
Business Assist	1
Business Security	58
PR/Talk/Presentation	12
Station Assisgnment	1
Street Beat	17
Suspicious Activity	1
Vehicle Maintenance	3
Vehicle Stop	1
Warrant Service	1

ARRESTS

False Report to Law Enforcement	1
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Recommendation: Approval of liquor license.

Staff Summary

10/19/2020

Agenda Item # B.



City of Storm Lake
PO Box 1086
Storm Lake, IA 50588
p (712) 732-8000
f (712) 732-4114

REPORT TO: Honorable Mayor and City Council

FROM: Mayra Martinez, City Clerk

SUBJECT: Buy Local Information

BACKGROUND: Early in 2011 during a Study Session discussion Council asked staff to look at putting together some analysis information regarding the amount of purchases made locally. We have pulled that information together and a provided a summary of purchases identified in the current list of bills to be approved that are purchased locally (within the City of Storm Lake), within Buena Vista County, and outside of Buena Vista County are presented here for Council's review. This information is presented for for both the City and King's Pointe's bills.

As the reader reviews the information they should note the following key notes:

- Costs associated with any major capital project (those bid under the State of Iowa Bid Law) are excluded from the calculation
- Costs associated with travel is excluded from the calculation and %
- Costs associated with payroll is excluded from the calculation and %
- In some cases there is only one vendor or an item is only available from vendors outside of the City limits and/or Buena Vista County – we have not identified these
- Some departments have fairly minor budgets and a major purchase can skew the % and or amount for a given review period (For Example: the Airport may have normally \$4,000 - \$6,000 in expenses until they purchase Jet Fuel or Av Gas which can be \$10,000 + and as a vendor who is not local this can skew the information for that review period)
- Local has been determined to be has an office front in the

area and based on where the office front is located for local vs. BV County (For Example: Wal-Mart is considered local since they have a store in Storm Lake even though their headquarters is not located here)

As with all analytical data it is possible to interpret the numbers in a variety of ways and as we move forward we would be happy to provide further detail and or revise the way in which we show the data. Likewise if you have any questions or concerns please don't hesitate to contact city staff.

FISCAL IMPACT:

Breakout	Calculated Expenses
Buena Vista County	\$ 15,228.04
Contract/Agreement	\$ 355,706.63
Local	\$ 135,940.71
Non- Local	\$ 89,863.51
Payroll/Refunds/Pyrl Tax & Ins	\$ 255,689.95
Total Expenses	\$ 852,428.84
Supporting Documents Attached	

RECOMMENDATION: Review Buy Local Information

ATTACHMENTS:

Description	Type
List of Bills	List of Bills
Project Activity Report	Backup Material

Storm Lake, IA

Payment Date Range: 10/08/2020 - 10/21/2020



Vendor Name	Vendor Number	Payable Description	Total Payments
BVC			
Buena Vista County Solid Waste	001035	Recycling	226.20
Control Systems Specialists, LLC	001013	Filters	218.49
Hare Painting & Sandblasting	001482	Hydrant Sandblast & Painting	10,800.00
Mike's Electronics Inc	001196	Sludge Press Services	3,269.81
Power Solutions, Inc	001465	LED Light Replacement	713.54
		BVC Total:	15,228.04
Contract/Agreement			
Bolton & Menk, Inc	001024	Final Design Services	91,484.50
Community Education Dept	001397	1st Quarter FY2021 Recreation Agreement	17,700.28
I & S Group, Inc	001103	Construction Admin	10,384.70
John Healy	001020	Pay Request # 2 of 4th & Barton SW Improv	236,137.15
		Contract/Agreement Total:	355,706.63
Local			
A & A Automotive	001022	Tie Rods & Brakes	1,670.93
Alliant Energy	001173	Gas Services	838.92
Buena Vista Regional Medical Center	001124	Physical- Schreck	535.00
Central Bank	001025	Supplies	35.69
Dennis R Julius	001064	Alteration Services	820.25
Dianne Johnson	001029	Bd & Disp Cats/Dogs	481.50
Edwards Storm Lake	001114	Blower Motor Replacement	809.22
Fastenal Company	001033	Supplies	30.57
Garbage Hauling Service Inc	001157	Garbage Service	1,843.40
Holzhauser Ford Lincoln Storm Lake Inc	001887	Battery Replacement	266.76
Iowa Office Supply Inc	001037	Office Chairs	1,674.91
Jim Bartholomew	001069	October 2020 Airport Contract	5,615.50
L & G Products, Inc	001099	Seed	109.50
Larson Oil & Distributing Co, Inc	001178	Diesel Fuel	1,656.73
Long Lines	001077	Fax Line & Emergency Line Service	1,399.68
Mangold Environmental Testing, Inc	001119	Shipping	31.37
Michael P. Reinert	001079	Frame Fabrication	408.00
MidAmerican Energy Company	001074	Electric Services	68,119.37
Mike's Lawn Service, Inc	001195	Aerator Services	1,485.00
North Lake Truck Repair	001177	Power Steering Repairs	359.06
O'Reilly Automotive Inc	001108	Seat Cover	49.99
Philip E Havens	001019	Legal Services	2,838.00
Qwest Corporation	001070	Phone Service	127.51
Rebnord Technologies, Inc	001091	Switch from Water Damage 7/1/2020	9,752.65
Reding's Gravel & Excavating Co., Inc	001132	Sand	652.02
Rust Publishing NWIA, LLC	001493	September 2020 Advertising	50.72
Siouxland Certified Testing Services, Inc	001190	Concrete Testing	260.00
Stanton Electric, Inc	001264	Service Call- Mittlestats	65.00
Star Energy, LLC	001016	Fuel	6,315.52
Stille Pierce & Pertzborn	001294	Airport Pollution Liab Insurance	15,212.00
Storm Lake Ace Hardware	001216	Supplies	595.52
Storm Lake Hearing Aid Service, Inc	001364	Hearing Screening- Schreck	45.00
Storm Lake Industrial Corporation	001198	2nd Installment FY2021	8,333.33
The Storm Lake Times	001214	September 2020 Publications	222.40
Vanish LLC	001212	September 2020 Towing Services	400.00
Verizon Wireless Services LLC	001075	Cell Phone Service	2,663.47
Vetter Equipment	001098	Supplies	12.50
Visual Edge Inc	001063	Copier Maintenance Agreement	153.72

Buy Local_v1

Vendor Name	Vendor Number	Payable Description	Total Payments
		Local Total:	135,940.71
Non-Local			
ABC Pest Control, Inc	001078	Pest Control Services	100.00
Ahlers & Cooney, P.C.	001023	Labor Relation	252.00
Alpha Wireless Communications	001105	New Radio Programming	260.00
Amerigas	001014	FY2021 Tank Rental	87.00
Baker & Taylor, Inc	001957	Books	17.09
Barnes & Noble Booksellers, USA Inc	001274	Books	94.43
Brodart Co.	001009	Books	894.80
Central Iowa Distributing, Inc	001026	Cleaning Supplies	117.40
Cintas First Aid & Safety	001094	First Aid Supplies	12.28
Dale Vitito	001061	Uniforms	3,675.36
Davis Equipment Corporation	001113	Mower Supplies	3,239.50
Demco, Inc	001273	Labels	100.49
Dorsey & Whitney LLP	001954	Bond Ref Services	3,000.00
Foundation Analytical Laboratory, Inc	001100	Testing Services	3,742.95
Granicus, LLC	001767	NovusAGENDA Subscription	4,200.00
Hach Company	001034	Testing Supplies	1,111.96
Hawkins, Inc	001112	Hydro	1,781.53
H-O-H Water Technology, Inc	001400	Polymer	7,596.72
Ingram Library Services, Inc	001268	Books	277.70
International Association of Electrical Inspec	001654	Fall 2020 Conference Reg- Olesen	180.00
Iowa Lakes Regional Water	001073	October 2020 Water Service	71.19
Iowa League of Cities	001117	2020 Budget Workshop- Gibbins	50.00
Joyce's Greenery	001062	917 Highview Sod	216.00
Midwest Tape, LLC	001275	DVDs	111.70
Mississippi Lime Company	001095	Lime	11,403.15
MRA Custom Applications, LLC	001553	Lime Hauling Services	14,260.41
National Fire Protection Association	001300	FY2021 Membership- Olesen	175.00
NCL of Wisconsin, Inc	001191	Testing Supplies	597.44
Nyemaster Goode, P.C.	001955	Bond Ref Services	3,276.00
Petersen Manufacturing	001088	Plaque	51.70
Rehab Systems Inc	001332	Vac Cleaning	5,998.85
Salus LLC	001006	September 2020 Memberships	40.00
Schoon Construction & Excavation, LLC	001344	Casino Road LS Repairs	3,860.14
Schumacher Elevator Company	001200	FY2022 Elevator Maintenance	4,280.85
Siouxland Turf Products	001131	Chemicals	948.45
Sta-Mel Enterprises, Inc	001183	Deicing Salt	1,888.20
Trevor Kruger	001067	Plexi Glass	160.50
Tyler Technologies, Inc	001084	Insite Transaction Fees	4,807.85
Underground Location Company	001194	Locate Services	112.80
United States Plastic Corp	001614	Valves	543.61
UnityPoint Clinic- Occupational Medicine	001315	Testing Services	294.00
UnityPoint Health Trinity Regional Medical	001781	Physical	954.60
University Enterprises, Inc	001141	Collection Enrollment	150.00
UPS	001121	Shipping	14.39
Utility Supply of America, Inc	001336	Safety Cans	483.44
Vernon Library Supplies	001714	Labels	174.09
WaterPro Supplies Inc	001204	Frames, Grates, and Cub Guards	3,447.94
Werner Sewer & Septic, LLC	001572	Camera Sewer Mains	750.00
		Non-Local Total:	89,863.51
Payroll/Refunds			
Custodian of Petty Cash	001272	Postage	10.16
Mariana Montano	001956	2020 COVID Shelter Refund	80.00
Ruth Freese	001265	September 2020 Homebound Deliveries	13.80
TrueNorth Companies	001402	FY2021 FF AD & D Enrollment	292.60
		Payroll/Refunds Total:	396.56
		Grand Total:	597,135.45

Summary

Project Summary

Project Number	Project Name	Total Budget	Date Range Budget	Beginning Balance	Total Activity	Ending Balance	Budget Remaining
01112-0019	WasteWater Treatment Facility Wetlan...	1,195,689.00	34,139.79	1,018,649.36	0.00	1,018,649.36	177,039.64
01112-0020	10th & Ontario StormWater Improvem...	1,753,754.21	0.00	1,751,662.45	0.00	1,751,662.45	2,091.76
01112-0021	4th & Oats StormWater Improvements	837,480.15	0.00	805,613.07	42.00	805,655.07	31,825.08
16-19284	4th & Bartion Storm Water Improvemen...	751,002.10	15,243.95	346,322.07	213,929.31	560,251.38	190,750.72
18-CF-004	United Community Health Service Center	600,000.00	30,000.00	458,305.60	0.00	458,305.60	141,694.40
19-22797	Memorial Lift Station Improvements	404,755.00	20,237.75	249,755.00	0.00	249,755.00	155,000.00
35665	1st & Mae Street	796,373.28	-1,744.13	761,987.66	0.00	761,987.66	34,385.62
8406	7th & Geneseo St Sanitary Sewer Impro...	410,306.35	0.00	408,234.48	0.00	408,234.48	2,071.87
A21.117315	Casino Lift Station Ordor Control Impro...	255,104.58	-122.41	262,403.64	0.00	262,403.64	-7,299.06
P11.106893	Richland Street Rehabilitation	549,149.30	0.00	540,222.55	0.00	540,222.55	8,926.75
P11.112742	North Central SW Phase II	1,875,592.00	0.00	1,852,522.38	0.00	1,852,522.38	23,069.62
P11.115917	Memorial Park Water Quality	48,076.03	1,657.80	48,388.53	0.00	48,388.53	-312.50
P11.117908	Michigan Street Parking Lot Reconstruct...	409,297.00	25,580.95	439,080.90	0.00	439,080.90	-29,783.90
P11.118940	Oneida Street Reconstruction from RR t...	388,300.00	13,867.86	193,858.59	0.00	193,858.59	194,441.41
P11.119679	FEMA Lake Bank Restoration	124,296.50	8,286.43	51,659.00	1,622.00	53,281.00	71,015.50
P11.120411	Highway 7/110 Traffic Lane/Signalization	1,423,630.00	48,362.18	122,921.01	30,241.00	153,162.01	1,270,467.99
P11.120478	Tulip Lane SW Improvements	345,398.00	6,516.95	28,767.82	15,625.00	44,392.82	301,005.18
P11.120650	2020 Expansion Blvd Improvements	861,088.10	34,443.52	37,869.00	23,825.50	61,694.50	799,393.60
P11.122266	2021 CIPP Sanitary Sewer Improvements	57,200.00	57,200.00	4,014.00	14,775.00	18,789.00	38,411.00
T51.119823	Runway 13/31 & Taxiway Lighting	453,189.00	32,370.65	62,987.00	590.00	63,577.00	389,612.00
Urban20WQI-004	SLHS Courtyard Conservation	100,000.00	100,000.00	13,688.96	0.00	13,688.96	86,311.04
Report Total:		13,639,680.60	426,041.29	9,458,913.07	300,649.81	9,759,562.88	3,880,117.72

Group Summary

Group	Total Budget	Date Range Budget	Beginning Balance	Total Activity	Ending Balance	Budget Remaining
Airport Projects	453,189.00	32,370.65	62,987.00	590.00	63,577.00	389,612.00
Economic Development	824,296.50	138,286.43	523,653.56	1,622.00	525,275.56	299,020.94
National Resiliency Disaster Grant Proje...	8,070,871.12	113,014.36	7,026,161.82	244,371.31	7,270,533.13	800,337.99
Sanitary Sewer Projects	659,859.58	20,115.34	512,158.64	0.00	512,158.64	147,700.94
Street Construction	3,631,464.40	122,254.51	1,333,952.05	54,066.50	1,388,018.55	2,243,445.85
Report Total:	13,639,680.60	426,041.29	9,458,913.07	300,649.81	9,759,562.88	3,880,117.72

Type Summary

Group	Total Budget	Date Range Budget	Beginning Balance	Total Activity	Ending Balance	Budget Remaining
Construction	4,801,712.98	231,940.50	1,913,111.69	69,431.50	1,982,543.19	2,819,169.79
Federal/State Grant	8,137,967.62	64,100.79	7,073,806.82	231,218.31	7,305,025.13	832,942.49
Grant	700,000.00	130,000.00	471,994.56	0.00	471,994.56	228,005.44
Report Total:	13,639,680.60	426,041.29	9,458,913.07	300,649.81	9,759,562.88	3,880,117.72

Staff Summary

10/19/2020

Agenda Item # C.



City of Storm Lake
PO Box 1086
Storm Lake, IA 50588
p (712) 732-8000
f (712) 732-4114

REPORT TO: Honorable Mayor and City Council

FROM: Chris Cole, Police Chief

SUBJECT: **SLPD City Code Enforcement Summary**

BACKGROUND: 9/30/2020 TO 10/13/2020

Total: 38

Accumulate Trash – 2
Junk Vehicle – 4
Tall Grass and Weeds – 11
Accumulate Junk – 17
Parking Restricted to hard surfaces – 1
Accumulate used tires – 3

0 citations

FISCAL IMPACT: None

RECOMMENDATION: None

Staff Summary

10/19/2020

Agenda Item # D.



City of Storm Lake
PO Box 1086
Storm Lake, IA 50588
p (712) 732-8000
f (712) 732-4114

REPORT TO: Honorable Mayor and City Council

FROM: Scott Olesen, Building Official

SUBJECT: **Resolution No. 17-R-2020-2021 Amending Fee Resolution For Building Official and Roadway Maintenance**

BACKGROUND: This item will set the fees for the sawing and breaking of the City curb and gutter prior to pouring new driveway approach under the Building Official fees. The fee for a residential driveway would be \$150 and a commercial driveway would be \$200.

This agenda item will add the fee for Roadway Maintenance fees. The City of Storm Lake Street Crews are required at times to cut the street for the purpose of repair or installation of utilities such as gas, electric, or water or sewer connections. This agenda item will set the fee for cutting of City streets at \$800 for half of the street and \$1600 for the full street.

FISCAL IMPACT: Will reimburse the City for the costs associated to the project.

RECOMMENDATION: Approve Resolution No. 17-R-2020-2021

ATTACHMENTS:

Description	Type
□ Resolution No. 17-R-2020-2021	Resolution

RESOLUTION NO. 53-R-2019-2020

RESOLUTION SETTING FINES AND FEES

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF STORM LAKE, IOWA that the following schedule of fees are approved and effective as of the date of this resolution.

<u>Administration</u>	<u>Fee</u>	<u>Code Section</u>
Administrative Fee	\$30.00	
City Code Subscription (yearly)	\$50.00	
Garbage Truck Permits (per business)	\$100.00	3-1-5
Insufficient Check Fee	\$30.00	
New Friends List	\$10.00	
Peddlers Transient Merchant Permit (1 Day)	\$25.00	4-3-6
Investigation Fee	\$25.00	4-3-4
Peddlers Transient Merchant Permit (1 Week)	\$75.00	4-3-6
Investigation Fee	\$25.00	4-3-4
Transient Merchant Permit (28 days)	\$150.00	
Investigation Fee	\$25.00	
Solicitors Permit (per person)	\$2.00	4-3-6
Solicitors Permit (principal) (1 day)	\$25.00	4-3-6
Investigation Fee (per organization)	\$25.00	4-3-4
Investigation Fee (per Individual soliciting)	\$5.00	
Solicitors Permit (principal) (1 week)	\$75.00	4-3-6
Investigation Fee	\$25.00	4-3-4
Investigation Fee (per Individual soliciting)	\$5.00	
Solicitors Permit (principal) (28 days)	\$150.00	
Investigation fee (per organization)	\$25.00	
Investigation Fee (per Individual soliciting)	\$5.00	
Taxi Permit (Business)	\$100.00	4-5-3
Taxi Permit (per vehicle)	\$10.00	4-5-3
Cancel Permit Fee	\$25.00	
Freedom of Information Requests (FOIA Request)		
Single Sided Copy 8.5x11	\$.30/page	
Duplex copy 8.5x11	\$.40/page	
Single Sided Legal	\$.35/page	
Duplex Legal copy	\$.45/page	
Single Sided Ledger (11x17)	\$.70/page	
Single Sided Ledger with Color Print	\$.90/page	
Duplex Ledger (11x17)	\$.80/page	
Duplex Ledger with Color Print	\$1.00/page	
Large Format Prints (one side only and in color)	\$8.00/page	
CD Cost (for requests that ask for the files digitally on a CD)	\$10.00	
Research Hourly Rate – per hour/per person	\$25.00	
Mailing Costs – 3 pages	\$1.00	
Mailing Costs – 50 pages	\$5.00	
Mailing Costs – 100 pages	\$10.00	
Special City Council Meeting	\$250.00	
Downtown Parking Space Rental Fees (specific lots)		
Per quarter (paid quarterly)	\$75.00	
Per six months (paid bi-annually)	\$112.50	
Annually (paid annually)	\$150.00	

Airport Hangar Rent (monthly fees)

Hangar A	\$75.00
12 Month Lease Discount Rate	\$65.00
Hangar B	\$75.00
12 Month Lease Discount Rate	\$65.00
Hangar C (VT)	\$400.00
Hangar D	\$92.00
12 Month Lease Discount Rate	\$80.00
Hangar E	\$110.00
12 Month Lease Discount Rate	\$95.00
Hangar F	\$156.00
12 Month Lease Discount Rate	\$135.00
FBO Stall	\$173.00
12 Month Lease Discount Rate	\$150.00
Daily Inside Storage/per night	\$30.00

Building Official

Central Business District Bench & Flower Pot Permit	\$25.00	
Driveway (Curb) Cut, Inspection & Marking Residential	\$150.00	
Driveway (Curb) Cut, Inspection & Marking Commercial	\$200.00	
Driveway Cut Inspection & Marking Only	\$30.00	
Driveway Cut < 18'	\$80.00	
Driveway Cut 24'	\$95.00	
Driveway Cut 34'	\$120.00	
ROW Temp Closure Permit	\$25.00	
Building Moving Permit (Per Bldg)	\$100.00	5-1-1
Demolition Permit	\$50.00	
Pool Inspection	\$20.00	8-8-11
Re-inspection Fee (after 1 per inspection)	\$35.00	
No Show Fee (per event)	\$50.00	
Rental Registration Fee – Yearly (July 1st – June 30th)		
Base Registration Fee (Structure and 1 unit)	\$15.00	5-8-9
Additional unit in excess of 1 (per unit)	\$7.00	5-8-9
Late Registration Fee	\$50.00	5-8-9
Property Maintenance Ordinance Appeal	\$150.00	Zoning Ord.
Variance Request	\$150.00	Zoning Ord.
Zoning Request	\$200.00	Zoning Ord.
Conditional Use	\$300.00	Zoning Ord.
Sub-Division Application Fee	\$300.00	
Sidewalk Repair Permit Fee	\$0	
New Construction Incentive		
Single Family Attached and Single Family Detached Dwelling	\$1.00	
(only valid from March 2, 2020 to Decemeber 31, 2020 with Council approval)		

Building & Sign Permit Fees

Building & Sign Permit <\$1,200	\$22.02	5-2-2
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Building & Sign Permit \$1,200-2,000		5-2-2
\$22.02 + \$2.88 for each additional \$100.00 over \$1,200		
Building & Sign Permit \$2,001-25,000		5-2-2
\$45.06+ \$9.16 for each additional \$1,000.00 over \$2,000		
Building & Sign Permit \$25,001-50,000		5-2-2
\$255.74 + \$6.22 for each additional \$1,000.00 over \$25,000		
Building & Sign Permit \$50,001-100,000		5-2-2
\$411.24+ \$4.15 for each additional \$1,000.00 over \$50,000		
Building & Sign Permit \$100,001 or more		5-2-2
\$618.74+ \$3.61 for each additional \$1,000.00 over \$100,000		
Portable Sign Permit (14 days)	\$30.00	Zoning Ord.

Electrical Fees

For New Residences		5-4-9
Single Dwelling	\$38.00	
Duplex Dwelling	\$56.75	
Triplex Dwelling	\$75.50	
4-Plex Dwelling	\$113.00	
Multi Units Between 5 and 12	\$156.75	
Over 12 Units	\$156.75 plus \$38.00each over 12	
For New Commercial or Industrial Buildings		
First \$5,000.00 at \$8.00 per/\$1,000.00 of cost		
Second \$5,000.00 at \$6.75 per /\$1,000.00 of cost		
Third \$5,000.00 at \$5.50 per/\$1,000.00 of cost		
Fourth \$5,000.00 at \$4.25 per/\$1,000.00 of cost		
Fifth \$5,000.00 at \$3.00 per/\$1,000.00 of cost		
All over \$25,000.00 at \$1.50 per/\$1,000.00 of cost		

For Rewiring, Repairs or Alterations on Residence, Commercial and Industrial Buildings

\$100.00 to \$150.00 electric contract	\$6.75
\$151.00 to \$200.00 electric contract	\$8.00
\$201.00 to \$250.00 electric contract	\$9.25
\$251.00 to \$300.00 electric contract	\$10.50
\$301.00 to \$350.00 electric contract	\$11.75
\$351.00 to \$400.00 electric contract	\$13.00
\$401.00 to \$450.00 electric contract	\$14.25
\$451.00 to \$500.00 electric contract	\$15.50
\$501.00 to \$1,000.00 electric contract	\$23.00
\$1,001.00 to \$2,000.00 electric contract	\$28.00
All over \$2,001.00	\$28.00 plus \$1.50per \$100.00

Plumbing Fees

For New Residences		5-3-10
Single Dwelling	\$38.00	
Duplex Dwelling	\$56.75	
Triplex Dwelling	\$75.50	
4-Plex Dwelling	\$113.00	
Multi Units Between 5 and 12	\$156.75	
Over 12 Units	\$156.75 plus \$38.00 each over 12	

For New Commercial or Industrial Buildings

First \$5,000.00 at \$8.00 per/\$1,000.00 of cost
Second \$5,000.00 at \$6.75 per /\$1,000.00 of cost
Third \$5,000.00 at \$5.50 per/\$1,000.00 of cost
Fourth \$5,000.00 at \$4.25 per/\$1,000.00 of cost
Fifth \$5,000.00 at \$3.00 per/\$1,000.00 of cost
All over \$25,000.00 at \$1.75 per/\$1,000.00 of cost

For Repairs or Alterations on Residence, Commercial and Industrial Buildings

\$100.00 to \$150.00 plumbing contract \$6.75
\$151.00 to \$200.00 plumbing contract \$8.00
\$201.00 to \$250.00 plumbing contract \$9.25
\$251.00 to \$300.00 plumbing contract \$10.50
\$301.00 to \$350.00 plumbing contract \$11.75
\$351.00 to \$400.00 plumbing contract \$13.00
\$401.00 to \$450.00 plumbing contract \$14.25
\$451.00 to \$500.00 plumbing contract \$15.50
\$501.00 to \$1,000.00 plumbing contract \$23.00
\$1,001.00 to \$2,000.00 plumbing contract \$28.00
All over \$2,001.00 \$28.00 plus \$1.50 per \$100.00

Campground

Class A Site \$27.00
(Lake View, Patio, Water, Sewer, Electric, Cable TV, Fire Pit)

Class B Site \$26.00
(Patio, Water, Sewer, Electric, Cable TV, Fire Pit)

Class C Site \$26.00
(Lake View, Patio, Water, Sewer, Electric, Fire Pit)

Class D Site \$23.00
(Patio, Water, Sewer, Electric, Fire Pit)

Class E Site \$22.00
(Water, Sewer, Electric)

Class F Site \$18.00
(Electric)

Glass G Site \$12.00
(Tent)

Long Term Stay Rate

Limited to Long Term Stay slots which include Water, Sewer, Electric
Minimum 30 day stay paid in advance – 10% off

Extra Vehicle Parking (if space available) \$5.00

Non-Campers Dump Station (per event) \$5.00

Non-Camper Shower (per shower) \$5.00

Fire Department

False Alarm Fee (after 1)	\$150.00	4-7-16
Liquor License Inspection Fee	\$50.00	
Fireworks Display (Mortar sizes from 1-3 inches)	\$150.00	
Fireworks Display (Mortar size larger than 3 inches)	\$250.00	
Emergency Response and/or Cleanup of Material (per hour)		
Large Fire Apparatus	\$150.00	
Fire Commander Vehicle	\$75.00	

Golf Course

Single Season Pass	\$275.00	
Family Season Pass - Family: Two or more persons (one of whom is the householder) related by birth, marriage, or adoption, living together and sharing common living, sleeping, cooking, and eating facilities within and individual housing unit as defined by the Storm Lake Zoning Code.)	\$550.00	
College Season Pass	\$149.00	
Junior Season Pass (12 and Under)	\$50.00	
Electric Cart Storage	\$275.00	
Gas Cart Storage	\$225.00	
Locker Rent/yr	\$20.00	
Golf Club Rental	\$10.00	
Trail Fee (per day)	\$10.00	
Pull Cart Rental	\$3.00	
Trail Fee (year)	\$150.00	
Discount Tickets – per 9 holes (sold in advance with minimum quantity of 50)	\$10.00	
Weekday 9 Holes	\$15.00	
Weekday 18 Holes	\$20.00	
Weekend 9 Holes	\$20.00	
Weekend 18 Holes	\$25.00	
Cart Rental 9 Holes	\$10.00	
Cart Rental 18 Holes	\$20.00	
Yearly Cart Rental	\$325.00	
Hall Rental – Off Season Rate	\$300.00	
Hall Rental – Peak Season Rate (Memorial Day to Labor Day)	\$400.00	
Bar Set-Up Fee	\$100.00	
Hall Rental - Friday Setup Fee	\$100.00	
(Valid only after 5:00pm Friday with following Sat. rental)		
Hall Rental (weekday 4hrs or less)	\$100.00	
Group Golf Rates	As Set by the Following Table	

# Rounds Per Event	9 Holes	18 Holes
0-25	Regular Rates	Regular Rates
26-50	\$12.00 / Round	\$15.00 / Round
51-99	\$9.00 / Round	\$10.00 / Round
100+	\$8.00 / Round	\$9.00 / Round

Police

Administrative Fee	\$30.00
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Alarm Business Permit Application	\$75.00	4-7-6
Alarm Business Permit Renewal	\$75.00	4-7-9
False Alarm Equip Malfunction (after 3)	\$75.00	4-7-16
False Alarm	\$75.00	4-7-16
Building Escorts (per car)	\$75.00	5-1-3
Cat License – Not Neutered/Spayed (per year)	\$20.00	8-4-2
Neutered/Spayed (per year)	\$10.00	
Dog License – Not Neutered/Spayed (per year)	\$20.00	8-3-2
Neutered/Spayed (per year)	\$10.00	
Fingerprinting	\$10.00	
Impound/Storage Fee (per day)	\$30.00	8-6-5
Impound Storage Fee – felony related (per day)	\$50.00	
Parking Fine	\$15.00	9-11-4
Police Escort Fee – per hour, per unit	\$75.00	5-1-3
Emergency Response and/or Cleanup of Material (per hour)		
Police Vehicle (per vehicle)	\$75.00	

King's Pointe Outdoor Aquatic Center

Family Season Pass	\$275.00	
(up to 5 family members can be included on Pass, Children 4 and under need not be on pass, as they are free.)		
Up to 4 additions of children 5-12 years old @\$55 each		
Single Season Pass (children and adults)	\$150.00	
Adult BV Resident Daily Pass (Age 12+)	\$8.00	
Child BV Resident Daily Pass (Age 5-11)	\$5.00	
Children (Age 5-11) Standard Pricing	\$12.00	
Adults (Age 12+) Standard Pricing	\$15.00	
4 and under	free	
Twilight Pricing (after 3:00)		
Age 12+	\$7.50	
Age 5-11	\$6.00	
Age 0-4	free	
Land Lovers	\$5.00	
Swim Lessons	\$40.00	

Roadway Maintenance

Concrete Breaking (per sq ft)	\$2.50
Concrete Sawing (per ft)	\$3.75
Street Cuts (per sq yard of concrete)	\$37.00
Street Cuts & Replacement - Half Street	\$800.00
Street Cuts & Replacement Full Street	\$1600.00

Sewer

Sewer Svc Permit & Connection Fee	\$150.00	3-2-4
Private Wastewater System Permit	\$50.00	3-2-3

Shelter House

Rental Fee - Mon. – Thurs., per side	\$55.00
Rental Fee - Fri., Sat., & Sun., per side	\$80.00
Damage Deposit – per side	\$100.00
AWAYSIS Pavilions – per time slot (3 times available)	\$25.00
Frank Starr Park Open Shelter – per time slot (2 times available)	\$50.00
Campground Open Shelter – per time slot (2 time slots available)	\$50.00
AWAYSIS Great Lawn – per day	\$200.00
Band Shell – per day	\$25.00

Water

Door Tag Fee	\$20.00	3-5-3
Meter Testing Fee (within 2%)	\$50.00	3-4-20
Shut Off – 8 AM to 3 PM	\$50.00	3-4-19 & 3-5-3
Shut Off – After 3 PM	\$75.00	3-4-19 & 3-5-3
Water Svc Permit & Connect Fee	\$150.00	3-4-5
Water Tapping Fee (per inch)	\$65.00	3-4-5
Outside City Limits Hook-up Fee	\$1,500.00	3-4-6
Combined Utility Deposit	\$160.00	
Bulk Water Sales Access Card	\$10.00	

PASSED AND APPROVED this 2th day of March, 2020.

Michael Porsch, Mayor

ATTEST:

Mayra A. Martinez, City Clerk

Staff Summary

10/19/2020

Agenda Item # E.



City of Storm Lake
PO Box 1086
Storm Lake, IA 50588
p (712) 732-8000
f (712) 732-4114

REPORT TO: Honorable Mayor and City Council

FROM: Chris Cole, Police Chief

SUBJECT: **Motion To Approve Farmer's Market Permit Amendment Request.**

BACKGROUND: Storm Lake United (SLU) is requesting an amendment to our previously approved permit for the 2020 Farmers Market. Specifically, they are asking that the permit is extended until midnight October 31st, 2020.

All requests are the same except the final date of the Farmer's Market (see below).

Authorized to have sales of farmer raised goods in Public Parking Lot C located at Erie Street and 6th Street.

Permission for set up of Farmers Market stands on Thursday nights from 3PM to 6:30 PM and on Saturday mornings from 7AM to 1PM.

A noise variance on Thursday events and Saturday Events for the duration.

See attached request from Lee Dutfield.

FISCAL IMPACT: None

RECOMMENDATION: Approve request

ATTACHMENTS:

Description	Type
Request letter from SLU	Contract



October 15, 2020

Storm Lake Public Safety Department
Attn: Chief Chris Cole
401 East Milwaukee Ave
Storm Lake, IA 50588

Dear Chief Cole,

Storm Lake United respectfully requests an amendment to the existing Farmers' Market permit as it pertains to the expiration date of said permit. The expiration date of the permit is October 11, 2020. We hereby request the permit be amended and extended until midnight on October 31, 2020.

All requests below remain the same except the final date of the Farmers' Market.

- Authorization to have sales of farmer raised goods in Public Parking Lot C located at Erie Street and 6th Street.
- Permission for set up of Farmers Market stands starting on Saturday June 2nd *and running through Saturday October 31st* on both Thursday Nights from 3:00pm to 6:30pm and on Saturday Mornings from 7:00am to 1:00pm.
- A Noise Variance on Thursday events and Saturday events for the duration.

The reason for this amendment request is because the Famers Market vendors wish to continue to sell goods and inventory while favorable weather permits.

If you would have any questions or concerns regarding our amendment request, please feel free to contact me directly.

Thank you for your time and consideration

Sincerely,

Lee Dutfield
Acting CEO/ Marketing & Activities Director
Storm Lake United
(712) 732.3780

Staff Summary

10/19/2020

Agenda Item # 3.



City of Storm Lake
PO Box 1086
Storm Lake, IA 50588
p (712) 732-8000
f (712) 732-4114

REPORT TO: Honorable Mayor and City Council

FROM: Scott Olesen, Building Official

SUBJECT: **Public Hearing for the 2020 Sanitary Sewer Cleaning & Televising Plans, Specifications, and Form of Contract**

BACKGROUND: Eight NRDC-HUD funded projects were originally approved. With remaining funds, this is the ninth project and will allow for additional improvements of sanitary sewer mains in the vicinity of the previous 7th and Geneseo project as well as the Violet/Tulip/Rose Lane neighborhood. The public infrastructure improvements entail CIPP lining of existing 8" mains and associated manhole rehabilitation within the improvement areas.

This portion of the effort will entail cleaning and televising of the sewer mains. The collected televising data will reveal the condition of the pipes and allow the design engineers to identify the appropriate means of rehabilitation for the system.

The Engineer's Opinion of Probable Cost is \$24,770.00. The project is one of nine NRDC-HUD funded projects with federal funding entailing 75% and local match 25%.

FISCAL IMPACT: To move forward with the bidding process, a public hearing is set for October 19, 2020 at 5:00 p.m. in City Council Chambers.

The Engineer's Opinion of Probable Construction Cost is \$24,770.00 (75% federal funding/25% local match)

RECOMMENDATION: Hold the Public Hearing for 5:00 p.m. on October 19, 2020 in City Council Chambers. Open hearing, take public comments, close hearing.

ATTACHMENTS:

Description

Type

- 📁 Notice of Public Hearing
- 📁 Project Manual
- 📁 Sanitary Sewer Cleaning

- Backup Material
- Backup Material
- Backup Material

NOTICE OF PUBLIC HEARING

2020 Sanitary Sewer Cleaning & Televising City of Storm Lake

Public Hearing on Proposed Contract Documents and Estimated Costs for Repair or Improvement.

A public hearing will be held by the City of Storm Lake on the proposed contract documents (plans, specifications and form of contract) and estimated cost for the improvement at its meeting at 5:00 P.M. on October 19, 2020, at 620 Erie Street, in Storm Lake, Iowa.

Project Description: The work includes cleaning and televising approximately 12,310 LF of sanitary sewer mains.

This Notice is given by authority of the
City of Storm Lake

Mayra Martinez
City Clerk



PROJECT MANUAL

2020 Sanitary Sewer Cleaning & Televising
City of Storm Lake

218 11th Street SW Plaza • Spencer, IA 51301
Ph: (712) 580-5075



Bolton-Menk.com

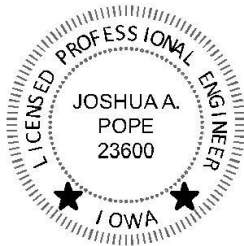
SECTION 00005 – CERTIFICATION

PROJECT MANUAL

for

2020 Sanitary Sewer Cleaning & Televising

City of Storm Lake



I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

Date: September 8, 2020

Joshua A. Pope

License No. 23600

My renewal date is 12/31/2021

Pages or sheets covered by this seal:

All Sheets

SECTION 00010 - TABLE OF CONTENTS

2020 Sanitary Sewer Cleaning & Televising City of Storm Lake

CONTRACT DOCUMENTS:

PROJECT MANUAL:

Introductory Information, Bidding Requirements, Contract Forms and Conditions of Contract

- 00005 - CERTIFICATION PAGE
- 00010 - TABLE OF CONTENTS
- 00100 - NOTICE TO BIDDERS
- 00200 - INSTRUCTIONS TO BIDDERS
- 00410 - PROPOSAL
- 00420 - BID BOND
- 00500 - CONTRACT
- 00501 - FEDERAL LABOR STANDARDS PROVISIONS
- 00502 - WAGE DECISION
- 00610 - PERFORMANCE & PAYMENT BOND
- 00800 - SPECIAL PROVISIONS
- 00900 - NOTICE OF AWARD
- 00910 - NOTICE TO PROCEED
- 00920 - LETTER OF TRANSMITTAL

TECHNICAL SPECIFICATIONS:

- 01000 - SANITARY SEWER TELEVISION, CLEANING AND INSPECTION

DRAWINGS:

2 sheets bearing the following general title:

2020 Sanitary Sewer Cleaning & Televising
City of Storm Lake

**This project is based on
SUDAS STANDARD SPECIFICATIONS, 2020 EDITION
unless modified herein.**

*******END OF SECTION*******

SECTION 00100 - NOTICE TO BIDDERS

2020 Sanitary Sewer Cleaning & Televising
City of Storm Lake

Time and Place for Filing Sealed Proposals. Sealed bids for the work described below must be filed before 3:00 P.M. on September 24, 2020, in the office of the City Clerk, 620 Erie Street, Storm Lake, IA 50588, **OR** filed online via Quest CDN.

Time and Place Sealed Proposals Will be Opened and Considered. Proposals for the work described below will be received online through QuestCDN.com **OR** in the office of the City Clerk, until 3:00 PM on September 24, 2020 at which time the bids will be opened and publicly read online through Microsoft Teams. Please use the link or call-in number/Conference ID below to see and/or hear the bid opening results:

Microsoft Teams Meeting Link: <https://bit.ly/3hyE5MZ> Call: 612-428-8778, Conference ID: 505 422 970

The results will be reported to the City of Storm Lake at its meeting at 5:00 P.M. on October 5, 2020 at which time the City Council may take action on the proposals submitted or at such time as may then be fixed. The City of Storm Lake City Council reserves the right to reject any or all bids, to waive informalities or technicalities in any bid, and to enter into such contract, or contracts, as it shall deem to be to the best interest of the City of Storm Lake.

Time for Commencement and Completion of Work. Work shall commence upon approval of the contract by the City Council and as stated in the Notice to Proceed. All work under the Contract must be substantially complete on or before November 30, 2020.

Bid Security. Each bidder shall accompany its bid with bid security, as defined in Iowa Code Section 26.8, as security that the successful bidder will enter into a contract for the work bid upon. The bidder's security shall be in an amount equal to 5 percent of the total amount of the bid. The bid shall contain no condition except as provided in the specifications.

If the bidder fails to execute the contract and to furnish an acceptable performance and payment bond or provide a Certificate of Insurance within ten (10) days after acceptance of the bid by the City, the bid security may be forfeited or cashed by the City as liquidated damages.

Contract Documents. Copies of the project documents are available for a price of \$25 per set. This fee is refundable, provided the plans and specifications are returned complete and in reusable condition, and they are returned within fourteen (14) calendar days after the award of the project. Please make your check payable to Bolton & Menk, Inc. and send it to 218 11th Street SW, Spencer, IA 51301, (712) 580-5075, fax (515) 233-4430. Complete digital project bidding documents are available at www.bolton-menk.com or www.questcdn.com. You may view the digital plan documents for free by entering Quest project #7283452 on the website's Project Search page. Documents may be downloaded for \$0.00. Please contact QuestCDN.com at 952-233-1632 or info@questcdn.com for assistance in free membership registration, viewing, downloading, and working with this digital project information.

Preference of Products and Labor. Preference shall be given to domestic construction materials by the contractor, subcontractors, material, men, and suppliers in performance of the contract and further, by virtue of statutory authority, preference will be given to products and provisions grown and coal produced within the State of Iowa, and to Iowa domestic labor, to the extent lawfully required under Iowa statutes. Failure to submit a fully completed Bidder Status Form with the bid may result in the bid being deemed nonresponsive and rejected.

Sales Tax Exemption Certificates. The bidder shall not include sales tax in the bid. The City of Storm Lake will distribute tax exemption certificates and authorization letters to the Contractor and all subcontractors who are identified. The Contractor and subcontractor may make copies of the tax exemption certificates and provide a copy to each supplier providing construction materials. These tax exemption certificates and authorization letters are applicable only for this specific project under the Contract.

PROJECT DESCRIPTION: The work includes cleaning and televising approximately 12,310 LF of sanitary sewer main in Storm Lake, IA.

Section 3 clause

All section 3 covered contracts shall include the following clause (referred to as the section 3 clause):

A. The work to be performed under this contract is subject to the requirements of section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (section 3). The purpose of section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

B. The parties to this contract agree to comply with HUD's regulations in 24 CFR part 135, which implement section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 135 regulations.

C. The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.

D. The contractor agrees to include this section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 135. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 135.

E. The contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR part 135.

F. Noncompliance with HUD's regulations in 24 CFR part 135 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD assisted contracts.

G. With respect to work performed in connection with section 3 covered Indian housing assistance, section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450e) also applies to the work to be performed under this contract. Section 7(b) requires that to the greatest extent feasible (i) preference and opportunities for training and employment shall be given to Indians, and (ii) preference in the award of contracts and subcontracts shall be given to Indian organizations and Indian-owned Economic Enterprises. Parties to this contract that are subject to the provisions of section 3 and section 7(b) agree to comply with section 3 to the maximum extent feasible, but not in derogation of compliance with section 7(b).

The Notice is given by order of the City Council of the City of Storm Lake

Mayra Martinez, City Clerk

SECTION 00200 - INSTRUCTIONS TO BIDDERS

2020 Sanitary Sewer Cleaning & Televising City of Storm Lake

The work comprising the above referenced project shall be completed in accordance with the SUDAS Standard Specifications, 2020 Edition, and Special Provisions and Technical Specifications included in the contract documents. The terms used in the contract version of the documents are defined in said Standard Specifications. Before submitting a bid, please review the requirements of Division One, General Provisions and Covenants. Please be certain that all documents have been completed properly as failure to complete and sign all documents and to comply with the requirements listed below can cause a submitted bid not to be read.

ARTICLE 1 - BID SECURITY

- 1.01 The bid security may be in the minimum amount of 5% of the total bid amount including all add alternates (do not deduct the amount of deduct alternates).
- 1.02 Bid security other than said bid bond shall be in accordance with Chapter 26 of the Iowa Code.
- 1.03 Bid security shall be in the form of a cashier's check or certified check drawn on a state chartered or federally chartered bank; or a certified share draft drawn on a state chartered or federally chartered credit union; or a bidder's bond with corporate surety satisfactory to the City of Storm Lake, hereinafter called the "Jurisdiction".
- 1.04 The bid bond may be submitted on the enclosed Bid Bond form (or form that is equivalent in terms, duration, and obligation). All signatures on the bid bond must be original signatures in ink; electronic, copies, or facsimile (fax) of any signature on the bid bond is not acceptable.

ARTICLE 2 - SUBMISSION OF THE PROPOSAL AND IDENTITY OF BIDDER

- 2.01 If a written proposal is delivered to City Hall, the proposal shall be sealed in an envelope, properly identified as the Proposal with the project title and the name and address of the bidder. The Proposal and Bid security shall be deposited with the Jurisdiction at or before the time and at the place provided in the Notice to Bidders. The City will also be accepting online electronic bids through QuestCDN. To access the electronic bid form, download the project documents and click the online bidding button at the top of the advertisement. Prospective bidders must be on the planholders list through QuestCDN for bids to be accepted. It is the sole responsibility of the bidder to see that its proposal is delivered to the Jurisdiction or filed online via Quest CDN prior to the time for opening bids along with the appropriate bid security. Any proposal received after the scheduled time for the receiving of proposals will be returned to the bidder unopened and will not be considered.
- 2.02 If a written proposal is delivered to City Hall, the following documents shall be completed, signed and returned in the Proposal envelope. The bid cannot be read if any of these documents are omitted from the Proposal.
 - A. PROPOSAL – Complete each of the following parts:
 - Part B – Acknowledgment of Addenda, if any have been issued;
 - Part C – Bid Items, Quantities and Prices
 - Part G – Identity of Bidder;
- 2.03 If a written proposal is delivered to City Hall, the signature on the proposal and all proposal attachments must be an original signature in ink signed by the same individual who is the Company owner or an authorized Officer of the Company; copies or facsimile of any signature will not be accepted.

- 2.04 If a written proposal is delivered to City Hall, documents must be submitted as printed where no alterations, additions, or deletions are permitted. If the Bidder notes a requirement in the contract documents which the Bidder believes will require a conditioned or unsolicited alternate bid, the Bidder must immediately notify the Engineer in writing. The Engineer will issue any necessary interpretation by an addendum.
- 2.04 Division 1 - General Provisions and Covenants of the 2020 SUDAS Standard Specifications is modified as follows:
- A. Section 1020.1.09B, Unit Price Attachment.
- A computer-generated unit price attachment may be submitted by the Bidder as specified by this Section.

ARTICLE 3 - PROSECUTION AND PROGRESS OF THE WORK

- 3.01 The work is located in the City of Storm Lake.
- Work shall commence upon approval of the contract by the City Council and as stated in the Notice to Proceed. All work under the Contract must be substantially complete as stated in Section 00500 Contract.
- 3.02 Community Events.
- Successful bidder will be required to coordinate with the owner and accommodate the owner's requirements for the following list of events:
- A. None.
- 3.03 Each successful bidder will be required to furnish a corporate surety bond in an amount equal to 100% of its contract price. Said bond shall be issued by a responsible surety approved by City of Storm Lake and shall guarantee the faithful performance of the contract, the terms and conditions therein contained, the prompt payment of all material and labor and protect and save harmless City of Storm Lake from claims and damages of any kind caused by the operations of the contract.
- 3.04 The City of Storm Lake, in accordance with Title VI of the Civil Rights Act of 1964, 78 Stat. 252, 42U.S.C. 2000d to 2000d-4 and title 49 Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Nondiscrimination in Federally-assisted programs of the Department of Transportation issued pursuant to such Act, hereby notifies all bidders that it will affirmatively ensure that with any contract entered into pursuant to this advertisement, minority business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

ARTICLE 4 - PREFERENCE OF PRODUCTS AND LABOR

- 4.01 In accordance with Iowa statutes, a resident bidder shall be allowed preference against a nonresident bidder from a state or foreign country provided that state or foreign country gives or requires any preference to bidders from that state or foreign country. This includes, but is not limited to any preference to bidders, the imposition of any type of labor force preference, or any other form of preferential treatment to bidders or laborers from that state or foreign country. The preference allowed shall be equal to the preference given or required by the state of foreign country in which the nonresident bidder is a resident. In the instance of a resident labor force preference, a nonresident bidder shall apply the same resident labor force preference to a public improvement in this state as would be required in the construction of a public improvement by the state or foreign country in which the nonresident bidder is a resident. If it is determined that this may cause denial of federal funds which would otherwise be available, or would otherwise be inconsistent with requirements of any federal law or regulation, this resident bidder preference shall be suspended, but only to the extent necessary to prevent denial of the funds or to eliminate the inconsistency with federal requirements.

ARTICLE 5 - TAXES

- 5.01 The City will issue a sales tax exemption certificate and authorization letters to the Contractor and all subcontractors for all materials purchased on the project. Tax exemption certificates are applicable only for the specific project for which the tax exemption certificate is issued.
- 5.02 The Contractor shall provide a listing to the City identifying all appropriate subcontractors qualified for use of the tax exemption certificate. The Contractor and subcontractors may make copies of the certificate and provide to each supplier providing construction material.
- 5.03 Income Tax:
 - A. Successful Bidder is subject to payment of Iowa income tax on income from this work in amounts prescribed by law.
 - B. If successful bidder is a non-Iowa partnership, individual or association, Bidder shall furnish evidence prior to execution of contract that bond or securities have been posted with the Iowa Department of Revenue in the amount required by law.

******END OF SECTION******

SECTION 00410 - PROPOSAL

2020 Sanitary Sewer Cleaning & Televising City of Storm Lake

PROPOSAL: PART A – SCOPE

The City of Storm Lake, hereinafter called the "Jurisdiction", has need of a qualified contractor to complete the below referenced work. The undersigned Bidder hereby proposes to complete the work as specified in the contract documents, which are officially on file with the Jurisdiction, in the office of the City Clerk, at the prices hereinafter provided in Part C of the Proposal, for the work on 2020 Sanitary Sewer Cleaning & Televising.

PROPOSAL: PART B – ACKNOWLEDGMENT OF ADDENDA

The Bidder hereby acknowledges that all addenda become a part of the contract documents when issued and that each such addendum has been received and utilized in the preparation of this bid. The Bidder hereby acknowledges receipt of the following addenda by inserting the number of each addendum in the blanks below:

ADDENDUM NUMBER _____	ADDENDUM NUMBER _____
ADDENDUM NUMBER _____	ADDENDUM NUMBER _____

and certifies that said addenda were utilized in the preparation of this bid.

PROPOSAL: PART C – BID ITEMS AND QUANTITIES

UNIT BID PRICE CONTRACTS: The Bidder must provide the Unit Bid Price, the Total Bid Price, any Alternate Prices, and the Total Project Costs on the Proposal Attachment: Part C – Bid Items and Quantities. In case of discrepancy, the Unit Bid Price governs. The quantities shown on the Proposal Attachment: Part C – Bid Items and Quantities are approximate only, but are considered sufficiently adequate for the purpose of comparing bids. The Total Project Cost shall be used only for the comparison of bids. The jurisdiction shall only use the Total Project Cost for determining the sufficiency of the bid security.

PROPOSAL: PART D – GENERAL

The Bidder hereby acknowledges that the Jurisdiction, in advertising for public bids for this project reserves the right to:

1. Reject any or all bids. Award of the contract, if any, to be to the lowest responsible, responsive bidder; and
2. Reject any or all alternates in determining the items to be included in the contract. Designation of the lowest responsible, responsive bidder to be based on comparison of the total bid only, not including any alternates; and
3. Make such alterations in the contract documents or in the proposal quantities as it determines necessary in accordance with the contract documents after execution of the contract. Such alterations shall not be considered a waiver of any conditions of the contract documents, and shall not invalidate any of the provisions thereof; and

The Bidder hereby agrees to:

1. Enter into a contract, if this proposal is selected, in the form approved by the Jurisdiction, provide proof of registration with the Iowa Division of Labor in accordance with Chapter 91C of the Iowa Code, and furnish a performance, maintenance, and payment bond; and
2. Forfeit bid security, not as a penalty but as liquidated damages, upon failure to enter into such contract and/or to furnish said bond; and

3. Commence the work upon written Notice to Proceed; and
4. Substantially complete the work on or before as detailed in Section 00500 – Contract.

PROPOSAL: PART E – NON-COLLUSION AFFIDAVIT

The Bidder hereby certifies:

1. That this proposal is not affected by, contingent on, or dependent on any other proposal submitted for any improvement with the Jurisdiction; and
2. That no individual employed by the Bidder has employed any person to solicit or procure the work on this project, nor will any employee of the Bidder make any payment or agreement for payment of any compensation in connection with the procurement of this project; and
3. That no part of the bid price received by the Bidder was or will be paid to any person, corporation, firm, association, or other organization for soliciting the bid, other than the payment of their normal compensation to persons regularly employed by the Bidder whose services in connection with the construction of the project were in the regular course of their duties for the Bidder; and
4. That this proposal is genuine and not collusive or sham; that the Bidder has not colluded, conspired, connived, or agreed, directly or indirectly, with any bidder or person, to submit a sham bid or to refrain from bidding; and
5. That the bid has not in any manner, directly or indirectly, sought, by agreement or collusion, or communication or conference, with any person, to fix the bid price of the Bidder or of any other bidder; and
6. That all statements in this proposal are true; and
7. That the individual(s) executing this proposal have the authority to execute this proposal on behalf of the Bidder.

PROPOSAL: PART F – ADDITIONAL REQUIREMENTS

The Bidder hereby agrees to comply with the additional requirements listed below which are included in this proposal and identified as proposal attachments:

ITEM NO.	DESCRIPTION OF ATTACHMENT
1.	CDBG REQUIREMENTS
2.	FEDERAL LABOR STANDARDS PROVISIONS

PROPOSAL: PART G - IDENTITY OF BIDDER

The Bidder shall indicate whether the bid is submitted by a/an:

☐ Individual,
Sole Proprietorship

Bidder

☐ Partnership

Signature

☐ Corporation

By

Name (Print/Type)

☐ Limited Liability Company

Title

☐ Joint-venture; all parties must join-in and
execute all documents

Street Address

☐ Other

City, State, Zip Code

The bidder shall enter its Public
Registration Number ____ - ____
issued by the Iowa Commissioner of Labor
Pursuant Section 91C.5 of the Iowa Code.

Telephone Number

**Type or print the name and title of the company's
owner, president, CEO, etc. if a different person
than entered above**

Failure to provide said Registration
Number shall result in the bid being read
under advisement. A contract will not be
executed until the Contractor is registered.

Name

Title

**NOTE: The signature on this proposal must be an original signature in ink; copies, facsimiles, or
electronic signatures will not be accepted.**

All bidders must submit the following completed form to the governmental body requesting bids per
875 Iowa Administrative Code Chapter 156.

Bidder Status Form

To be completed by all bidders

Part A

Please answer "Yes" or "No" for each of the following:

- ☐ Yes ☐ No My company is authorized to transact business in Iowa.
(To help you determine if your company is authorized, please review the worksheet on the next page).
- ☐ Yes ☐ No My company has an office to transact business in Iowa.
- ☐ Yes ☐ No My company's office in Iowa is suitable for more than receiving mail, telephone calls, and e-mail.
- ☐ Yes ☐ No My company has been conducting business in Iowa for at least 3 years prior to the first request for bids on this project.
- ☐ Yes ☐ No My company is not a subsidiary of another business entity or my company is a subsidiary of another business entity that would qualify as a resident bidder in Iowa.
If you answered "Yes" for each question above, your company qualifies as a resident bidder. Please complete Parts B and D of this form.
If you answered "No" to one or more questions above, your company is a non-resident bidder. Please complete Parts C and D of this form.

To be completed by resident bidders

Part B

My company has maintained offices in Iowa during the past 3 years at the following addresses:

Dates: _____ to _____ Address: _____
(mm/dd/yyyy) City, State, Zip: _____

Dates: _____ to _____ Address: _____
(mm/dd/yyyy) City, State, Zip: _____

Dates: _____ to _____ Address: _____
(mm/dd/yyyy) City, State, Zip: _____

You may attach additional sheet(s) if needed.

To be completed by non-resident bidders

Part C

1. Name of home state or foreign country reported to the Iowa Secretary of State: _____
2. Does your company's home state or foreign country offer preferences to bidders who are residents? ☐ Yes ☐ No
3. If you answered "Yes" to question 2, identify each preference offered by your company's home state or foreign country and the appropriate legal citation.

You may attach additional sheet(s) if needed.

To be completed by all bidders

Part D

I certify that the statements made on this document are true and complete to the best of my knowledge and I know that my failure to provide accurate and truthful information may be reason to reject my bid.

Firm Name: _____
Signature: _____ Date: _____

WORKSHEET: AUTHORIZATION TO TRANSACT BUSINESS

This worksheet may be used to help complete Part A of the Resident Bidder Status form. If at least one of the following describes your business, you are authorized to transact business in Iowa.

- ☐ Yes ☐ No My business is currently registered as a contractor with the Iowa Division of Labor.
- ☐ Yes ☐ No My business is a sole proprietorship and I am an Iowa resident for Iowa income tax purposes.
- ☐ Yes ☐ No My business is a general partnership or joint venture. More than 50 percent of the general partners or joint venture parties are residents of Iowa for Iowa income tax purposes
- ☐ Yes ☐ No My business is an active corporation with the Iowa Secretary of State and has paid all fees required by the Secretary of State, has filed its most recent biennial report, and has not filed articles of dissolution.
- ☐ Yes ☐ No My business is a corporation whose articles of incorporation are filed in a state other than Iowa, the corporation has received a certificate of authority from the Iowa Secretary of State, has filed its most recent biennial report with the Secretary of State, and has neither received a certificate of withdrawal from the Secretary of state nor had its authority revoked.
- ☐ Yes ☐ No My business is a limited liability partnership which has filed a statement of qualification in this state and the statement has not been canceled.
- ☐ Yes ☐ No My business is a limited liability partnership which has filed a statement of qualification in a state other than Iowa, has filed a statement of foreign qualification in Iowa and a statement of cancellation has not been filed.
- ☐ Yes ☐ No My business is a limited partnership or limited liability limited partnership which has filed a certificate of limited partnership in this state, and has not filed a statement of termination.
- ☐ Yes ☐ No My business is a limited partnership or a limited liability limited partnership whose certificate of limited partnership is filed in a state other than Iowa, the limited partnership or limited liability limited partnership has received notification from the Iowa Secretary of state that the application for certificate of authority has been approved and no notice of cancellation has been filed by the limited partnership or the limited liability limited partnership.
- ☐ Yes ☐ No My business is a limited liability company whose certificate of organization is filed in Iowa and has not filed a statement of termination.
- ☐ Yes ☐ No My business is a limited liability company whose certificate of organization is filed in a state other than Iowa, has received a certificate of authority to transact business in Iowa and the certificate has not been revoked or canceled.

PROPOSAL ATTACHMENT: PART C – BID ITEMS AND QUANTITIES

This is a UNIT BID PRICE CONTRACT. The bidder must provide the Unit Bid Price, the total Bid Price, and the Total Bid Amount; in case of discrepancy, the Unit Bid Price governs. The Quantities shown on the Proposal Attachment: Part C – Bid Items and quantities are approximate only but are considered sufficiently adequate for the purpose of comparing bids. The Jurisdiction shall only use the Total Base Bid Amount for comparison of bids.

ITEM NO.	DESCRIPTION	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT
1	TELEVISIONING, CLEANING, & INSPECTING SANITARY SEWER MAIN, 6"	LF	300	\$	\$
2	TELEVISIONING, CLEANING, & INSPECTING SANITARY SEWER MAIN, 8"	LF	11,710	\$	\$
3	TELEVISIONING, CLEANING, & INSPECTING SANITARY SEWER MAIN, 10"	LF	300	\$	\$
			TOTAL AMOUNT BID:		\$

NOTE: IT IS UNDERSTOOD THAT THE ABOVE QUANTITIES ARE ESTIMATED FOR THE PURPOSE OF THIS BID. ALL QUANTITIES ARE SUBJECT TO REVISION BY THE DISTRICT AS NOTED IN SECTION 00500 – CONTRACT.

Bidder Name

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SECTION 00420 - BID BOND

**2020 Sanitary Sewer Cleaning & Televising
City of Storm Lake**

KNOW ALL BY THESE PRESENTS:

That we, _____, as Principal, and
_____, as Surety, are held and firmly bound unto, City of
Storm Lake as Oblige, (hereinafter referred to as "the Jurisdiction"), in the penal sum of _____
dollars (\$ _____), lawful money of the United States, for which payment said Principal and Surety bind
themselves, their heirs, executors, administrators, successors, and assigns jointly and severally, firmly by these presents.

The condition of the above obligation is such that whereas the Principal has submitted to the Jurisdiction a certain proposal,
in a separate envelope, and hereby made a part hereof, to enter into a contract in writing, for the following project:

2020 Sanitary Sewer Cleaning & Televising

The Surety hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or
affected by any extension of the time within which the Jurisdiction may accept such bid or execute such Contract; and said
Surety does hereby waive notice of any such extension.

In the event that any actions or proceedings are initiated with respect to this Bond, the parties agree that the venue thereof
shall be Buena Vista County, State of Iowa. If legal action is required by the Jurisdiction against the Surety or Principal to
enforce the provisions of the bond or to collect the monetary obligation incurring to the benefit of the Jurisdiction, the
Surety or Principal agrees to pay the Jurisdiction all damages, costs, and attorney fees incurred by enforcing any of the
provisions of this Bond. All rights, powers, and remedies of the Jurisdiction hereunder shall be cumulative and not
alternative and shall be in addition to all rights, powers, and remedies given to the Jurisdiction, by law. The Jurisdiction may
proceed against Surety for any amount guaranteed hereunder whether action is brought against Principal or whether
Principal is joined in any such action or actions or not.

NOW, THEREFORE, if said proposal by the Principal be accepted, and the Principal shall enter into a contract with
Jurisdiction in accordance with the terms of such proposal, including the provision of insurance and of a bond as may be
specified in the contract documents, with good and sufficient surety for the faithful performance of such contract, for the
prompt payment of labor and material furnished in the prosecution thereof, and for the maintenance of said work as may
be required therein, then this obligation shall become null and void; otherwise, the Principal shall pay to the Jurisdiction the
full amount of the bid bond, together with court costs, attorney's fees, and any other expense of recovery.

Signed and sealed this _____ day of _____, 20____.

SURETY:

By

Surety Company

Signature Attorney-in-Fact/Officer

Name of Attorney-in-Fact/Officer

Company Name

Company Address

City, State, Zip Code

Company Telephone Number

PRINCIPAL:

By

Bidder

Signature

Name (Print/Type)

Title

Address

City, State, Zip Code

Telephone Number

NOTE: All signatures on this bid bond must be original signatures in ink; electronic, copies or facsimile of any signature will not be accepted. This bond must be sealed with the Surety's raised, embossing seal or official adhesive seal. The Certificate or Power of Attorney accompanying this bond must be valid on its face and sealed with the Surety's raised, embossing seal or official adhesive seal.

SECTION 00500 - CONTRACT
2020 Sanitary Sewer Cleaning & Televising
City of Storm Lake

THIS CONTRACT, made and entered into at _____
this _____ day of _____, by and between the City of Storm Lake hereinafter
called the "Jurisdiction", and _____, hereinafter called the "Contractor".

WITNESSETH:

The Contractor hereby agrees to complete the work comprising the 2020 Sanitary Sewer Cleaning & Televising as specified in the contract documents, which are officially on file with the Jurisdiction, in the office of the City Clerk, City of Storm Lake, 620 Erie Street, Storm Lake, IA 50588, Iowa. This contract includes all such contract documents. All work under this contract shall be completed in accordance with the SUDAS Standard Specifications, 2020 Edition and as further modified by the Special Provisions and Technical Specifications included in said contract documents and the Contract Attachment which is attached hereto. The Contractor further agrees to complete the work in strict accordance with said contract documents, and to guarantee the work as required by law for the time required in said contract documents after its acceptance by the Jurisdiction.

This contract is awarded and executed for completion of the work specified in the contract documents for the bid prices shown on the Contract Attachment: Bid Items and Quantities which were proposed by the Contractor in its Proposal submitted in accordance with the Notice to Bidders and Notice of Public Hearing for the following project:

2020 Sanitary Sewer Cleaing & Televising

The Contractor agrees to perform said work for and in consideration of the Jurisdiction's payment of the bid amount of _____ dollars (\$ _____), which amount shall constitute the required amount of the performance, maintenance, and payment bond. The Contractor hereby agrees to commence work as stated in the written Notice to Proceed; and substantially complete the work in accordance with the following contract provisions:

CONTRACT PROVISIONS

- A. Completion Date
 - 1. All work under the Contract must be substantially complete on or before November 30, 2020.
- B. Bid Quantity Revisions
 - 1. All quantities are estimates and subject to revision by the Jurisdiction.
 - 2. Quantity changes that do not materially change the character of the work to be performed and amount to less than Twenty (20) percent of a given bid item or less than Five (5) percent of the total contract amount shall not affect the unit price bid.

CDBG REQUIREMENTS
2020 Sanitary Sewer Cleaning & Televising
City of Storm Lake

A. Executive Orders 11246 and 11375.

The Contractor will comply with all provisions of Executive Orders 11246 and 11375. During the performance of this Contract, the Contractor agrees as follows:

- 1) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, transfer, recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.
- 2) The Contractor will, in all solicitations or advertisement for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.
- 3) The Contractor will send to each labor union or representative of workers with which they have a collective bargaining agreement or other Contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the Contractor's commitments under Section 202 of Executive Order No. 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- 4) The Contractor will comply with all provisions of Executive Order No. 11246 of September 24, 1965, and of the rules, regulations, and relevant order of the Secretary of Labor.
- 5) The Contractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to their books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- 6) In the event of the Contractor's noncompliance with the nondiscrimination clauses of this Contract or with any such rules, regulations or orders, this Contract may be canceled, terminated or suspended in whole or in part and the Contractor may be declared ineligible for further government Contracts in accordance with procedures authorized in Executive Order No. 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
- 7) The Contractor will include the provision of Paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions including sanctions for noncompliance; provided, however, that in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

B. Title VI of the Civil Rights Act of 1964 and Iowa Civil Right Act of 1965.

This act provides that no person shall be excluded from participation, denied benefits, or subjected to discrimination on the basis of race, color, or national origin under any program or activity receiving federal financial assistance. Iowa Civil Right Act mirrors the Federal Civil Rights Act.

C. Federal Executive Order 11063, as amended by Executive Order 12259 Equal Opportunity Housing

D. Section 109 of Title I of the Housing and Community Development Act.

This act provides that no person shall be excluded from participation, including employment, denied program benefits, or subjected to discrimination on the basis of race, color, physical or mental disabilities, national origin, sex, handicap, religion or religious affiliation, or age under any program or activity funded in whole or in part under Title I of this act.

E. Section 3 of the Housing and Urban Development Act of 1965 (as amended).

A. The work to be performed under this contract is subject to the requirements of section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (section 3). The purpose of section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

B. The parties to this contract agree to comply with HUD's regulations in 24 CFR part 135, which implement section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 135 regulations.

C. The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.

D. The contractor agrees to include this section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 135. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 135.

E. The contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR part 135.

F. Noncompliance with HUD's regulations in 24 CFR part 135 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD assisted contracts.

G. With respect to work performed in connection with section 3 covered Indian housing assistance, section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450e) also applies to the work to be performed under this contract. Section 7(b) requires that to the greatest extent feasible (i) preference and opportunities for training and employment shall be given to Indians, and (ii) preference in the award of contracts and subcontracts shall be given to Indian organizations and Indian-owned Economic Enterprises. Parties to this contract that are subject to the provisions of section 3 and section 7(b) agree to comply with section 3 to the maximum extent feasible, but not in derogation of compliance with section 7(b).

F. The Americans with Disabilities Act (P.L. 101-336, 42 U.S.C. 12101-12213).

This act guarantees equal opportunity for individuals with disabilities in public accommodations, employment, transportation, state and local government services and telecommunications.

G. Access to and Maintenance of Records. The Contractor must maintain all required records for five years after final payments are made and all other pending matters are closed. At any time during normal business hours and as frequently as is deemed necessary, the Contractor shall make available and furnish all information and reports required, and will permit access to books, records, and accounts by the Owner, Department of Housing and Urban Development, the Secretary of Labor, the Iowa Economic Development Authority or their authorized representatives, for purposes of investigation to ascertain compliance.

H. Termination. The Owner and/or the Contractor shall have the right to terminate this Contract at any time by giving at least ten (10) days notice in writing. The notice shall specify the effective date of such termination. Upon cancellation, the Owner will be responsible only for those costs incurred by the Contractor to the date of termination. In the event of termination, all finished or unfinished documents, data, studies, surveys, drawings, maps, models, photographs and reports prepared by the Contractor under this Contract shall, at the option of the City, become its property and the Contractor shall be entitled to receive just and equitable compensation for any work satisfactorily completed hereunder.

I. Awarding Agency Reporting Requirements. The Contractor must provide information as necessary and as requested by the Iowa Economic Development Authority for the purpose of fulfilling all reporting requirements related to the CDBG program.

J. Energy Efficiency. Mandatory standards and policies relating to energy efficiency which are contained in the State energy conservation plan issued in compliance with the Energy Policy and Conservation Act.
Pub. L 94-163, 89 Stat. 871

K. All Contracts in Excess of \$100,000.

In addition to the preceding provisions, Contracts in excess of \$100,000 shall require compliance with the following laws and regulations:

- Section 306 of the Clean Air Acts [42 U.S.C. 1857 (h)].
- Section 508 of the Clean Water Act [33 U.S.C. 1368].
- Executive Order 11738.
- EPA Regulations - 40 CFR, Part 15.

In accordance with the Clean Air and Water Act, the Contractor agrees as follows:

- 1) The Contractor will certify that any facility to be utilized in the performance of any nonexempt contract or subcontract is not listed on the List of Violating Facilities issued by the Environmental Protection Agency pursuant to 40 CFR 15.20.
- 2) The Contractor agrees to comply with all the requirements of Section 114 of the Clean Air Act, as amended, (42 U.S.C. 1857c-8) and Section 308 of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1318) relating to inspection, monitoring, entry, reports, and information, as well as all other requirements specified in said Section 114 and Section 308, and all regulations and guidelines issued thereunder.
- 3) The Contractor agrees that as a condition for the award of a Contract, prompt notice will be given of any notification received from the Director, Office of Federal Activities, Environmental Protection Agency, indicating that a facility utilized or to be utilized for the Contract is under consideration to be listed on the Environmental Protection Agency List of Violating Facilities.

- 4) The Contractor agrees that it will include or cause to be included the criteria and requirements in Paragraphs (1) through (4) of this section in every nonexempt subcontract and require every subcontractor to take such action as the Government may direct as a means of enforcing such provisions.

L. All Contracts in Excess of \$2,000.

In addition to the preceding provisions, all construction contracts in excess of \$2,000 must include the Federal Labor Standards Provisions:

- Davis-Bacon and Related Acts
- Contract Work Hours and Safety Standard Act
- Copeland Anti-kickback Act

IN WITNESS WHEREOF, the Parties hereto have executed this instrument, in triplicate on the date first shown written.

JURISDICTION: City of Storm Lake

CONTRACTOR:

By _____
Michael Porsch, Mayor

(Seal)
ATTEST:

Mayra Martinez, City Clerk

By _____
Contractor's Contact Name
Contractor's Title

Street Address

City, State, Zip Code

Telephone

CONTRACTOR PUBLIC REGISTRATION INFORMATION to be Provided By:

1. All Contractors: The Contractor shall enter its Public Registration No. _____ issued by the Iowa Commissioner of Labor pursuant to Section 91C.5 of the Iowa Code.
2. Out-of-State Contractors:
 - A. Pursuant to Section 91C.7 of the Iowa Code, an out-of-state contractor, before commencing a contract in excess of five thousand dollars in value in Iowa, shall file a bond with the division of labor services of the department of workforce development. The contractor should contact 515-242-5871 for further information. Prior to contract execution, the Jurisdictional Engineer may forward a copy of this contract to the Iowa Department of Workforce Development as notification of pending construction work. It is the contractor's responsibility to comply with said Section 91C.7 before commencing this work.
 - B. Prior to entering into contract, the designated low bidder, if it is a corporation organized under the laws of a state other than Iowa, shall file with the Jurisdictional Engineer a certificate from the Secretary of the State of Iowa showing that it has complied with all the provisions of Chapter 490 of the Code of Iowa, as amended, governing foreign corporations. For further information contact the Iowa Secretary of State Office at 515-281-5204.

Bond No. _____

Name of Surety _____

NOTE: All signatures on this contract must be original signatures in ink; electronic, copies or facsimile of any signature will not be accepted.

CORPORATE ACKNOWLEDGMENT

State of _____)
_____) SS
_____ County)

On this ____ day of _____, 20____, before me, the undersigned, a Notary Public in and for the State of _____, personally appeared _____ and _____, to me known, who, being by me duly sworn, did say that they are the _____, and _____, respectively, of the corporation executing the foregoing instrument; that (no seal has been procured by) (the seal affixed thereto is the seal of) the corporation; that said instrument was signed (and sealed) on behalf of the corporation by authority of this Board of Directors; that _____ and _____ acknowledged the execution of the instrument to be the voluntary act and deed of the corporation, by it and by them voluntarily executed.

Notary Public in and for the State of _____
My commission expires _____ 20, _____

PARTNERSHIP ACKNOWLEDGMENT

State of _____)
_____) SS
_____ County)

On this ____ day of _____, 20 ____, before me, the undersigned, a Notary Public in and for the State of _____, personally appeared _____ to me personally known, who being by me duly sworn, did say that the person is one of the partners of _____, a partnership, and that the instrument was signed on behalf of the partnership by authority of the partners and the partner acknowledged the execution of the instrument to be the voluntary act and deed of the partnership by it and by the partner voluntarily executed.

Notary Public in and for the State of _____
My commission expires _____ 20, _____

INDIVIDUAL ACKNOWLEDGMENT

State of _____)
_____) SS
_____ County)

On this ____ day of _____, 20 ____, before me, the undersigned, a Notary Public in and for the State of _____, personally appeared _____ and _____, to me known to be the identical person(s) named in and who executed the foregoing instrument, and acknowledged that (he) (she) (they) executed the instrument as (his) (her) (their) voluntary act and deed.

Notary Public in and for the State of _____
My commission expires _____ 20, _____

LIMITED LIABILITY COMPANY ACKNOWLEDGMENT

State of _____)
_____) SS
_____ County)

On this ____ day of _____, 20 ____, before me a Notary Public in and for said county, personally appeared _____, to me personally known, who being by me duly sworn did say that person is _____ of said _____, that (the seal affixed to said instrument is the seal of said OR no seal has been procured by the said) _____, and that said instrument was signed and sealed on behalf of the said _____, by authority of its managers and the said _____ acknowledged the execution of said instrument to be the voluntary act and deed of said _____, by it voluntarily executed.

Notary Public in and for the State of _____
My commission expires _____ 20, _____

CONTRACT ATTACHMENT: ITEM 1: GENERAL – NONE

CONTRACT ATTACHMENT: ITEM 2: BID ITEMS AND, QUANTITIES

THIS CONTRACT IS AWARDED AND EXECUTED FOR COMPLETION OF THE WORK SPECIFIED IN THE CONTRACT DOCUMENTS FOR THE BID PRICES TABULATED BELOW AS PROPOSED BY THE CONTRACTOR IN ITS PROPOSAL SUBMITTED IN ACCORDANCE WITH NOTICE TO BIDDERS AND NOTICE OF PUBLIC HEARING. ALL QUANTITIES ARE SUBJECT TO REVISION BY THE JURISDICTION. THE JURISDICTION RESERVES THE RIGHT TO ADJUST QUANTITIES AS NECESSARY TO MAXIMIZE FUNDS BUDGETED FOR THIS PROJECT AS NOTED IN SECTION 00500 – CONTRACT.

ITEM NO.	DESCRIPTION	UNIT	APPROX. QUANTITY	UNIT PRICE	AMOUNT
1	TELEVISIONING, CLEANING, & INSPECTING SANITARY SEWER MAIN, 6"	LF	300	\$	\$
2	TELEVISIONING, CLEANING, & INSPECTING SANITARY SEWER MAIN, 8"	LF	11,710	\$	\$
3	TELEVISIONING, CLEANING, & INSPECTING SANITARY SEWER MAIN, 10"	LF	300	\$	\$
			TOTAL AMOUNT BID:		\$

PERFORMANCE & PAYMENT BOND

2020 Sanitary Sewer Cleaing & Televising
City of Storm Lake

KNOW ALL BY THESE PRESENTS:

That we, _____, as Principal (hereinafter the "Contractor" or "Principal" and _____, as Surety are held and firmly bound unto _____, as Obligee (hereinafter referred to as "the Jurisdiction"), and to all persons who may be injured by any breach of any of the conditions of this Bond in the penal sum of _____ DOLLARS (\$ _____), lawful money of the United States, for the payment of which sum, well and truly to be made, we bind ourselves, our heirs, legal representatives and assigns, jointly or severally, firmly by these presents.

The conditions of the above obligations are such that whereas said Contractor entered into a contract with the Jurisdiction, bearing date the _____ day of _____, hereinafter the "Contract" wherein said Contractor undertakes and agrees to construct the 2020 Sanitary Sewer Cleaning & Televising project in Storm Lake, IA 50588.

and to faithfully perform all the terms and requirements of said Contract within the time therein specified, in a good and workmanlike manner, and in accordance with the Contract Documents.

It is expressly understood and agreed by the Contractor and Surety in this bond that the following provisions are a part of this Bond and are binding upon said Contractor and Surety, to-wit:

PERFORMANCE: The Contractor shall well and faithfully observe, perform, fulfill, and abide by each and every covenant, condition, and part of said Contract and Contract Documents, by reference made a part hereof, for the above referenced improvements and shall indemnify and save harmless the Jurisdiction from all outlay and expense incurred by the Jurisdiction by reason of the Contractor's default of failure to perform as required. The Contractor shall also be responsible for the default or failure to perform as required under the Contract and Contract Documents by all its subcontractors, suppliers, agents, or employees furnishing materials or providing labor in the performance of the Contract.

PAYMENT: The Contractor and the Surety on this Bond are hereby agreed to pay all just claims submitted by persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the performance of the Contract on account of which this Bond is given, including but not limited to claims for all amounts due for labor, materials, lubricants, oil, gasoline, repairs on machinery, equipment and tools, consumed or used by the Contractor or any subcontractor, wherein the same are not satisfied out of the portion of the contract price which the Jurisdiction is required to retain until completion of the improvement, but the Contractor and Surety shall not be liable to said persons, firms, or corporations unless the claims of said claimants against said portion of the contract price shall have been established as provided by law. The Contractor and Surety hereby bind themselves to the obligations and conditions set forth in Chapter 573, Code of Iowa, which by this reference is made a part hereof as though fully set out herein.

GENERAL: Every Surety on this Bond shall be deemed and held bound, any contract to the contrary notwithstanding, to the following provisions:

To consent without notice to any extension of time to the Contractor in which to perform the Contract;

To consent without notice to any change in the Contract or Contract Documents, which thereby increases the total contract price and the penal sum of this bond, provided that all such changes do not, in the aggregate, involve an increase of more than twenty percent of the total contract price, and that this bond shall then be released as to such excess increase; and

To consent without notice that this Bond shall remain in full force and effect until the Contract is completed, whether completed within the specified contract period, within an extension thereof, or within a period of time after the contract period has elapsed and the liquidated damage penalty is being charged against the Contractor.

The Contractor and every Surety on the bond shall be deemed and held bound, any contract to the contrary notwithstanding, to the following provisions:

That no provision of this Bond or of any other contract shall be valid which limits to less than five years after the acceptance of the work under the Contract the right to sue on this Bond.

That as used herein, the phrase "all outlay and expense" is not to be limited in any way, but shall include the actual and reasonable costs and expenses incurred by the Jurisdiction including interest, benefits and overhead where applicable. Accordingly, "all outlay and expense" would include but not be limited to all contract or employee expense, all equipment usage or rental, materials, testing, outside experts, attorney's fees (including overhead expenses of the Jurisdiction's staff attorneys), and all costs and expenses of litigation as they are incurred by the Jurisdiction. It is intended the Contractor and Surety will defend and indemnify the Jurisdiction on all claims made against the Jurisdiction on account of Contractor's failure to perform as required in the Contract and Contract Documents, that all agreements and promises set forth in the Contract and Contract Documents, in approved change orders, and in this Bond will be fulfilled, and that the Jurisdiction will be fully indemnified so that it will be put into the position it would have been in had the Contract been performed in the first instance as required.

In the event the Jurisdiction incurs any "outlay and expense" in defending itself with respect to any claim as to which the Contractor or Surety should have provided the defense, or in the enforcement of the promises given by the Contractor in the Contract, Contract Documents, or approved change orders, or in the enforcement of the promises given by the Contractor and Surety in this Bond, the Contractor and Surety agree that they will make the Jurisdiction whole for all such outlay and expense, provided that the Surety's obligation under this bond shall not exceed 125% of the penal sum of this bond.

In the event that any actions or proceedings are initiated with respect to this Bond, the parties agree that the venue thereof shall be Buena Vista County, State of Iowa. If legal action is required by the Jurisdiction to enforce the provisions of this Bond or to collect the monetary obligation incurring to the benefit of the Jurisdiction, the Contractor and the Surety agree, jointly and severally, to pay the Jurisdiction all outlay and expense incurred therefor by the Jurisdiction. All rights, powers, and remedies of the Jurisdiction hereunder shall be cumulative and not alternative and shall be in addition to all rights, powers and remedies given to the Jurisdiction, by law. The Jurisdiction may proceed against surety for any amount guaranteed hereunder whether action is brought against the Contractor or whether Contractor is joined in any such action(s).

NOW THEREFORE, the condition of this obligation is such that if said Principal shall faithfully perform all the promises of the Principal, as set forth and provided in the Contract, in the Contract Documents, and in this Bond, then this obligation shall be null and void, otherwise it shall remain in full force and effect.

When a work, term, or phrase is used in this Bond, it shall be interpreted or construed first as defined in this Bond, the Contract, or the Contract Documents; second, if not defined in the Bond, Contract, or Contract Documents, it shall be interpreted or construed as defined in applicable provisions of the Iowa Code; third, if not defined in the Iowa Code, it shall be interpreted or construed according to its generally accepted meaning in the construction industry; and fourth, if it has no generally accepted meaning in the construction industry, it shall be interpreted or construed according to its common or customary usage.

Failure to specify or particularize shall not exclude terms or provisions not mentioned and shall not limit liability hereunder. The Contract and Contract Documents are hereby made a part of this Bond.

Project No. _____

(CON'T – PERFORMANCE & PAYMENT BOND)

Witness our hands, in triplicate, this _____ day of _____, _____.

Surety Countersigned By:

PRINCIPAL:

Signature of Iowa Resident Commission Agent as
Prescribed by Chapter 515.52-57, Iowa Code.
(Require only if Attorney-in-Fact is not also an
Iowa Resident Commission Agent).

Contractor

By:

Signature

Name of Resident Commission Agent

Title

Company Name

SURETY:

Company Address

Surety Company

City, State, Zip Code

By:

Signature Attorney-in-Fact Officer

Company Telephone Number

Name of Attorney-in-Fact Officer

Company Name

Company Address

City, State, Zip Code

Company Telephone Number

NOTE: All signatures on this Performance & Payment Bond must be original signatures in ink; electronic, copies, or facsimile of any signature will not be accepted. This bond must be sealed with the Surety's raised, embossing seal or official adhesive seal. The Certificate or Power of Attorney accompanying this bond must be valid on its face and sealed with the Surety's raised, embossing seal or official adhesive seal.

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SECTION 00501 - FEDERAL LABOR STANDARDS PROVISIONS

2020 SANITARY SEWER CLEANING & TELEVISION

CITY OF STORM LAKE

Applicability

The Project or Program to which the construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

A. 1. (i) Minimum Wages. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section I(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible, place where it can be easily seen by the workers.

(ii) (a) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(b) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB control number 1215-0140.)

(c) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

(d) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii)(b) or (c) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part

of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

2. Withholding. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract in the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work, all or part of the wages required by the contract, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or subcontractor to the respective employees to whom they are due. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

3. (i) Payrolls and basic records. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section I(b)(2)(B) of the Davis-bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5 (a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section I(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been

communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1215-0140 and 1215-0017.)

(ii) (a) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i) except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this subparagraph for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to HUD or its designee. (Approved by the Office of Management and Budget under OMB Control Number 1215-0149.)

(b) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under 29 CFR 5.5 (a)(3)(ii), the appropriate information is being maintained under 29 CFR 5.5(a)(3)(i), and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(c) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph A.3.(ii)(b).

(d) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under subparagraph A.3.(i) available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and Trainees.

(i) **Apprentices.** Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who

is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) **Trainees.** Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by

the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under 29 CFR Part 5 shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR Part 3 which are incorporated by reference in this contract

6. Subcontracts. The contractor or subcontractor will insert in any subcontracts the clauses contained in subparagraphs 1 through 11 in this paragraph A and such other clauses as HUD or its designee may by appropriate instructions require, and a copy of the applicable prevailing wage decision, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this paragraph.

7. Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.

10. (i) Certification of Eligibility. By entering into this contract the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be

awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001. Additionally, U.S. Criminal Code, Section 1 01 0, Title 18, U.S.C., "Federal Housing Administration transactions", provides in part: "Whoever, for the purpose of . . . influencing in any way the action of such Administration..... makes, utters or publishes any statement knowing the same to be false..... shall be fined not more than \$5,000 or imprisoned not more than two years, or both."

11. Complaints, Proceedings, or Testimony by Employees. No laborer or mechanic to whom the wage, salary, or other labor standards provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

B. Contract Work Hours and Safety Standards Act. The provisions of this paragraph B are applicable where the amount of the prime contract exceeds \$100,000. As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which the individual is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in subparagraph (1) of this paragraph, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph (1) of this paragraph, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by the clause set forth in subparagraph (1) of this paragraph.

(3) Withholding for unpaid wages and liquidated damages. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contract, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act which is held by the same prime contractor such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph (2) of this paragraph.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph (1) through (4) of this paragraph and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in subparagraphs (1) through (4) of this paragraph.

C. Health and Safety. The provisions of this paragraph C are applicable where the amount of the prime contract exceeds \$100,000.

(1) No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

(2) The Contractor shall comply with all regulations issued by the Secretary of Labor pursuant to Title 29 Part 1926 and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act, (Public Law 91-54, 83 Stat 96). 40 USC 3701 et seq.

(3) The contractor shall include the provisions of this paragraph in every subcontract so that such provisions will be binding on each subcontractor. The contractor shall take such action with respect to any subcontractor as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

SECTION 00502 – WAGE DECISION

2020 SANITARY SEWER CLEANING & TELEVISIONING

CITY OF STORM LAKE

"General Decision Number: IA20200028 06/12/2020

State: Iowa

Construction Types: Heavy and Highway

Counties: Adair, Adams, Allamakee, Appanoose, Audubon, Benton, Black Hawk, Boone, Bremer, Buchanan, Buena Vista, Butler, Calhoun, Carroll, Cass, Cedar, Cerro Gordo, Cherokee, Chickasaw, Clarke, Clay, Clayton, Clinton, Crawford, Dallas, Davis, Decatur, Delaware, Des Moines, Dickinson, Dubuque, Emmet, Fayette, Floyd, Franklin, Fremont, Greene, Grundy, Guthrie, Hamilton, Hancock, Hardin, Harrison, Henry, Howard, Humboldt, Ida, Iowa, Jackson, Jasper, Jefferson, Johnson, Jones, Keokuk, Kossuth, Lee, Linn, Louisa, Lucas, Lyon, Madison, Mahaska, Marion, Marshall, Mills, Mitchell, Monona, Monroe, Montgomery, Muscatine, O'Brien, Osceola, Page, Palo Alto, Plymouth, Pocahontas, Polk, Pottawattamie, Poweshiek, Ringgold, Sac, Shelby, Sioux, Story, Tama, Taylor, Union, Van Buren, Wapello, Warren, Washington, Wayne, Webster, Winnebago, Winneshiek, Woodbury, Worth and Wright Counties in Iowa.

EXCLUDES SCOTT COUNTY

HEAVY AND HIGHWAY CONSTRUCTION PROJECTS

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.80 for calendar year 2020 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.80 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2020. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	06/12/2020

SUIA2020-001 10/18/2017

	Rates	Fringes
Carpenter & Piledriversmen		
ZONE 1.....	\$ 28.52	14.08
ZONE 2.....	\$ 26.73	14.08
ZONE 3.....	\$ 26.73	14.08

ZONE 4.....	\$ 26.25	11.50
ZONE 5**.....	\$ 25.15	9.90
CONCRETE FINISHER		
ZONE 1.....	\$ 28.10	7.40
ZONE 2.....	\$ 28.10	7.40
ZONE 3.....	\$ 28.10	7.40
ZONE 4.....	\$ 25.45	6.40
ZONE 5.....	\$ 24.40	6.40
ELECTRICIAN (STREET AND HIGHWAY LIGHTING AND TRAFFIC SIGNALS)		
ZONE 1, 2, AND 3.....	\$ 25.05	6.80
ZONE 4.....	\$ 23.75	6.80
ZONE 5.....	\$ 21.60	6.80
IRONWORKER (SETTING OF STRUCTURAL STEEL)		
ZONE 1.....	\$ 31.50	10.90
ZONE 2.....	\$ 29.41	10.90
ZONE 3.....	\$ 29.41	11.20
ZONE 4.....	\$ 27.35	9.90
ZONE 5**.....	\$ 25.50	9.45
LABORER		
ZONE 1, 2 AND 3		
GROUP A.....	\$ 23.75	9.68
GROUP AA.....	\$ 26.13	9.68
GROUP B.....	\$ 21.90	9.68
GROUP C.....	\$ 18.82	9.68
ZONE 4		
GROUP A.....	\$ 21.27	9.08
GROUP B.....	\$ 19.95	9.08
GROUP C.....	\$ 17.07	9.08
ZONE 5		
GROUP A.....	\$ 21.77	7.63
GROUP B.....	\$ 19.27	7.63
GROUP C.....	\$ 18.42	7.63
POWER EQUIPMENT OPERATOR		
ZONE 1		
GROUP A.....	\$ 32.55	14.90
GROUP B.....	\$ 31.00	14.90
GROUP C.....	\$ 28.50	14.90
GROUP D.....	\$ 28.50	14.90
ZONE 2		
GROUP A.....	\$ 31.85	14.90
GROUP B.....	\$ 30.25	14.90
GROUP C.....	\$ 27.70	14.90
GROUP D.....	\$ 27.70	14.90
ZONE 3		
GROUP A.....	\$ 29.70	24.65
GROUP B.....	\$ 27.90	24.65
GROUP C.....	\$ 26.90	24.65
GROUP D.....	\$ 26.90	24.65
ZONE 4		
GROUP A.....	\$ 31.05	12.50
GROUP B.....	\$ 29.91	12.50
GROUP C.....	\$ 27.83	12.50
GROUP D.....	\$ 27.83	12.50
ZONE 5		
GROUP A.....	\$ 28.02	10.70
GROUP B.....	\$ 26.98	10.70
GROUP C.....	\$ 25.25	10.70

GROUP D.....	\$ 24.25	10.70
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TRUCK DRIVER (AND PAVEMENT
MARKING DRIVER/SWITCHPERSON)

ZONE 1.....	\$ 24.45	11.15
ZONE 2		
.....	\$ 24.45	11.15
ZONE 3.....	\$ 24.45	11.15
ZONE 4.....	\$ 24.45	6.95
ZONE 5		
.....	\$ 22.50	6.95

ZONE DEFINITIONS

ZONE 1 The Counties of Polk, Warren, and Dallas for all Crafts, and Linn County Carpenters only.

ZONE 2 The Counties of Dubuque for all Crafts and Linn County for all Crafts except Carpenters.

ZONE 3 The Cities of Burlington, Clinton, Fort Madison, Keokuk, and Muscatine (and abutting municipalities of any such cities).

ZONE 4 Story, Black Hawk, Cedar, Jasper, Jones, Jackson, Louisa, Madison, and Marion Counties; Clinton County (except the City of Clinton), Johnson County, Muscatine County (except the City of Muscatine), the City of Council Bluffs, Lee County and Des Moines County.

ZONE 5 All areas of the state not listed above.

LABORER CLASSIFICATIONS - ALL ZONES

GROUP AA - {Skilled pipelayer (sewer, water and conduits) and tunnel laborers; asbestos abatement worker} (Zones 1, 2 and 3).

GROUP A - Carpenter tender on bridges and box culverts; curb machine (without a seat); deck hand; diamond & core drills; drill operator on air tracs, wagon drills and similar drills; form setter/stringman on paving work; gunnite nozzleman; joint sealer kettleman; laser operator; powderman tender; powderman/blaster; saw operator; {pipelayer (sewer, water, and conduits); sign erector*; tunnel laborer; asbestos abatement worker (Zones 4 and 5)}, sign erector.

GROUP B - Air, gas, electric tool operator; barco hammer; carpenter tender; caulker; chain sawman; compressor (under 400 cfm); concrete finisher tender; concrete processing materials and monitors; cutting torch on demolition; drill tender; dumpmen; electric drills; fence erectors; form line expansion joint assembler; form tamper; general laborer; grade checker; handling and placing metal mesh, dowel bars, reinforcing bars and chairs; hot asphalt laborer; installing temporary traffic control devices; jackhammerman; mechanical grouter; painter (all except stripers); paving breaker; planting trees, shrubs and flowers; power broom (not self-propelled); power buggyman; rakers; rodman (tying reinforcing steel); sandblaster; seeding and mulching; sewer utility topman/bottom man; spaders; stressor or stretcherman on pre or post tensioned concrete; stringman on re/surfacing/no grade control; swinging stage, tagline, or block and tackle; tampers; timberman; tool room men and checkers; tree climber; tree groundman; underpinning and shoring caissons over twelve feet deep; vibrators; walk behind trencher; walk behind paint stripers; walk behind vibrating compactor; water pumps (under three inch); work from bosun chair.

GROUP C - Scale weigh person; traffic control/flagger, surveillance or monitor; water carrier.

POWER EQUIPMENT OPERATOR CLASSIFICATIONS - ALL ZONES

GROUP A - All terrain (off road) forklift; asphalt breakdown roller (vibratory); asphalt laydown machine; asphalt plant; asphalt screed; bulldozer (finish); central mix plant; concrete pump; crane; crawler tractor pulling scraper; directional drill (60,000 (lbs) pullback and above); dragline and power shovel; dredge engine; excavator (over 1 cu. yd.); front end loader (4 cy and over); horizontal boring machine; master mechanic; milling machine (over 350 hp); motor grader (finish); push cat; rubber tired backhoe (over 1 cu. yd.); scraper (12 cu. yd. and over or finish); Self-propelled rotary mixer/road reclaimer; sidebroom tractor; slipform portland concrete paver; tow or push boat; trenching machine (Cleveland 80 or similar)

GROUP B - Articulated off road hauler, asphalt heater/planer; asphalt material transfer vehicle; asphalt roller; belt loader or similar loader; bulldozer (rough); churn or rotary drill; concrete curb machine; crawler tractor pulling ripper, disk or roller; deck hand/oiler; directional drill (less than 60,000 (lbs) pullback); distributor; excavator (1/2 cu. yd. and under); form riding concrete paver; front end loader (2 to less than 4 cu. yd.); group equipment greaser; mechanic; milling machine (350 hp. and less); paving breaker; portland concrete dry batch plant; rubber tired backhoe (1/2 cu. yd. and under); scraper (under 12 cu. yd.); screening, washing and crushing plant (mobile, portable or stationary); shoulder machine; skid loader (1 cu. yd. and over); subgrader or trimmer; trenching machine; water wagon on compaction.

GROUP C - Boom & winch truck; concrete spreader/belt placer; deep wells for dewatering; farm type tractor (over 75 hp.) pulling disc or roller; forklift; front end loader (under 2 cu. yd.); motor grader (rough); pile hammer power unit; pump (greater than three inch diameter); pumps on well points; safety boat; self-propelled roller (other than asphalt); self-propelled sand blaster or shot blaster, water blaster or striping grinder/remover; skid loader (under 1 cu. yd.); truck mounted post driver.

GROUP D - Boiler; compressor; cure and texture machine; dow box; farm type or utility tractor (under 75 hp.) pulling disk, roller or other attachments; group greaser tender; light plants; mechanic tender; mechanical broom; mechanical heaters; oiler; pumps (under three inch diameter); tree chipping machine; truck crane driver/oiler.

** CARPENTERS AND PILEDRIVERMEN, or IRONWORKERS (ZONE 5)

Setting of structural steel; any welding incidental to bridge or culvert construction; setting concrete beams.

* ADDED CRAFT - SIGN ERECTOR

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave

for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average

calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

SECTION 00800 - SPECIAL PROVISIONS

FOR

2020 Sanitary Sewer Cleaning & Televising
City of Storm Lake

1. CONTRACT PROVISIONS
2. DEFINITION AND INTENT
3. GENERAL PROVISIONS AND COVENANTS
4. WORK REQUIRED
5. STANDARDS AND CODES
6. EMPLOYMENT PRACTICES
7. RESPONSIBILITIES OF CONTRACTOR
8. INCIDENTAL CONTRACT ITEMS

1) CONTRACT PROVISIONS

a) Completion Date

- i) All work under the Contract must be substantially complete as detailed in Section 00500 – Contract

b) Bid Quantity Revisions

- i) All quantities are estimates and subject to revision by the Jurisdiction.
- ii) Quantity changes that do not materially change the character of the work to performed and amount to less than Twenty (20) percent of a given bid item or less than Five (5) percent of the total contract amount shall not affect the unit price bid.

2) DEFINITION AND INTENT

a) The Specifications that apply to the materials and construction practices for this project are defined as follows:

- i) The 2020 Edition of the SUDAS Standard Specifications, except as modified by these Special Provisions to the Technical Specifications.
- ii) Omissions of words or phrases such as “the Contractor shall”, “in accordance with”, “shall be”, “as noted on the Plans”, “according to the Plans”, “a”, “an”, “the” and “all” are unintentional; supply omitted words or phrases by inference.
- iii) “Owner”, “Jurisdiction” and “City” shall mean the City of Storm Lake, acting through the Tulip Lane Stormwater Improvements Project.
- iv) “Person” shall mean any individual, partnership, limited partnership, joint venture, society, association, joint stock company, corporation, limited liability company, estate, receiver, trustee, assignee, or referee, whether appointed by a court or otherwise, and any combination of individuals.
- v) “Engineer” shall mean the Engineer on Record.
- vi) The intent of the Technical Specifications is to describe the construction desired, performance requirements, and standards of materials and construction.
- vii) “Standard Drawings” shall mean the Figures bound within the SUDAS Standard Specifications and/or the Typical Drawings bound within the plans.
- viii) “Work” shall mean the work to be done and the equipment, supplies, and materials to be furnished under the contract unless some other meaning is indicated by the context.
- ix) “Or equal” shall follow manufacturers names used to establish standards and, if not stated, is implied.

b) Engineer: Bolton & Menk, Inc., 218 11th Street SW, Spencer, IA 51301, (712) 580-5075, fax (515) 233-4430.

3) GENERAL PROVISIONS AND COVENANTS

a) Division 1 of the General Provisions and Covenants of the 2020 Edition SUDAS Standard Specifications is modified as follows:

i) Section 1020.1.09B, Unit Price Attachment.

- (a) A computer generated unit price attachment may be submitted by the Bidder as specified by this Section.

ii) Section 1050, 1.15 - Additional Contractor Responsibilities.

- (a) Section 1050 1.15 is eliminated; Automatic machine guidance is permitted

4) WORK REQUIRED

- a) Work under this contract includes all materials, equipment, transportation, traffic control, and associated work for the completion of the 2020 Sanitary Sewer Cleaning & Televising project as described in the Official Publication.

5) STANDARDS AND CODES

- a) Construct improvements with best present day practices and equipment.
- b) Conform with and test in accordance with applicable sections of the following guidelines, standards, and codes.
 - i) National Association of Sewer Service Companies (NASSCO)
 - ii) American Society for Testing and Materials (ASTM).
 - iii) Iowa Department of Natural Resources (IDNR)
 - iv) American National Standards Institute (ANSI).
 - v) Federal Specifications (FS).
 - vi) Iowa Occupational Safety and Health Act of 1972 (IOSHA).
 - vii) Manual of Accident Prevention in Construction by Associated General Contractors of America, Inc. (AGC).
 - viii) Standards and Codes of the State of Iowa and the ordinances of the Owner.
 - ix) Other standards and codes which may be applicable to acceptable standards of the industry for equipment and materials under the contract.

6) EMPLOYMENT PRACTICES

- a) Neither the Contractor nor the Contractor's subcontractors shall employ any person whose physical or mental condition is such that their employment will endanger the health and safety of anyone employed on the Project.
- b) The Contractor shall not commit any of the following employment practices and agrees to include the following clauses in any subcontracts:
 - i) To discharge from employment or refuse to hire any individual because of sex, race, color, religion, national origin, sexual orientation, marital status, age, or disability unless such disability is related to job performance of such person or employee.
 - ii) To discriminate against any individual in terms, conditions, or privileges of employment because of sex, race, color, religion, national origin, sexual orientation, marital status, age, or disability unless such disability is related to job performance of such person or employee.

7) RESPONSIBILITY OF CONTRACTOR

- a) Contractor shall provide supervision of the work.
- b) Contractor shall provide protection of all property from injury or loss resulting from construction operations.
- c) Contractor shall replace or repair objects sustaining any such damage, injury, or loss, to the satisfaction of Owner and Engineer.

d) Contractor shall keep cleanup current with work operations.

e) Contractor shall comply with all Federal, State of Iowa, and local laws and ordinances.

8) INCIDENTAL CONTRACT ITEMS

a) The furnishing and installing of specific items and/or the performance of work under certain circumstances shall not be individually paid in the absence of a specific bid item for the work. These costs shall be included in the Unit Price bid for the individual items associated with the stated specific item or work effort. Such items of work include, but are not limited to:

Mobilization
Traffic Control

NOTICE OF AWARD
(To be executed after bid is awarded)

TO: Contractor _____
Address 1 _____
Address 2 _____
City, ST Zip _____

PROJECT TITLE: 2020 Sanitary Sewer Cleaning & Televising

PROJECT DESCRIPTION: Cleaning and televising approximately 12,310 LF of sanitary sewer main in Storm Lake, IA.

OWNER'S NAME: City of Storm Lake

The OWNER has considered the BID submitted by you for the above described WORK in response to its Advertisement for Bids dated _____, 2020, and Information for Bidders.

You are hereby notified that your BID has been accepted for items in the amount of \$ _____.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER within fifteen (15) days of this, the _____ day of _____, 2020.

You must deliver to the OWNER Three (3) fully executed counterparts of the Agreement, including all the Contract Documents. Each of the Contract Documents must bear your signature. You must deliver with the executed Agreement acceptable Contract Security (Bonds), Certificate(s) of Insurance, and other required information. Within ten days after you comply with the above conditions, the OWNER will return to you one fully executed counterparts of the Agreement.

Dated this, the _____ day of _____, 2020

City of Storm Lake
Storm Lake, IA 50588

BY: _____

TITLE: _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged by _____,
this, the _____ day of _____, 2020.

BY: _____

TITLE: _____

NOTICE TO PROCEED

(To be executed after Agreement, Bonds and Insurance Certificates are approved)

TO: Contractor

Address 1

Address 2

City, ST Zip

Date:

Project Title: 2020 Sanitary Sewer Cleaning & Televising

Project Owner: City of Storm Lake

Project Location: Storm Lake, IA 50588

You are hereby notified to commence WORK in accordance with the Agreement awarded on _____, 2020. The Contract Time shall commence to run on Anticipated start date: _____, 2020. WORK shall proceed in accordance with the dates set forth in the Contract and all other provisions of the Contract Documents.

City of Storm Lake

Storm Lake, IA 50588

BY: _____

TITLE: _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by _____, this, the _____ day of _____, 2020.

BY: _____

TITLE: _____

Letter of Transmittal

Date: _____
Project No.: P11.122266

TO: _____

☐ UPS Dropdown Selection
☐ Fedex Ground
☐ Regular Mail
☐ Client Pick-up
☐ Hand Carry
☐ Fax
☐ Fax/Send

RE:

WE ARE ENCLOSING:

FOR YOUR: ☐ Review ☐ Records ☐ Approval ☐ Distribution ☐ Information
☐ Use as Requested ☐ Please Return Corrected Prints

REMARKS:

CC: _____ By: _____

SECTION 01000 - TECHNICAL SPECIFICATIONS

SANITARY SEWER TELEVISION, CLEANING, AND INSPECTION

City of Storm Lake

PART 1 -- GENERAL

1.1 SUMMARY

- A. Section includes sanitary sewer cleaning, televising and inspection of pipe, fittings, and miscellaneous appurtenances.

1.2 METHOD OF MEASUREMENT AND PAYMENT

- A. Payment for all labor, equipment, materials, and supplies necessary to complete the work specified in this section shall be incidental to the unit price bid by linear foot (LF) for pipe cleaned, televised and inspected.
- B. The furnishing and installing of specific items and/or the performance of work under certain circumstances will not be individually paid in the absence of a specific bid item for the work. All costs will be included in the unit price for pipe cleaned, televised and inspected. Such items of work include but are not limited to:
 - 1. Bypass pumping (as needed)
 - 2. Notices to the impacted property owners
 - 3. Traffic control
 - 4. Disposal fees
 - 5. Removal of roots and debris
 - 6. Any heavy cleaning processes or equipment needed to remove pipe deposits

1.3 SUBMITTALS

- A. All submittals are to be provided in digital format via email, USB Flash Drive, or other method approved by the Engineer.
- B. A sanitary sewer bypass pumping plan and traffic control plan shall be submitted to the Engineer for review a minimum 5 working days prior to beginning of work.
- C. The Contractor shall provide submittals within 10 working days of completion of the televising.
- D. Acceptable File Formats
 - 1. Video: MP4 or WAV with both audio and video
 - 2. Reports: Searchable PDF
 - 3. Images: JPG
- E. File Naming
 - 1. The Contractor will be provided with a map showing manholes and pipes to be cleaned, televised, and inspected.
 - 2. All files shall be named and/or numbered providing location of the specific manholes and pipes cleaned, televised, and inspected.
- F. A summary report shall be provided with the submittals. The summary shall include a table showing the following information:
 - 1. Manhole and pipe identification numbers.

2. Date of televising.
3. Starting manhole number.
4. Ending manhole number.
5. File names for video, report, and images associated with each section of pipe

PART 2 -- PRODUCTS

2.1 NOT USED.

PART 3 -- EXECUTION

3.1 NOTIFICATIONS TO PROPERTY OWNERS

- A. The Owner shall coordinate and distribute any required public notices.

3.2 EXAMINATION

- A. Commence televising only when pipe and structures are clean and free of dirt or other foreign matter.

3.3 SANITARY SEWER TELEVISION

A. General

1. Televising will be performed on all gravity/pressure utility lines that are planned for rehabilitation and shown in the plans and specifications.
2. Televising shall be performed by experienced personnel trained in locating breaks, obstacles, and service connections.
3. All televising video shall be in color. Each individual reach of pipe between manholes shall be identified as a chapter on the video or a separate file.
4. A USB Flash Drive and suitable log shall be kept of all televising and submitted to the owner.
5. Camera – The camera will be a self-propelled unit providing color video with the ability to tilt up and down and pan left to right. The camera lens will be capable of turning and looking up each wye or service tap to a minimum distance of the first fitting of the service pipe. The camera is to provide color video and still photographs of any defect.
6. Rate – The televising will be conducted at a rate not to exceed 30.0-feet per minute.

B. Line Requirements

1. All lines will be jetted and vacuumed so that all debris has been removed prior to televising.
2. A small quantity of water is to be introduced into the line prior to televising. Contractor shall secure their own water source. Access to City of Storm Lake water source(s) and associated compensation shall be coordinated with the City of Storm Lake. The amount of water will be determined by the Engineer and coordinated with the City of Storm Lake's Water and Sewer Department. The amount of water will be sufficient enough to distinguish any sags or alignment problems with the pipe.
3. Each run will consist of a starting and ending MH-#, line size, and a zero reading on the counter at center of the starting manhole.
4. Each service wye will be examined using the pan and tilt feature.
5. The video camera operator will type into the video:
 - (a) The station (distance)
 - (b) Wye location on either the top, left, or right side of the pipe

- (c) Any visible defects that are apparent while televising the sewer lines. Examples of defects include offset joints, leaking joints, sags, cracked pipe, etc.

C. Manhole Requirements

1. Examine upstream and down doghouses for water tightness.
2. Examine all joints to confirm watertight quality of gaskets and seals.
3. While at the bottom of the manhole, the camera will examine for infiltration as close to the manhole rim as feasible and around the entire manhole circumference.
4. Examine vertical outside drops.

D. Report Requirements

1. A technician will observe the monitoring apparatus at all times during the televising and record the data per NASSCO standards.
2. Note locations, length and depth of any sag in the pipe (indicate any depths greater than ½-inch).
3. Note locations, length and depth of any areas of dirt or debris in the pipe (indicate any depths greater than ½-inch).
4. Note all defective or substandard areas identified during the inspection.
5. Record distance from center of manhole to center of manhole.
6. Note each change in pipe material, including station.
7. Note each wye or service tap location with station and orientation (Example: wye right, 3 o'clock).
8. Note direction of flow using cardinal/ordinal directions.
9. Include color photos/images of defects in the written report.

E. Review

1. All television reports and videos will be reviewed after the submittal is received.

3.4 SANITARY SEWER CLEANING

A. Cleaning Equipment

1. Hydraulically propelled equipment.
 - (a) Equipment will be of a movable dam type and be constructed in such a way that a portion of the dam may collapse at any time during the cleaning operations to protect against flooding of the sewer.
 - (b) The movable dam will be equal in diameter to the pipe being cleaned and will provide a flexible scraper around the outer periphery to insure removal of grease.
 - (c) If sewer cleaning balls or other equipment which cannot be collapsed is used, special precautions to prevent flooding of the sewers and public or private property will be taken.
2. High-Velocity Jet (Hydro cleaning) Equipment.
 - (a) All high-velocity sewer cleaning equipment will be constructed for ease and safety of operation.
 - (b) The equipment will have a selection of 2 or more high-velocity nozzles.
 - (c) The nozzles will be capable of producing a scouring action from 15 to 45 degrees in all size lines designated to be cleaned.
 - (d) Equipment will include a high-velocity gun for washing and scouring manhole walls and floor.

- (e) The gun will be capable of producing flows from a fin spray to a solid stream.
- (f) The equipment will carry its own water tank, auxiliary engines, pumps and hydraulically driven hose reel.
- 3. Mechanically Powered Equipment.
 - (a) Bucket machines will be in pairs with sufficient power to perform the work in an efficient manner.
 - (b) Machines will be belt operated or have an overload device.
 - (c) Machines with direct drive that could cause damage to the pipe are not permitted.
 - (d) A power rodding machine will be either a sectional or continuous rod type capable of holding a minimum of 750.0-feet of rod.
 - (e) The rod will be specifically heat-treated steel.
 - (f) The machine will be fully enclosed and have an automatic safety clutch or relief valve.
- B. Cleaning Precautions
 - 1. During sewer cleaning operations, satisfactory precautions will be taken in the use of cleaning equipment.
 - 2. When hydraulically propelled cleaning tools or tools which retard the flow in the sewer lines are used, precautions will be taken to ensure that the water pressure created does not damage or cause flooding of public or private property being served by the sewer. Contractor will be fully responsible for any property damage caused by the cleaning operations.
 - 3. When possible, the flow of sewage will be utilized to provide the necessary pressure for hydraulic cleaning devised.
 - 4. When additional water from fire hydrants is necessary to avoid a delay in normal work procedures, the water will be conserved and not used unnecessarily.
 - 5. No fire hydrant will be obstructed in case of a fire in the area served by the hydrant.
- C. Sewer Cleaning
 - 1. The cleaning of the sewer lines will begin upstream and work downstream.
 - 2. The sewer manhole sections will be cleaned using hydraulically propelled, high-velocity jet or mechanically powered equipment. Selection of the equipment will be based on the conditions of lines at the time the work commences.
 - 3. The equipment will be capable of removing dirt, grease, rocks, sand and other materials and obstructions from the sewer lines and manholes.
 - 4. If cleaning of an entire section cannot be successfully performed from one manhole, the equipment will be set up on the other manhole and cleaning will be attempted again.
 - 5. There shall be no additional compensation for cleaning processes that require heavy cleaning or additional cleaning equipment to remove deposits from the pipeline.
 - 6. If successful cleaning from both manholes cannot be completed, Contractor will contact the Engineer.
- D. Root Removal
 - 1. Roots will be removed completely where root intrusion is a problem.
 - 2. Any roots which could inhibit the proposed construction will be removed.
 - 3. There will be no additional compensation for removing roots as part of this cleaning and televising process.

E. Material Removal

1. All sludge, dirt, sand, rocks, grease and other solids or semisolid material resulting from cleaning operations will be removed at the downstream manhole of the section being cleaned.
2. Passing material from manhole section to manhole section, which could cause line stoppages, accumulation of sand in wet wells, or damage to pumping equipment, will not be permitted.

F. Disposal of Material

1. All solids or semisolids resulting from the cleaning operations will be removed from the site and disposed of at a site secured by Contractor.
2. All materials will be removed from the site no less often than at the end of each workday. Under no circumstances will Contractor be allowed to accumulate debris on the site of work.

G. Final Acceptance

1. Acceptance of sewer line cleaning will be made up on successful completion of the television inspection and will be to the satisfaction of the Owner.
2. If television inspection shows the cleaning to be unsatisfactory, resulting in debris being left inside or attached to the pipeline, the Contractor will be required to re-clean and re-televise the sewer line until cleaning is shown to be satisfactory and all deposits are removed from the pipeline.

3.5 SEWER FLOW CONTROL

- A. When sewer line depth of flow at the upstream manhole of the manhole section being worked in is above the maximum allowable for television inspection, the flow will be reduced to the level shown below by operation of pump stations, plugging or blocking of the flow or by pumping and bypassing of the flow as specified.

B. Plugging or Blocking

1. Perform bypass pumping as needed to complete the work.
2. A sewer line plug will be inserted into the line upstream of the section being worked.
3. The plug will be designed so that all or any portion of the sewage can be released in accordance with Engineer approved criteria.
4. During television inspection, flow will be reduced within the specified limits.
5. After the work has been completed, flow will be restored.

C. Pumping and Bypassing

1. When pumping and bypassing is required, Contractor will supply the pumps, conduits and other equipment to divert the flow of sewage around the manhole section in which work is being performed.
2. The bypass pump system will be of sufficient capacity to handle existing peak flow.
3. Contractor will be responsible for furnishing the necessary labor and supervision to set up and operate the pumping and bypass pumping system. If pumping is required on a 24-hour basis, engines will be equipped in a manor to reduce noise to a minimum.

D. Flow Control Precautions

1. When flow in a sewer line is plugged, blocked or bypasses, sufficient precautions must be taken to protect the sewer lines from damage that might result from surcharging.
2. Precautions must be taken to ensure that sewer flow control operations do not cause flooding or damage to public or private property be served by the sewers involved.



Legend

- Sanitary Service
- Sanitary Structures
 - Cleanout
 - Lift Station
 - Manhole
 - Valve
- Sanitary Pipes
 - Abandoned Pipe
 - Force Main
 - Gravity Main
- City Limits
- Lot Lines
- Parcels (10-16-2018)
- Televise Sanitary Manhole
- Clean & Televise 8" Sanitary Sewer

Notes

1) Manhole identification numbers match those on Storm Lake's GIS application.

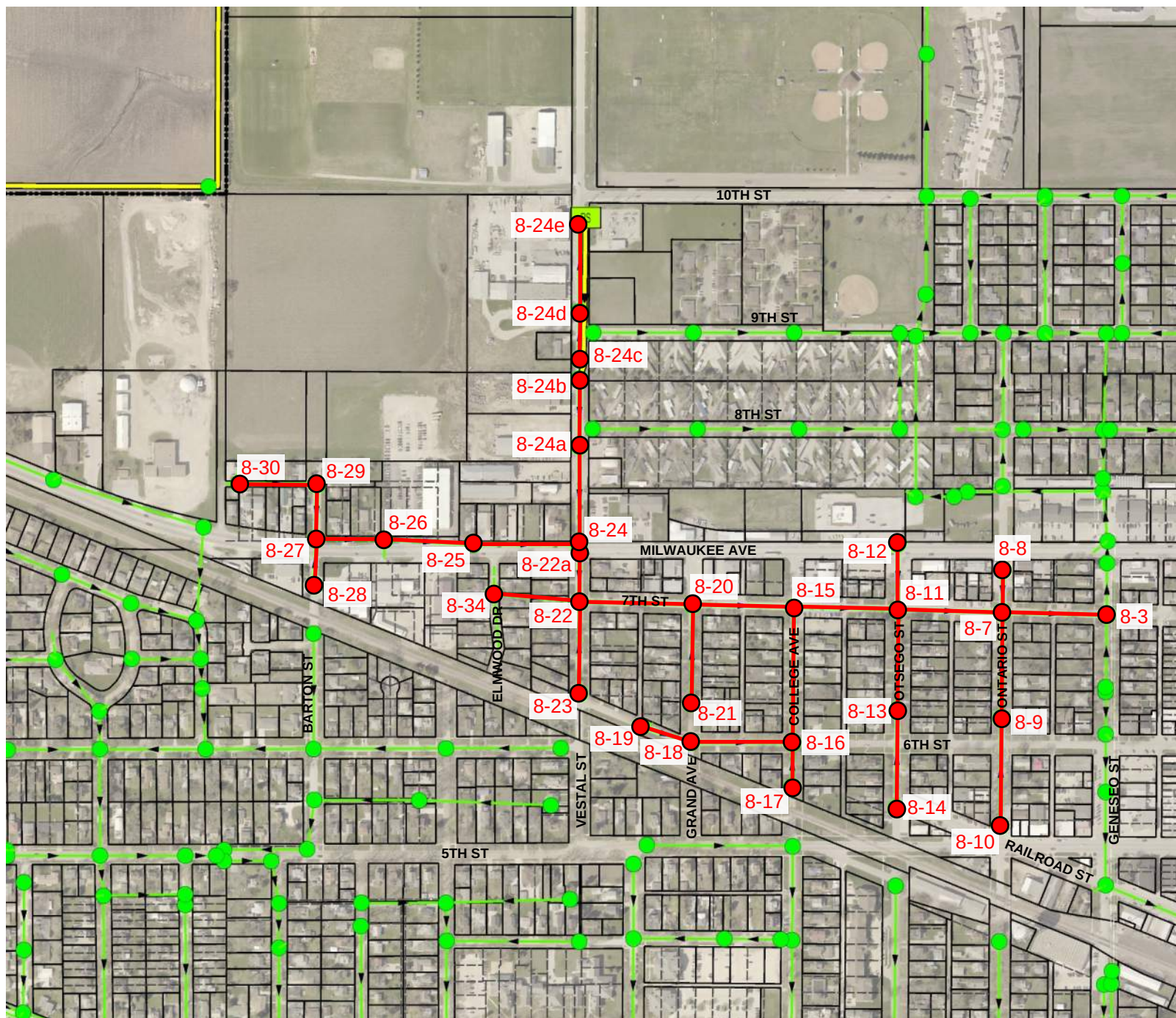
2) No manholes shall be accessed within Iowa DOT Right-Of-Way. This would include IA Hwy 7 (Milwaukee Ave).

2020 Sanitary Sewer Cleaning & Televising



Disclaimer:

This drawing is neither a legally recorded map nor a survey and is not intended to be used as one. This drawing is a compilation of records, information, and data located in various city, county, and state offices, and other sources affecting the area shown, and is to be used for reference purposes only. The City of Storm Lake is not responsible for any inaccuracies herein contained.



0 500 Feet



Legend

- Sanitary Service
- Sanitary Structures
 - Cleanout
 - Lift Station
 - Manhole
 - Valve
- Sanitary Pipes
 - Abandoned Pipe
 - Force Main
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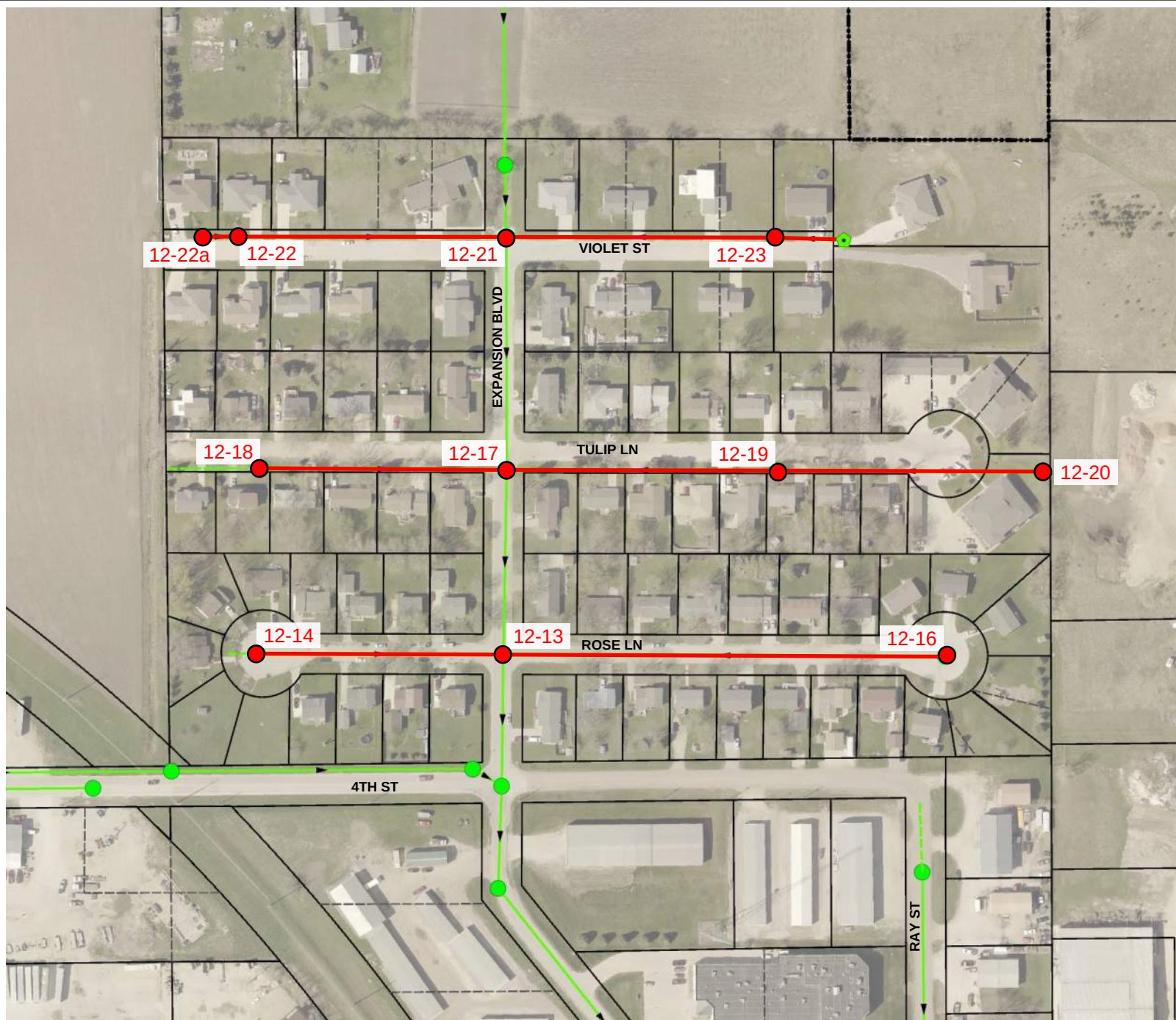
Note
Manhole identification numbers match those on Storm Lake's GIS application.

2020 Sanitary Sewer Cleaning & Televising



Disclaimer:

This drawing is neither a legally recorded map nor a survey and is not intended to be used as one. This drawing is a compilation of records, information, and data located in various city, county, and state offices, and other sources affecting the area shown, and is to be used for reference purposes only. The City of Storm Lake is not responsible for any inaccuracies herein contained.



0 200 Feet

ENGINEER'S ESTIMATE

2020 SANITARY SEWER CLEANING & TELEVISION
CITY OF STORM LAKE

BMI PROJECT NO. P11.122266



September 8, 2020

Item No.	Item	Unit	Estimated Quantity	Unit Price	Total Amount
1	TELEVISION, CLEANING, & INSPECTING SANITARY SEWER MAIN, 6"	LF	300	\$2.25	\$675.00
2	TELEVISION, CLEANING, & INSPECTING SANITARY SEWER MAIN, 8"	LF	11710	\$2.00	\$23,420.00
3	TELEVISION, CLEANING, & INSPECTING SANITARY SEWER MAIN, 10"	LF	300	\$2.25	\$675.00

OPINION OF PROBABLE CONSTRUCTION COST: **\$24,770.00**

Staff Summary

10/19/2020

Agenda Item # 4.



City of Storm Lake
PO Box 1086
Storm Lake, IA 50588
p (712) 732-8000
f (712) 732-4114

REPORT TO: Honorable Mayor and City Council

FROM: Scott Olesen, Building Official

SUBJECT: **Approve Resolution No. 18-R-2020-2021 Awarding the Bid for the 2020 Sanitary Sewer Cleaning & Televising Plans, Specifications, and Form of Contract**

BACKGROUND: Eight NRDC-HUD funded projects were originally approved. With remaining funds, this is the ninth project and will allow for additional improvements of sanitary sewer mains in the vicinity of the previous 7th and Geneseo project as well as the Violet/Tulip/Rose Lane neighborhood. The public infrastructure improvements entail CIPP lining of existing 8" mains and associated manhole rehabilitation within the improvement areas.

This portion of the effort will entail cleaning and televising of the sewer mains. The collected televising data will reveal the condition of the pipes and allow the design engineers to identify the appropriate means of rehabilitation for the system.

Bids were opened on September 24, 2020. Seven bids were received with the apparent low bidder being Empire Pipe Services in the amount of \$21,992.80.

The Engineer's Opinion of Probable Cost is \$24,770.00. The project is one of nine NRDC-HUD funded projects with federal funding entailing 75% and local match 25%.

The public hearing was held on October 19, 2020 at 5:00 p.m. in City Council Chambers.

FISCAL IMPACT: The construction contract has an estimated value of \$21,992.80. The project is one of nine NRDC-HUD funded projects with federal funding entailing 75% and local match 25%.

RECOMMENDATION: Approve Resolution 18-R-2020-2021 to award the construction contract to Empire Pipe Services in the amount of \$21,992.80.

ATTACHMENTS:

Description		Type
	Engineer's Recommendation	Backup Material
	Resolui 18-R-2020-2021ton	Resolution



Real People. Real Solutions.

218 11th Street SW Plaza
Spencer, IA 51301

Ph: (712) 580-5075
Bolton-Menk.com

September 29, 2020

City of Storm Lake
Attn: David Derragon
620 Erie Street
Storm Lake, IA 50588

RE: Recommendation of Award
2020 Sanitary Sewer Cleaning & Televising
Project No.: P11.122266

Dear Mr. Derragon:

Bids were received and opened online via Microsoft Teams on Thursday, September 24th, 2020 at 3:00 PM for the project referenced above. Seven (7) bids were received and the result is tabulated below:

	<u>Total Bid</u>
Empire Pipe Services	\$ 21,992.80
Equix Integrity, Inc	\$ 22,217.00
Hydro-Klean	\$ 23,512.10
Visu-Sewer	\$ 26,589.60
Rehab Systems, Inc	\$ 32,006.00
Midwest Vac Professionals	\$ 52,317.50
National Power Rodding Corp.	\$ 63,050.00
Engineer's Estimate	\$ 24,770.00

A detailed bid abstract including the engineer's estimate is attached for your reference. If deemed economically feasible, we recommend awarding the contract to Empire Pipe Services in the amount of \$21,992.80.

Sincerely,
Bolton & Menk, Inc.

DocuSigned by:

Josh Pope

7367BB09A51D4F7...

Josh Pope P.E. LEED AP BD+C
City Infrastructure Engineer

encl.

BID ABSTRACT

2020 SANITARY SEWER CLEANING & TELEVISIONING
CITY OF STORM LAKE
BMI PROJECT NO. P11.122266

218 11th Street SW Plaza
Spencer, IA 51301
(712) 580-5075



September 24, 2020 @ 3:00 PM

Item No.	Description	Unit	Quantity	Engineer's Estimate Bolton & Menk		Empire Pipe Services N Mankato, MN		Equix Integrity, Inc Fond du Lac, WI		Hydro-Klean Des Moines, IA		Visu-Sewer Pewaukee, WI		Rehab Systems, Inc Cherokee, IA		Midwest Vac Professionals Panora, IA		National Power Rodding Chicago, IL	
				Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1	TELEVISIONING, CLEANING, & INSPECTING SANITARY SEWER MAIN, 6"	LF	300	\$2.25	\$675.00	\$2.05	\$615.00	\$6.00	\$1,800.00	\$1.91	\$573.00	\$2.16	\$648.00	\$2.60	\$780.00	\$4.00	\$1,200.00	\$10.00	\$3,000.00
2	TELEVISIONING, CLEANING, & INSPECTING SANITARY SEWER MAIN, 8"	LF	11710	\$2.00	\$23,420.00	\$1.78	\$20,843.80	\$1.70	\$19,907.00	\$1.91	\$22,366.10	\$2.16	\$25,293.60	\$2.60	\$30,446.00	\$4.25	\$49,767.50	\$5.00	\$58,550.00
3	TELEVISIONING, CLEANING, & INSPECTING SANITARY SEWER MAIN, 10"	LF	300	\$2.25	\$675.00	\$1.78	\$534.00	\$1.70	\$510.00	\$1.91	\$573.00	\$2.16	\$648.00	\$2.60	\$780.00	\$4.50	\$1,350.00	\$5.00	\$1,500.00
TOTAL BASE BID				\$24,770.00		\$21,992.80		\$22,217.00		\$23,512.10		\$26,589.60		\$32,006.00		\$52,317.50		\$63,050.00	
TOTAL BASE BID				\$24,770.00		\$21,992.80		\$22,217.00		\$23,512.10		\$26,589.60		\$32,006.00		\$52,317.50		\$63,050.00	

25-Sep-20 Denotes math error on proposal
H:\SMLK\P11122266\6_Plans-Specs\A_Bid Documents\Pre-Televising\[2020 09 25 122266 Abstract of Bids.xlsx]Sheet1

RESOLUTION NO. 18 R-2020-2021

RESOLUTION ADOPTING PLANS, SPECIFICATIONS, FORM OF CONTRACT, ESTIMATE OF COST, BID AND AWARD CONTRACT FOR THE 2020 SANITARY SEWER CLEANING & TELEVISIONING PROJECT

WHEREAS, the plans, specifications, form of contract, estimate of cost, and award bid were filed with the CITY for the construction of certain public improvements described in general as the 2020 Sanitary Sewer Cleaning & Televisioning Project; and

WHEREAS, notice of hearing on plans, specifications, form of contract and estimate of cost for said public improvements was published as required by law:

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF STORM LAKE, IOWA;

Section 1. . That the said plans, specifications, form of contract and estimate of cost, are hereby approved, as described in the preamble of this Resolution.

Section 2. That the following bid for the construction of certain public improvements described in general as the 2020 Sanitary Sewer Cleaning & Televisioning Project, is hereby accepted, the same being the lowest responsible bid received for said work, as follows:

Contractor: Empire Pipe Services

Amount of bid: \$21,992.80

Portion of bid: All

Section 3. That the Mayor and Clerk are hereby directed to execute contract with the contractor for the construction of said public improvements, said contract to be binding on the City, contingent to obtaining all the required concurrences and consents.

PASSED AND APPROVED this 19th day of October 2020.

Michael Porsch, Mayor

ATTEST:

Mayra A. Martinez, City Clerk

Staff Summary

10/19/2020

Agenda Item # 5.



City of Storm Lake
PO Box 1086
Storm Lake, IA 50588
p (712) 732-8000
f (712) 732-4114

REPORT TO: Honorable Mayor and City Council

FROM: Scott Olesen, Building Official

SUBJECT: **Resolution No. 19-R-2020-2021 Approving Change Order No. 1 of the Tulip Lane Storm Water Improvements Project**

BACKGROUND: The Tulip Lane neighborhood has been subjected to numerous flooding impacts in recent years. In March 2019, rainfall and rapid snowmelt resulted in considerable ponding west of Expansion Boulevard. The proposed improvements include installation of new storm sewer intakes and 15" to 24" mains, water quality infrastructure, and related improvements.

The project is one of nine NRDC-HUD funded projects with federal funding entailing 75% and local match 25%.

Based on favorable pricing provided by the contractor and combined with the 75% grant component, additional pavement reconstruction and installation of drainage infrastructure is recommended. Such additional improvements will cost-effectively maximize the drainage benefit of construction for the neighborhood.

FISCAL IMPACT: The estimated value of the contract prior to Change Orders with the Tulip Lane Stormwater Improvements project is \$292,995.50 with 0 previous change orders. This change order will result in an estimated \$95,251.50 increase to the contract. The project is one of nine NRDC-HUD funded projects with federal funding entailing 75% and local match 25% (\$23,813.00 increase).

RECOMMENDATION: Approve Resolution No. 19-R-2020-2021 Approving Change Order No. 1 of the Tulip Lane Storm Water Improvements project

ATTACHMENTS:

Description	Type
Change Order No. 1	Change Order
Resolution No. 19-R-2020-2021	Resolution

CHANGE ORDER NO.: 1

Owner: City of Storm Lake Owner's Project No.:
 Engineer: Bolton & Menk, Inc. Engineer's Project No.: P11.120478
 Contractor: Reding's Gravel & Excavating, Inc. Contractor's Project No.:
 Project: 2020 Tulip Lane Stormwater Improvements
 Contract Name:
 Date Issued: September 25, 2020 Effective Date of Change Order: August 3, 2020

The Contract is modified as follows upon execution of this Change Order:

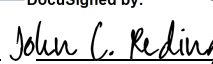
Description:

- 1) Reconstruction of Tulip Lane has extended to the east up to the Expansion Boulevard intersection. As a result, multiple estimated quantities are revised.
- 2) Added Item 37, STORM SEWER, TRENCHED, RCP CLASS III ARCH, 24".
- 3) Added Item 38, INTAKE, SW-504.
- 4) Added Item 39, REMOVAL OF DRIVEWAY
- 5) Added Item 40, TRAFFIC SIGN, SALVAGE AND REINSTALL
- 6) Miscellaneous storm sewer structures adjustments.
- 7) The project completion date has extended by 2 weeks.

Attachments:

- Change Order No. 1 – Schedule of Unit Prices
- Revised plan set dated Aug. 3, 2020

Change in Contract Price		Change in Contract Times	
Original Contract Price:		Original Contract Times:	
\$ 292,995.50		Substantial Completion:	May 28, 2021
		Ready for final payment:	June 11, 2021
Increase/Decrease from previously approved Change Orders No. 1 to No. :		Increase/Decrease from previously approved Change Orders No.1 to No. :	
\$ 0.00		Substantial Completion:	None
		Ready for final payment:	None
Contract Price prior to this Change Order:		Contract Times prior to this Change Order:	
\$ 292,995.50		Substantial Completion:	May 28, 2021
		Ready for final payment:	June 11, 2021
Increase this Change Order:		Increase this Change Order:	
\$ 95,251.50		Substantial Completion:	14 days
		Ready for final payment:	14 days
Contract Price incorporating this Change Order:		Contract Times with all approved Change Orders:	
\$ 388,247.00		Substantial Completion:	June 11, 2021
		Ready for final payment:	June 25, 2021

Recommended by Engineer (if required) DocuSigned by:  By: <u>John C. Reding</u> Title: <u>City Infrastructure Engineer</u> Date: <u>September 29, 2020</u> <u>Authorized by Owner</u> By: _____ Title: <u>Mayor</u> Date: _____	Accepted by Contractor DocuSigned by:  By: <u>John C. Reding</u> Title: <u>Secretary</u> Date: <u>September 29, 2020</u> <u>Approved by Funding Agency (if applicable)</u> By: _____ Title: _____ Date: _____
--	---

CHANGE ORDER #1 - SCHEDULE OF UNIT PRICES
 TULIP LANE STORM WATER IMPROVEMENTS
 CITY OF STORM LAKE, IOWA
 BMI PROJECT NO. P11.120478



Real People. Real Solutions.

Date: 10/05/2020

Item No.	Item	Unit	As-Bid Quantity	Change Quantity	Unit Price	Amount
1	EXCAVATION, CLASS 13	CY	505	338	\$30.75	\$10,393.50
2	SUBGRADE PREPARATION	SY	1133	703	\$3.25	\$2,284.75
3	SUBBASE, MODIFIED, 6"	SY	1133	703	\$11.50	\$8,084.50
8	STORM SEWER, TRENCHED, RCP CLASS III, 24"	LF	253	-230	\$56.00	-\$12,880.00
10	SUBDRAIN, PERFORATED PVC, 6"	LF	329	356	\$18.75	\$6,675.00
18	INTAKE, SW-503	EA	1	-1	\$6,575.00	-\$6,575.00
22	PAVEMENT, PCC, 7"	SY	1004	616	\$66.00	\$40,656.00
23	DRIVEWAY, PAVED, PCC, 6"	SY	87	121	\$96.00	\$11,616.00
24	FULL DEPTH PATCHES	SY	100	-100	\$87.00	-\$8,700.00
25	PAVEMENT REMOVAL	SY	1004	621	\$8.00	\$4,968.00
28	SOD	SY	497	313	\$10.75	\$3,364.75
34	REMOVE AND REPLACE MAILBOX	EA	7	2	\$60.00	\$120.00
35	SUMP PUMP CONNECTION	EA	8	4	\$910.00	\$3,640.00
37	STORM SEWER, TRENCHED, RCP CLASS III ARCH, 24"	LF	---	230	\$85.00	\$19,550.00
38	INTAKE, SW-504	EA	---	1	\$10,268.00	\$10,268.00
39	REMOVAL OF DRIVEWAY	SY	---	192	\$8.00	\$1,536.00
40	TRAFFIC SIGN, SALVAGE AND REINSTALL	EA	---	1	\$250.00	\$250.00
BASE TOTAL:						<u>\$95,251.50</u>

CITY OF STORM LAKE

CONSTRUCTION PLANS FOR

TULIP LANE STORMWATER IMPROVEMENTS

STORMWATER IMPROVEMENTS
STREET IMPROVEMENTS

JUNE, 2020

RESOURCE LIST

CITY OF STORM LAKE

City Hall
620 Erie Street
P.O. Box 1086
Storm Lake, IA 50588

City Manager:
Keri Navratil
Assistant City Manager:
David Derragon

Mayor: Mike Porsch

City Council Members:
Dan Smith
Jose Ibarra
Kevin McKinney
Maria Ramos
Tyson Rice

Infrastructure Engineer:
Josh Pope P.E.
Bolton & Menk, Inc.
218 11th Street SW Plaza
712-580-5075

Public Services Supervisor:
Scott Bonebrake

UTILITIES

GAS
Alliant Energy
Storm Lake, IA 50588
1-800-822-4348

TELEPHONE/CABLE

Long Lines
118 E. 5th St.
Storm Lake, IA 50588
712-213-7425

Mediacom
720 Lake Ave.
Storm Lake, IA 50588
855-633-4226

Century Link
426 Lake Ave.
Storm Lake, IA 50588
1-800-261-1691

WATER, WASTEWATER,
STORMWATER
City of Storm Lake
433 Vilas Rd.
Storm Lake, IA 50588
712-732-8029

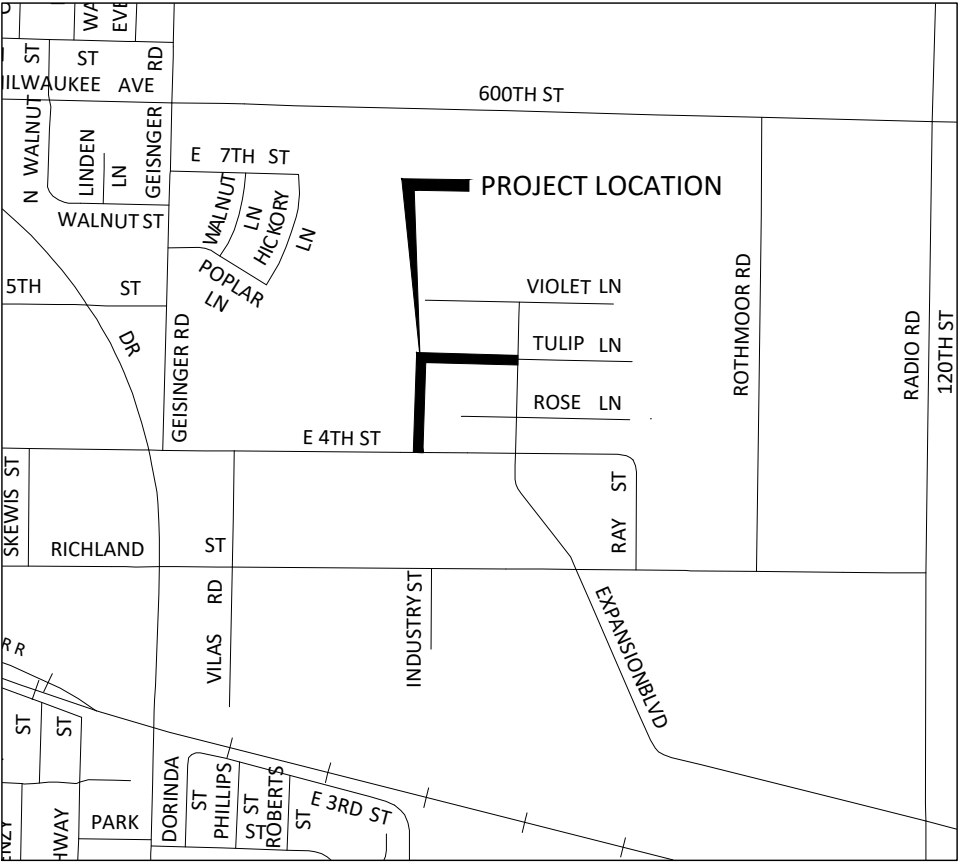
ELECTRIC
Mid American
1016 Vestal Street
Storm Lake, IA 50588
888-427-5632

MAP OF THE
CITY OF STORM LAKE
BUENA VISTA COUNTY, IA



MAP LEGEND

PROJECT LIMITS



SHEET NUMBER

GENERAL

G0.01 - G0.02
G1.01 - G1.02

SHEET TITLE

TITLE SHEET, LEGEND
ESTIMATED QUANTITIES & ESTIMATE REFERENCE NOTES

CIVIL

C0.01 EXISTING CONDITIONS & REMOVALS PLAN
C1.01 - C1.03 DETAILS AND TYPICAL SECTION
C2.01 EROSION CONTROL PLAN
C5.01 STORM SEWER PLAN & PROFILE
C6.01 STREET PLAN & PROFILE
C9.01 - C9.02 CROSS SECTIONS

THIS PLAN SET CONTAINS 13 SHEETS.



GOVERNING SPECIFICATIONS

THE 2020 EDITION OF THE "IOWA STATEWIDE URBAN STANDARD SPECIFICATIONS FOR PUBLIC IMPROVEMENTS" SHALL GOVERN.

IOWA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION", SERIES 2015 AND ALL CURRENT GENERAL SUPPLEMENTAL SPECIFICATIONS AND MATERIALS INSTRUCTIONAL MEMORANDUM SHALL GOVERN AS REFERENCED.

ALL APPLICABLE FEDERAL, STATE, AND LOCAL LAWS AND ORDINANCES WILL BE COMPLIED WITH IN THE CONSTRUCTION OF THIS PROJECT.

BM=1222.74
TOP OF EXISTING HYDRANT
NORTH SIDE OF TULIP LANE
STA. 102+69

BM=1430.00
TOP OF EXISTING HYDRANT
SOUTHWEST CORNER OF TULIP
LANE & EXPANSION BOULEVARD

PROJECT DATUM:
HORIZONTAL: Iowa Regional Coordinate System
(IRCS) Zone 4 Sioux City - Iowa Falls
VERTICAL: NAVD 88

RECORD DRAWING
INFORMATION
OBSERVER:
CONTRACTOR:
DATE:



I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS
PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION
AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER
UNDER THE LAWS OF THE STATE OF IOWA.

JOSHUA A. POPE, P.E.

LIC. NO. 23600 DATE: 06/01/2020

MY LICENSE RENEWAL DATE IS DECEMBER 31, 2021

PAGES OR SHEETS COVERED BY THIS SEAL:

ALL SHEETS



218 11TH STREET SW PLAZA
SPENCER, IOWA 51301
Phone: (712) 580-5075
Email: Spencer@bolton-menk.com
www.bolton-menk.com

DESIGNED	NO.	ISSUED FOR	DATE
WDB	0	BID	06/01/2020
DRAWN	1	CON	07/16/2020
CHECKED		CO 1	08/03/2020
JAP			
CLIENT PROJ. NO.			

CITY OF STORM LAKE, IOWA

TULIP LANE STORMWATER IMPROVEMENTS

TITLE SHEET

SHEET

G0.01

EXISTING TOPOGRAPHIC SYMBOLS

	ACCESS GRATE		REGULATION STATION GAS
	AIR CONDITION UNIT		SATELLITE DISH
	ANTENNA		SIGN TRAFFIC
	AUTO SPRINKLER CONNECTION		SIGNAL CONTROL CABINET
	BARRICADE PERMANENT		SOIL BORING
	BASKETBALL POST		SIREN
	BENCH		TELEPHONE BOOTH
	BIRD FEEDER		TILE INLET
	BOLLARD		TILE OUTLET
	BUSH		TILE RISER
	CATCH BASIN RECTANGULAR CASTING		TRANSFORMER-ELECTRIC
	CATCH BASIN CIRCULAR CASTING		TREE-CONIFEROUS
	CURB STOP		TREE-DEAD
	CLEAN OUT		TREE-DECIDUOUS
	CULVERT END		TREE STUMP
	DRINKING FOUNTAIN		TRAFFIC ARM BARRIER
	DOWN SPOUT		TRAFFIC SIGNAL
	FILL PIPE		TRASH CAN
	FIRE HYDRANT		UTILITY MARKER
	FLAG POLE		VALVE
	FLARED END / APRON		VALVE POST INDICATOR
	FUEL PUMP		VALVE VAULT
	GRILL		VENT PIPE
	GUY WIRE ANCHOR		WATER SPIGOT
	HANDHOLE		WELL
	HANDICAP SPACE		WETLAND DELINEATED MARKER
	IRRIGATION SPRINKLER HEAD		WETLAND
	IRRIGATION VALVE BOX		WET WELL
	LIFT STATION CONTROL PANEL		YARD HYDRANT
	LIFT STATION		
	LIGHT ON POLE		
	LIGHT-GROUND		
	MAILBOX		
	MANHOLE-COMMUNICATION		
	MANHOLE-ELECTRIC		
	MANHOLE-GAS		
	MANHOLE-HEAT		
	MANHOLE-SANITARY SEWER		
	MANHOLE-STORM SEWER		
	MANHOLE-UTILITY		
	MANHOLE-WATER		
	METER		
	ORDER MICROPHONE		
	PARKING METER		
	PAVEMENT MARKING		
	PEDESTAL-COMMUNICATION		
	PEDESTAL-ELECTRIC		
	PEDESTRIAN PUSH BUTTON		
	PICNIC TABLE		
	POLE-UTILITY		
	POST		
	RAILROAD SIGNAL POLE		

PROPOSED TOPOGRAPHIC SYMBOLS

	CLEANOUT
	MANHOLE
	LIFT STATION
	STORM SEWER CIRCULAR CASTING
	STORM SEWER RECTANGULAR CASTING
	STORM SEWER FLARED END / APRON
	STORM SEWER OUTLET STRUCTURE
	STORM SEWER OVERFLOW STRUCTURE
	CURB BOX
	FIRE HYDRANT
	WATER VALVE
	WATER REDUCER
	WATER BEND
	WATER TEE
	WATER CROSS
	WATER SLEEVE
	WATER CAP / PLUG
	RIP RAP
	DRAINAGE FLOW
	TRAFFIC SIGNS

SURVEY SYMBOLS

	BENCH MARK LOCATION
	CONTROL POINT
	MONUMENT IRON FOUND
	CAST IRON MONUMENT

EXISTING TOPOGRAPHIC LINES

	RETAINING WALL
	FENCE
	FENCE-DECORATIVE
	GUARD RAIL
	TREE LINE
	BUSH LINE

SURVEY LINES

	CONTROLLED ACCESS
	BOUNDARY
	CENTERLINE
	EXISTING EASEMENT LINE
	PROPOSED EASEMENT LINE
	EXISTING LOT LINE
	PROPOSED LOT LINE
	EXISTING RIGHT-OF-WAY
	PROPOSED RIGHT-OF-WAY
	SETBACK LINE
	SECTION LINE
	QUARTER LINE
	SIXTEENTH LINE
	TEMPORARY EASEMENT

EXISTING UTILITY LINES

	FORCEMAIN
	SANITARY SEWER
	SANITARY SERVICE
	STORM SEWER
	STORM SEWER DRAIN TILE
	WATERMAIN
	WATER SERVICE

PROPOSED UTILITY LINES

	FORCEMAIN
	SANITARY SEWER
	SANITARY SERVICE
	STORM SEWER
	STORM SEWER DRAIN TILE
	WATERMAIN
	WATER SERVICE
	PIPE CASING

GRADING INFORMATION

	EXISTING CONTOUR MINOR
	EXISTING CONTOUR MAJOR
	PROPOSED CONTOUR MINOR
	PROPOSED CONTOUR MAJOR
	PROPOSED GRADING LIMITS / SLOPE LIMITS
	PROPOSED SPOT ELEVATION
	RISE:RUN (SLOPE)

HATCH PATTERNS

	ASPHALT		GRAVEL
	CONCRETE		

EXISTING PRIVATE UTILITY LINES

NOTE:
EXISTING UTILITY INFORMATION SHOWN ON THIS PLAN HAS BEEN PROVIDED BY THE UTILITY OWNER. THE CONTRACTOR SHALL FIELD VERIFY EXACT LOCATIONS PRIOR TO COMMENCING CONSTRUCTION AS REQUIRED BY STATE LAW. NOTIFY IOWA ONE CALL, 1-800-292-8989.

THE SUBSURFACE UTILITY INFORMATION IN THIS PLAN IS UTILITY QUALITY LEVEL D UNLESS OTHERWISE NOTED. THIS UTILITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF CI/ASCE 38-02, ENTITLED "STANDARD GUIDELINES FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA"

	UNDERGROUND FIBER OPTIC
	UNDERGROUND ELECTRIC
	UNDERGROUND GAS
	UNDERGROUND COMMUNICATION
	OVERHEAD ELECTRIC
	OVERHEAD COMMUNICATION
	OVERHEAD UTILITY

UTILITIES IDENTIFIED WITH A QUALITY LEVEL :

LINE TYPES FOLLOW THE FORMAT: UTILITY TYPE - QUALITY LEVEL
EXAMPLE: GA GA UNDERGROUND GAS, QUALITY LEVEL A
UTILITY QUALITY LEVEL (A,B,C,D) DEFINITIONS CAN BE FOUND IN CI/ASCE 38-02.

UTILITY QUALITY LEVELS:

QUALITY LEVEL D: PROVIDES THE MOST BASIC LEVEL OF INFORMATION. IT INVOLVES COLLECTING DATA FROM EXISTING UTILITY RECORDS. RECORDS MAY INCLUDE AS-BUILT DRAWINGS, DISTRIBUTION AND SERVICES MAPS, EXISTING GEOGRAPHIC INFORMATION SYSTEM DATABASES, CONSTRUCTION PLANS, ETC.

QUALITY LEVEL C: INVOLVES SURVEYING VISIBLE SUBSURFACE UTILITY STRUCTURES SUCH AS MANHOLES, HAND-HOLES, UTILITY VALVES AND METERS, FIRE HYDRANTS, PEDESTALS AND UTILITY MARKERS, AND THEN CORRELATING THE INFORMATION WITH EXISTING UTILITY RECORDS TO CREATE COMPOSITE DRAWINGS. INCLUDES QUALITY LEVEL D ACTIVITIES.

QUALITY LEVEL B: INVOLVES DESIGNATING THE HORIZONTAL POSITION OF SUBSURFACE UTILITIES THROUGH SURFACE DETECTION METHODS AND COLLECTING THE INFORMATION THROUGH A SURVEY METHOD. INCLUDES QUALITY LEVEL C AND D TASKS.

QUALITY LEVEL A: PROVIDES THE HIGHEST LEVEL OF ACCURACY. IT INVOLVES LOCATING OR POTHOLING UTILITIES AS WELL AS ACTIVITIES IN QUALITY LEVELS B, C, AND D. THE LOCATED FACILITY INFORMATION IS SURVEYED AND MAPPED AND THE DATA PROVIDES PRECISE PLAN AND PROFILE INFORMATION.

ABBREVIATIONS

A	ALGEBRAIC DIFFERENCE	GRAV	GRAVEL	RSC	RIGID STEEL CONDUIT
ADJ	ADJUST	GU	GUTTER	RT	RIGHT
ALT	ALTERNATE	GV	GATE VALVE	SAN	SANITARY SEWER
B-B	BACK TO BACK	HDPE	HIGH DENSITY POLYETHYLENE	SCH	SCHEDULE
BIT	BITUMINOUS	HH	HANDHOLE	SERV	SERVICE
BLDG	BUILDING	HP	HIGH POINT	SHLD	SHOULDER
BMP	BEST MANAGEMENT PRACTICE	HWL	HIGH WATER LEVEL	STA	STATION
BR	BEGIN RADIUS	HYD	HYDRANT	STD	STANDARD
BV	BUTTERFLY VALVE	I	INVERT	STM	STORM SEWER
CB	CATCH BASIN	K	CURVE COEFFICIENT	TC	TOP OF CURB
C&G	CURB AND GUTTER	L	LENGTH	TE	TEMPORARY EASEMENT
CIP	CAST IRON PIPE	LO	LOWEST OPENING	TEMP	TEMPORARY
CIPP	CURED-IN-PLACE PIPE	LP	LOW POINT	TNH	TOP NUT HYDRANT
CL	CENTER LINE	LT	LEFT	TP	TOP OF PIPE
CL	CLASS	MAX	MAXIMUM	TYP	TYPICAL
CLVT	CULVERT	MH	MANHOLE	VCP	VITRIFIED CLAY PIPE
CMP	CORRUGATED METAL PIPE	MIN	MINIMUM	VERT	VERTICAL
C.O.	CHANGE ORDER	MR	MID RADIUS	VPC	VERTICAL POINT OF CURVE
COMM	COMMUNICATION	NIC	NOT IN CONTRACT	VPI	VERTICAL POINT OF INTERSECTION
CON	CONCRETE	NMC	NON-METALLIC CONDUIT	VPT	VERTICAL POINT OF TANGENT
CSP	CORRUGATED STEEL PIPE	NTS	NOT TO SCALE	WM	WATERMAIN
DIA	DIAMETER	NWL	NORMAL WATER LEVEL		
DIP	DUCTILE IRON PIPE	OHW	ORDINARY HIGH WATER LEVEL		
DWY	DRIVEWAY	PC	POINT OF CURVE	AC	ACRES
E	EXTERNAL CURVE DISTANCE	PCC	POINT OF COMPOUND CURVE	CF	CUBIC FEET
ELEC	ELECTRIC	PE	PERMANENT EASEMENT	CV	COMPACTED VOLUME
ELEV	ELEVATION	PED	PEDESTRIAN, PEDESTAL	CY	CUBIC YARD
EOF	EMERGENCY OVERFLOW	PERF	PERFORATED PIPE	EA	EACH
ER	END RADIUS	PERM	PERMANENT	EV	EXCAVATED VOLUME
ESMT	EASEMENT	PI	POINT OF INTERSECTION	LB	POUND
EX	EXISTING	PL	PROPERTY LINE	LF	LINEAR FEET
FES	FLARED END SECTION	PRC	POINT OF REVERSE CURVE	LS	LUMP SUM
F-F	FACE TO FACE	PT	POINT OF TANGENT	LV	LOOSE VOLUME
FF	FINISHED FLOOR	PVC	POLYVINYL CHLORIDE PIPE	SF	SQUARE FEET
F&I	FURNISH AND INSTALL	PVMT	PAVEMENT	SV	STOCKPILE VOLUME
FM	FORCEMAIN	R	RADIUS	SY	SQUARE YARD
FO	FIBER OPTIC	R/W	RIGHT-OF-WAY		
F.O.	FIELD ORDER	RCP	REINFORCED CONCRETE PIPE		
GRAN	GRANULAR	RET	RETAINING		



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DESIGNED	NO.	ISSUED FOR	DATE
WDB	BID	06/01/2020	
JJD	CON	07/16/2020	
CHECKED			
JAP			
CLIENT PROJ. NO.			

CITY OF STORM LAKE, IOWA

TULIP LANE STORMWATER IMPROVEMENTS

LEGEND

SHEET

G0.02

ESTIMATED PROJECT QUANTITIES				
ITEM NO.	ITEM CODE	ITEM	UNIT	QUANT
1	2010-108-E-0	EXCAVATION,CLASS 13	CY	843
2	2010-108-G-0	SUBGRADE PREPARATION	SY	1836
3	2010-108-I-0	SUBBASE, MODIFIED, 6"	SY	1836
4	2010-108-X-X	EXPLORATORY EXCAVATION	HR	3
5	3010-108-C-0	TRENCH FOUNDATION	TON	5
6	4020-108-A-1	STORM SEWER, TRENCHED, RCP CLASS V, 15"	LF	31
7	4020-108-A-1	STORM SEWER, TRENCHED, RCP CLASS III, 18"	LF	31
8	4020-108-A-1	STORM SEWER, TRENCHED, RCP CLASS III, 24"	LF	23
9	4030-108-B-0	PIPE APRON, RCP, 24"	EA	1
10	4040-108-A-0	SUBDRAIN, PERFORATED PVC, 6"	LF	685
11	4040-108-C-0	SUBDRAIN CLEANOUT, 6", TYPE A-1	EA	2
12	5010-108-A-1	WATER MAIN, TRENCHED, PVC, 6"	LF	86
13	5010-108-C-2	FITTING, DUCTILE IRON	LB	328
14	5010-108-X-X	POLYSTYRENE INSULATION, 4"	SF	32
15	5020-108-A-0	GATE VALVE & BOX, 6"	EA	2
16	5020-108-C-0	FIRE HYDRANT ASSEMBLY	EA	1
17	6010-108-B-0	INTAKE, SW-501	EA	1
18	6010-108-B-0	INTAKE, SW-503	EA	0
19	6010-108-B-0	INTAKE, SW-505	EA	1
20	6010-108-B-0	INTAKE, SW-506	EA	1
21	6010-108-X-X	STORM WATER TREATMENT DEVICE	EA	1
22	7010-108-A-0	PAVEMENT, PCC, 7"	SY	1620
23	7030-108-H-1	DRIVEWAY, PAVED, PCC, 6"	SY	208
24	7040-108-A-0	FULL DEPTH PATCHES	SY	0
25	7040-108-H-0	PAVEMENT REMOVAL	SY	1625
26	8030-108-A-0	TEMPORARY TRAFFIC CONTROL	LS	1
27	9010-108-A-0	CONVENTIONAL SEEDING, SEEDING, AND FERTILIZING	AC	0.5
28	9020-108-A-0	SOD	SY	810
29	9040-108-E-0	TEMPORARY RECP, TYPE 2C	SY	942
30	9040-108-R-0	TURF REINFORCEMENT MATS, TYPE 1	SQ	1
31	9040-108-T-1	INLET PROTECTION DEVICE	EA	7
32	11020-108-A-1	MOBILIZATION	LS	1
33	11030-108-A-0	MAINTENANCE OF POSTAL SERVICE	LS	1
34	11030-108-X-X	REMOVE AND REPLACE MAILBOX	EA	9
35	11030-108-X-X	SUMP PUMP CONNECTION	EA	12
36	12000-108-X-X	CONSTRUCTION ALLOWANCE	LS	1
37	4020-108-A-1	STORM SEWER, TRENCHED, RCP CLASS III ARCH, 24"	LF	230
38	6010-108-B-0	INTAKE, SW-504	EA	1
39	7030-108-A-0	REMOVAL OF DRIVEWAY	SY	192
40	8020-108-X-X	TRAFFIC SIGN, SALVAGE AND REINSTALL	EA	1

ESTIMATE REFERENCE INFORMATION		
ITEM NO.	ITEM CODE	DESCRIPTION
1	2010-108-E-0	EXCAVATION,CLASS 13 TOPSOIL STRIPPING, SALVAGING AND RE-SPREADING TO 8" MINIMUM THICKNESS IN ALL AREAS TO BE SEEDED SHALL BE CONSIDERED INCIDENTAL TO THIS ITEM.
2	2010-108-G-0	SUBGRADE PREPARATION
3	2010-108-I-0	SUBBASE, MODIFIED, 6"
4	2010-108-X-X	EXPLORATORY EXCAVATION THIS ITEM IS FOR THE INVESTIGATION OF LOCATIONS AND ELEVATIONS OF AN EXISTING UTILITY TO VERIFY THE POTENTIAL FOR CONFLICTS. THE ENGINEER OR THEIR REPRESENTATIVE MUST VERIFY THE CONDITIONS FOUND. NO PAYMENT WILL BE MADE FOR EXPLORATORY EXCAVATION UNLESS SPECIFICALLY DIRECTED AND AGREED TO BY THE ENGINEER. EXPLORATORY EXCAVATION WILL NOT BE PAID FOR EXCAVATION REQUIRED TO LOCATE AND CONNECT TO EXISTING PIPES UNLESS THE ENGINEER AGREES THAT EXCAVATION BEYOND WHAT COULD BE CONSIDERED REASONABLE IS REQUIRED. WHERE EXPLORATORY EXCAVATION IS PERFORMED IN A LOCATION THAT WILL NOT BE DISTURBED LATER, BACKFILL SHALL BE PLACED AND COMPACTED TO THE DENSITY SPECIFIED ELSEWHERE IN THE CONTRACT DOCUMENTS FOR THE TYPE OF UTILITY LOCATED. CONTRACTOR HAS THE OPTION TO USE OPEN EXCAVATION OR VACUUM TYPE EQUIPMENT TO PERFORM THE EXCAVATION DEPENDING UPON SITE CONDITIONS.
5	3010-108-C-0	TRENCH FOUNDATION ENGINEER SHALL APPROVE ALL TRENCH FOUNDATION LOCATIONS PRIOR TO CONTRACTOR PERFORMING THIS WORK. MATERIAL PLACED IN LIEU OF PERFORMING NECESSARY DEWATERING SHALL NOT BE PAID.
6	4020-108-A-1	STORM SEWER, TRENCHED, RCP CLASS V, 15" CONNECTION TO EXISTING PIPE WILL BE INCIDENTAL TO THIS ITEM. JOINTS SHALL MEET THE REQUIREMENTS OF ASTM C-361 & C-443 AND BE RUBBER O-RING. PIPE BEDDING SHALL CONFORM WITH SUDAS STANDARD PLATE SW-102, CLASS R-2. BEDDING MATERIAL SHALL BE CLASS I OR CLASS II OR AS SPECIFICALLY IDENTIFIED WITHIN THE CONTRACT DOCUMENTS. TRENCH COMPACTION TESTING SHALL BE PERFORMED BY THE OWNER.
7	4020-108-A-1	STORM SEWER, TRENCHED, RCP CLASS III, 18" CONNECTION TO EXISTING PIPE WILL BE INCIDENTAL TO THIS ITEM. JOINTS SHALL MEET THE REQUIREMENTS OF ASTM C-361 & C-443 AND BE RUBBER O-RING. PIPE BEDDING SHALL CONFORM WITH SUDAS STANDARD PLATE SW-102, CLASS R-2. BEDDING MATERIAL SHALL BE CLASS I OR CLASS II OR AS SPECIFICALLY IDENTIFIED WITHIN THE CONTRACT DOCUMENTS. TRENCH COMPACTION TESTING SHALL BE PERFORMED BY THE OWNER.
8	4020-108-A-1	STORM SEWER, TRENCHED, RCP CLASS III, 24" CONNECTION TO EXISTING PIPE WILL BE INCIDENTAL TO THIS ITEM. JOINTS SHALL MEET THE REQUIREMENTS OF ASTM C-361 & C-443 AND BE FABRIC WRAPPED UNLESS WITHIN 10 FEET OF A WATERMAIN WHICH SHALL BE GASKETED. PIPE BEDDING SHALL CONFORM WITH SUDAS STANDARD PLATE SW-102, CLASS R-2. BEDDING MATERIAL SHALL BE CLASS I OR CLASS II OR AS SPECIFICALLY IDENTIFIED WITHIN THE CONTRACT DOCUMENTS. TRENCH COMPACTION TESTING SHALL BE PERFORMED BY THE OWNER.
9	4030-108-B-0	PIPE APRON, RCP, 24" APRON GUARD SHALL BE INCIDENTAL TO THIS ITEM.
10	4040-108-A-0	SUBDRAIN, PERFORATED PVC, 6" SUBDRAIN SHALL BE PERFORATED PVC. BACKFILL SHALL BE PEA GRAVEL.
11	4040-108-C-0	SUBDRAIN CLEANOUT, 6", TYPE A-1
12	5010-108-A-1	WATER MAIN, TRENCHED, PVC, 6" PIPE SHALL BE DR-18 UNLESS OTHERWISE NOTED. ALL JOINTS, THRUST BLOCKS, TRACER WIRE, GROUNDING ANODES, AND CONNECTIONS TO EXISTING MAINS ARE CONSIDERED INCIDENTAL TO THIS ITEM EXCEPT AS OTHERWISE NOTED. PIPE BEDDING CLASS SHALL CONFORM WITH SUDAS STANDARD PLATE SW-101. CLASS P-3 BEDDING MATERIAL SHALL BE CLASS I OR CLASS II. CONTRACTOR SHALL COORDINATE WATER MAIN CONNECTIONS AND SHUTDOWN WITH OWNER. OWNER WILL PROVIDE WATER FOR INITIAL FILL AND FLUSHING. CONTRACTOR WILL BE CHARGED FOR WATER FLUSHING AFTER THE FIRST FAILED TEST. THE REMOVAL AND ABANDONMENT OF EXISTING WATERMAIN NECESSARY FOR INSTALLATION OF NEW WATERMAIN SHALL BE CONSIDERED INCIDENTAL. TESTING AND DISINFECTING SYSTEM PRIOR TO FINAL ACCEPTANCE IS CONSIDERED INCIDENTAL. TRACER WIRE AND CONNECTIONS TO EXISTING MAINS CONSIDERED INCIDENTAL TO THIS ITEM. TRACER WIRE SHALL BE #14 COPPER CLAD STEEL WIRE OR #12 AWD SOLID COPPER WIRE WITH 30-MIL HDPE INSULATING JACKET TAPED TO THE MAIN. TRACER WIRE SYSTEM SHALL USE 3M SPLICE KITS AND COPPERHEAD GROUNDING ANODES AND TERMINAL BOX, AND SHALL BE TERMINATED AS SHOWN ON PLAN. OWNER WILL TEST THE TRACER WIRE SYSTEM PRIOR TO FINAL ACCEPTANCE.
13	5010-108-C-2	FITTING, DUCTILE IRON ALL FITTINGS SHALL BE DUCTILE IRON, MECHANICAL JOINT, RESTRAINED JOINT WITH MEGALUG OR APPROVED EQUAL. NUTS AND BOLTS TO BE FLUOROCARBON COATED WITH 1-2.5 MIL THICKNESS. WEIGHTS ARE PER AWWA C-153. POLYETHYLENE WRAP AND BEDDING MATERIAL IS CONSIDERED INCIDENTAL TO THIS ITEM. ALL JOINTS TO HAVE A MINIMUM OF (2) 6 OZ. SACRIFICIAL ZINC ANODE CAPS PER GLAND INSTALLED. ALL SLEEVES SHALL BE SOLID SLEEVES, DRESSER COUPLINGS WILL NOT BE ALLOWED.
14	5010-108-X-X	POLYSTYRENE INSULATION, 4" INSULATION SHALL BE EXTRUDED RIGID BOARD MATERIAL WITH A THERMAL CONDUCTIVITY OF 0.23 BTU/HR/SF/INCH, MINIMUM COMPRESSIVE STRENGTH OF 35 PSI AND WATER ABSORPTION OF 0.25% BY VOLUME. BOARD DIMENSIONS SHALL BE 4' X 8' X 2" THICK. INSULATION SHALL BE PLACED ON A BED OF SAND AND SAND SHALL BE PLACED ABOVE THE INSULATION TO ISOLATE THE INSULATION FROM ROCKS AND OTHER SHARP OBJECTS THE ULTIMATE THICKNESS OF INSULATION REQUIRED SHALL BE ACHIEVED BY USING 2 LAYERS OF INSULATION, THE SECOND LAYER SHALL BE PLACED PERPENDICULAR TO THE FIRST LAYER AND THE JOINTS SHALL BE OFFSET.
15	5020-108-A-0	GATE VALVE & BOX, 6" VALVES SHALL BE RESILIENT WEDGE, NON-RISING STEM, IRON BODY, 2" SQUARE OPENING NUT, OPEN LEFT, MECHANICAL JOINTS AND 200 PSI WORKING PRESSURE. VALVES SHALL BE THE SAME SIZE AS THE PIPE ON WHICH THEY ARE LOCATED. VALVE BOXES SHALL BE HEAVY DUTY (THICK CAST) MARKED "WATER" ON VALVE BOX COVER. STRAIGHTENING AND ADJUSTING OF VALVE BOX TO FINAL GRADE IS INCIDENTAL TO THIS ITEM. VALVE UMBRELLA ANCHORAGE ASSEMBLY SHALL BE MANUFACUTRED BY ADAPTOR, INC., OAK CREST WI, OR EQUIVALENT.
16	5020-108-C-0	FIRE HYDRANT ASSEMBLY ALL FITTINGS, JOINTS, GATE VALVES, AND 6" PVC PIPE NECESSARY TO INSTALL HYDRANT SHALL BE CONSIDERED INCIDENTAL TO THIS ITEM INCLUDING THE HYDRANT TEE. HYDRANTS SHALL BE MUELLER SUPER CENTURION 250 3-WAY HYDRANTS MODEL A-423 AND PAINTED YELLOW. VALVES SHALL BE MUELLER RESILIENT WEDGE GATE VALVES WITH STAINLESS STEEL BOLTS, OR APPROVED EQUAL. "G" ELEVATION SHOWN IN PLANS REFERENCES THE FINISHED GROUND ELEVATION WHERE THE HYDRANT IS LOCATED. VALVE UMBRELLA ANCHORAGE ASSEMBLY SHALL BE MANUFACUTRED BY ADAPTOR, INC., OAK CREST WI, OR EQUIVALENT.
17	6010-108-B-0	INTAKE, SW-501 CUTTING CONCRETE FOR STRUCTURES AND/OR PIPE TO ACCOMMODATE PIPE CONNECTIONS SHALL BE CONSIDERED INCIDENTAL TO THIS ITEM.
18	6010-108-B-0	INTAKE, SW-503 CUTTING CONCRETE FOR STRUCTURES AND/OR PIPE TO ACCOMMODATE PIPE CONNECTIONS SHALL BE CONSIDERED INCIDENTAL TO THIS ITEM.



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DESIGNED	NO.	ISSUED FOR	DATE
WDB	0	BID	06/01/2020
DRAWN	1	CON	07/16/2020
CHECKED		CO 1	08/03/2020
JAP			
CLIENT PROJ. NO.			

CITY OF STORM LAKE, IOWA

TULIP LANE STORMWATER IMPROVEMENTS

QUANTITIES AND ESTIMATE REFERENCE INFORMATION

SHEET

G1.01

ESTIMATE REFERENCE INFORMATION		
ITEM NO.	ITEM CODE	DESCRIPTION
19	6010-108-B-0	INTAKE, SW-505 CUTTING CONCRETE FOR STRUCTURES AND/OR PIPE TO ACCOMMODATE PIPE CONNECTIONS SHALL BE CONSIDERED INCIDENTAL TO THIS ITEM.
20	6010-108-B-0	INTAKE, SW-506 CUTTING CONCRETE FOR STRUCTURES AND/OR PIPE TO ACCOMMODATE PIPE CONNECTIONS SHALL BE CONSIDERED INCIDENTAL TO THIS ITEM.
21	6010-108-X-X	STORM WATER TREATMENT DEVICE DEVICE SHALL BE CASCADE SEPARATOR MANUFACTURED BY CONTECH ENGINEERED SOLUTIONS MODEL CS-5. SEE SPECIAL PROVISIONS.
22	7010-108-A-0	PAVEMENT, PCC, 7" GROUND GRANULATED BLAST FURNACE SLAG SHALL NOT BE PERMITTED FOR ANY WORK ON THIS PROJECT. CONCRETE SHALL BE IDOT CLASS C #4000. CONCRETE MATERIAL TESTING TO BE PERFORMED BY OWNER.
23	7030-108-H-1	DRIVEWAY, PAVED, PCC, 6" GROUND GRANULATED BLAST FURNACE SLAG SHALL NOT BE PERMITTED FOR ANY WORK ON THIS PROJECT. CONCRETE SHALL BE IDOT CLASS C #4000. CONCRETE MATERIAL TESTING TO BE PERFORMED BY OWNER.
24	7040-108-A-0	FULL DEPTH PATCHES PATCHES WITH MANHOLES SHALL BE CONSTRUCTED AS A BOXOUT ACCORDING TO FIGURE 7010.103. ALL PAVEMENT PATCHES SHALL BE FLUSH WITH ADJACENT CONCRETE. GROUND GRANULATED BLAST FURNACE SLAG SHALL NOT BE PERMITTED FOR ANY WORK ON THIS PROJECT. CONCRETE SHALL BE IDOT CLASS C #4000 OR M #4000. CONCRETE MATERIAL TESTING TO BE PERFORMED BY OWNER. HOT POUR CRACK AND JOINT FILLER SHALL BE USED. PATCHING LIMITS TO BE FIELD-MARKED BY ENGINEER AND MAY BE LESS THAN FULL PANNEL WIDTH. PATCHES SHALL MATCH EXISTING JOINTING.
25	7040-108-H-0	PAVEMENT REMOVAL REMOVAL LIMITS SHALL BE FIELD-MARKED BY ENGINEER.
26	8030-108-A-0	TEMPORARY TRAFFIC CONTROL
27	9010-108-A-0	CONVENTIONAL SEEDING, SEEDING, AND FERTILIZING
28	9020-108-A-0	SOD SOD ALL AREAS DISTURBED BY CONSTRUCTION UNLESS INDICATED ON PLANS. COST FOR WATERING SHALL BE CONSIDERED INCIDENTAL TO THIS ITEM. ROCK PICKING, FINISH GRADING, AND REWORK, INCLUDING REGRADING AND ADJUSTING GRADING, ARE CONSIDERED INCIDENTAL TO THIS ITEM. CONTRACTOR RESPONSIBLE FOR PROTECTING ALL SODDED AREAS THRU ESTABLISHMENT AND ACCEPTANCE. CONTRACTOR RESPONSIBLE FOR MOWING AND MAINTAINING SODDED AREAS UNTIL PROJECT IS ACCEPTED BY OWNER. SODDING OF AREAS OUTSIDE OF CONSTRUCTION LIMITS SHALL BE RESPONSIBILITY OF CONTRACTOR AT NO ADDITIONAL COST TO OWNER. SEE SHEET C2.01 FOR LOCATION.
29	9040-108-E-0	TEMPORARY RECP, TYPE 2C PRIOR TO INSTALLING THE PRODUCT, SURFACE SHALL BE SMOOTH WITH SEED AND FERTILIZER ALREADY APPLIED. OVERLAP CONSECUTIVE ROLLS A MINIMUM OF 3 INCHES AND INSTALL ANCHORS AT A MAXIMUM OF 18 INCHES ALONG ALL OVERLAPS. ADJACENT PARALLEL ROLLS SHALL BE OVERLAPPED A MINIMUM OF 2 INCHES USING ANCHORS DEVICES.
30	9040-108-R-0	TURF REINFORCEMENT MATS, TYPE 1 EXCAVATION, STAPLES, ANCHORING DEVICES, AND MATERIAL FOR ANCHORING SLOTS SHALL BE CONSIDERED INCIDENTAL.

ESTIMATE REFERENCE INFORMATION		
ITEM NO.	ITEM CODE	DESCRIPTION
31	9040-108-T-1	INLET PROTECTION DEVICE INLET PROTECTION SHALL BE EITHER DROP IN OR WATTLES AS SHOWN IN PLANS. MAINTENANCE AND REMOVAL SHALL BE CONSIDERED INCIDENTAL.
32	11020-108-A-1	MOBILIZATION
33	11030-108-A-0	MAINTENANCE OF POSTAL SERVICE CONTRACTOR SHALL PROVIDE TEMPORARY MAIL BOXES FOR ALL RESIDENCES AFFECTED BY THE PROJECT. TEMPORARY MAILBOX SHALL BE LOCATED IN A PLACE ACCESSIBLE TO ALL RESIDENTS AND THE USPS FOR THE DURATION OF THE PROJECT. ITEM WILL BE PAID 0.5 OF THE TOTAL ITEM COST UPON INSTALLATION. REMAINDER WILL BE PAID UPON REMOVAL.
34	11030-108-X-X	REMOVE AND REPLACE MAILBOX CONTRACTOR SHALL REMOVE AND SALVAGE EXISTING MAILBOX AND REINSTALL EXISTING MAILBOX UPON PROJECT COMPLETION. REINSTALLED MAILBOX TO BE LOCATED AT EXISTING HORIZONTAL LOCATION AND IN CONFORMANCE WITH THE USPS STANDARDS. ITEM WILL BE PAID 0.5 OF THE TOTAL ITEM COST UPON INSTALLATION OF THE TEMPORARY MAILBOX AND THE TOTAL BID PRICE UPON REINSTALLATION OF THE EXISTING MAILBOX AND REMOVAL OF THE TEMPORARY MAILBOX.
35	11030-108-X-X	SUMP PUMP CONNECTION ITEM SHALL INCLUDE ALL LABOR AND MATERIALS NECESSARY FOR INSTALLATION ACCORDING TO THE DETAIL IN THIS PLAN.
36	12000-108-X-X	CONSTRUCTION ALLOWANCE THIS ITEM SHALL BE USED AT THE ENGINEER AND OWNER'S DISCRETION TO PAY FOR MINOR WORK CHANGE DIRECTIVES. NO PAYMENT SHALL BE MADE FOR EXTRA WORK UNLESS IT IS APPROVED IN WRITING BY THE ENGINEER PRIOR TO THE WORK BEING UNDERTAKEN BY THE CONTRACTOR. ANY PORTION OF THE LUMP SUM CONSTRUCTION ALLOWANCE THAT IS NOT USED WILL BE REFUNDED TO THE OWNER. CONTRACTOR SHALL SUBMIT A WRITTEN REQUEST FOR APPROVAL OF A WORK CHANGE PRIOR TO BEGINNING THE WORK.
37	4020-108-A-1	STORM SEWER, TRENCHED, RCP CLASS III ARCH, 24" JOINTS SHALL MEET THE REQUIREMENTS OF ASTM C-361 & C-443 AND BE RUBBER O-RING. PIPE BEDDING SHALL CONFORM WITH SUDAS STANDARD PLATE SW-102, CLASS R-2. BEDDING MATERIAL SHALL BE CLASS I OR CLASS II OR AS SPECIFICALLY IDENTIFIED WITHIN THE CONTRACT DOCUMENTS. TRENCH COMPACTION TESTING SHALL BE PERFORMED BY THE OWNER.
38	6010-108-B-0	INTAKE, SW-504 CUTTING CONCRETE FOR STRUCTURES AND/OR PIPE TO ACCOMMODATE PIPE CONNECTIONS SHALL BE CONSIDERED INCIDENTAL TO THIS ITEM.
39	7030-108-A-0	REMOVAL OF DRIVEWAY
40	8020-108-X-X	TRAFFIC SIGN, SALVAGE AND REINSTALL THIS ITEM INCLUDES ALL LABOR, MATERIAL, AND EQUIPMENT TO SALVAGE AND REINSTALL TRAFFIC SIGNS IN ACCORDANCE WITH THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD). STEEL POSTS, BASE PLATE AND ALL HARDWARE NECESSARY FOR INSTALLATION ARE CONSIDERED INCIDENTAL TO THIS ITEM.

A	CITY OF STORM LAKE - STORM SEWER CONSTRUCTION																				
STRUC IDENT.	STATION	LOC	TYPE	DESIGN	CASTING	RIM ELEV	OUTLET ELEV	DRAINS TO STRUC	PIPE GRADE	24" FLARED END SECTION	STORM WATER TREATMEN T DEVICE	SW-501 HEIGHT	SW-504 HEIGHT	SW-505 HEIGHT	SW-506 HEIGHT	6" PVC SUBDRAIN	15" RCP	18" RCP	24" RCP	24" RCP ARCH PIPE	NOTES
										(EA)	(LF)	(LF)	(LF)	(LF)	(LF)	(LF)	(LF)	(LF)	(LF)		
1	101+59.60	17.50 RT	FES	-----	-----	-----	1422.85	DITCH		1											
2	101+74.29	17.50 RT	MH		E	1426.55	1422.89	1	0.27%		8.16								15		
3	101+82.28	15.50 RT	CB	SW-504	R E	1425.43	1422.91	2	0.27%				2.52						8		
4	101+82.16	15.50 LT	CB	SW-501	R	1425.42	1423.15	3	0.76%			2.27				232	31				(1)
5	104+12.21	15.50 RT	CB	SW-506	R E	1426.01	1423.30	3	0.17%					2.71	227					230	(1)
6	104+12.21	15.50 LT	CB	SW-505	R R	1426.01	1423.63	5	1.08%					2.38	226		31				(2)
									TOTALS	1	8.16	2.27	2.52	2.38	2.71	685	31	31	23	230	

STORM SEWER NOTES:
STRUCTURE HEIGHTS ARE PROVIDED FOR INFORMATION ONLY.
(1) - PROVIDE 1 HOLE FOR 6" SUBDRAIN CONNECTION.
(2) - PROVIDE 2 HOLES FOR 6" SUBDRAIN CONNECTION.

CASTING NOMENCLATURE:
REFER TO SUDAS STANDARD PLATES SW-602, SW-603, & SW-604 FOR CASTING INFORMATION



BOLTON & MENK

218 11TH STREET SW PLAZA
SPENCER, IOWA 51301
Phone: (712) 580-5075
Email: Spencer@bolton-menk.com
www.bolton-menk.com

DESIGNED	NO.	ISSUED FOR	DATE
WDB	0	BID	06/01/2020
DRAWN	1	CON	07/16/2020
CHECKED		CO 1	08/03/2020
JAP			
CLIENT PROJ. NO.			

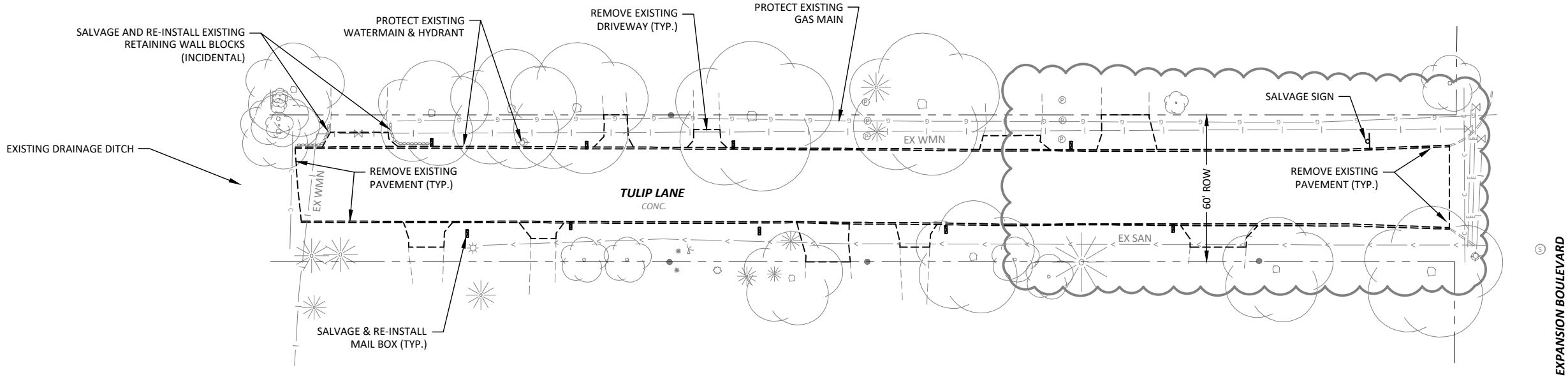
CITY OF STORM LAKE, IOWA

TULIP LANE STORMWATER IMPROVEMENTS

QUANTITIES AND ESTIMATE REFERENCE INFORMATION

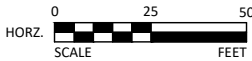
SHEET

G1.02



- NOTES**
- COORDINATE REMOVAL LIMITS WITH ENGINEER AND OWNER.
 - SALVAGE/REMOVAL AND RE-INSTALLATION OF ALL LANDSCAPING INCLUDING, BUT NOT LIMITED TO, RETAINING WALLS AND PLANTING BEDS SHALL BE INCIDENTAL. COORDINATE WITH THE ENGINEER PRIOR TO COMMENCING LANDSCAPE REMOVAL ACTIVITIES.

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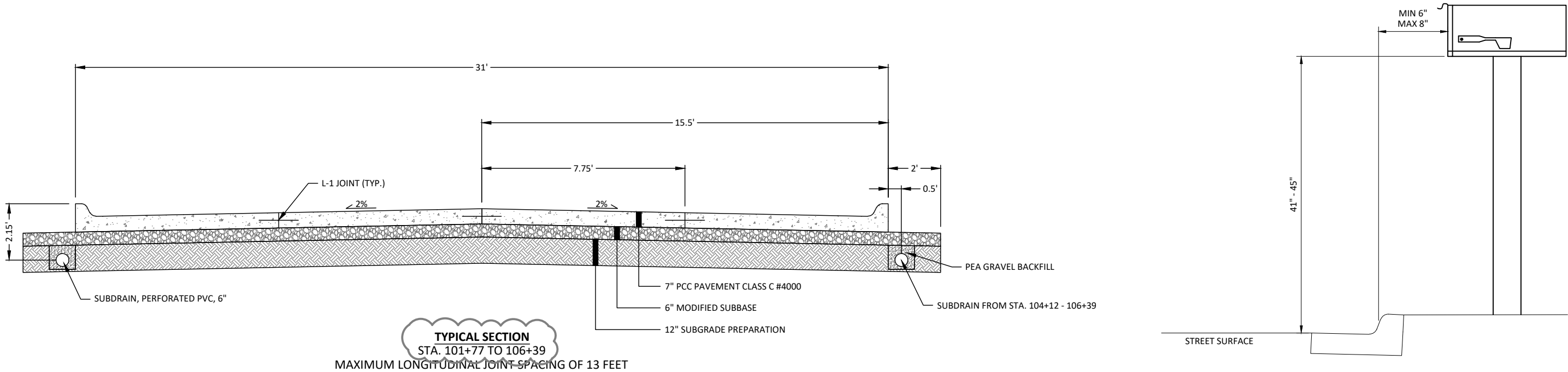


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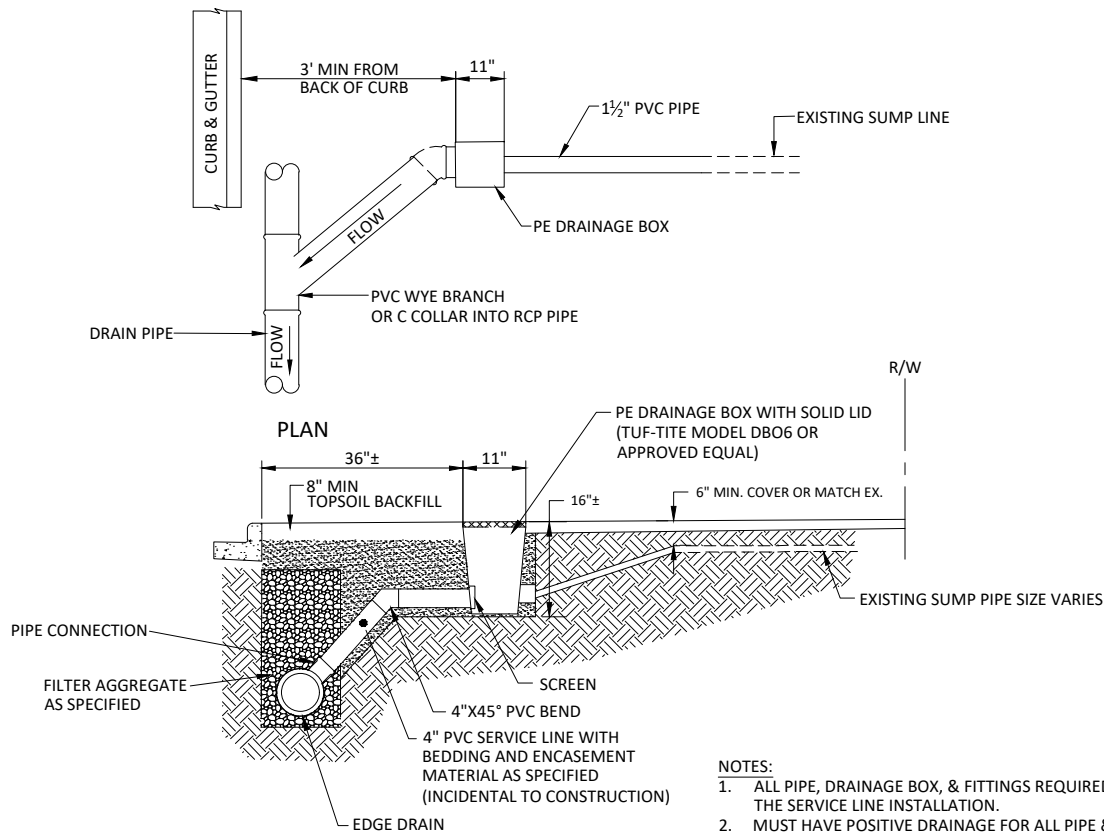
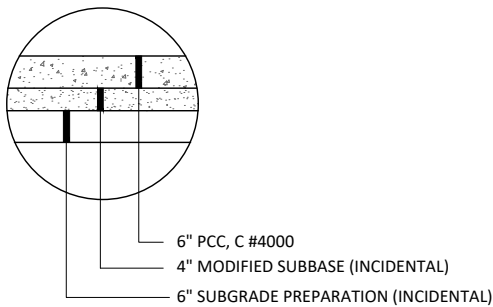
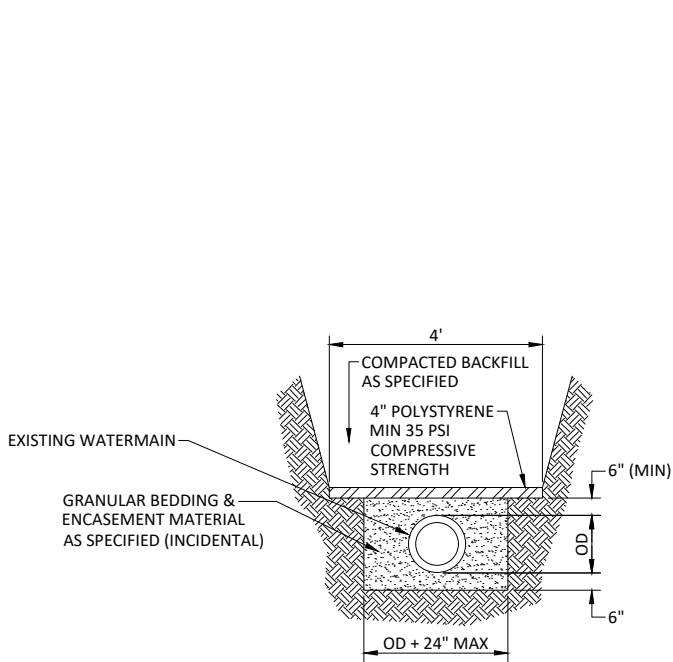
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JAP			
CLIENT PROJ. NO.			

CITY OF STORM LAKE, IOWA
TULIP LANE STORMWATER IMPROVEMENTS
EXISTING CONDITIONS & REMOVALS
STORMWATER SWALE & TULIP LANE

SHEET
C0.01



MAILBOX INSTALLATION
NOT TO SCALE



SUMP PUMP CONNECTION
NOT TO SCALE

- NOTES:
1. ALL PIPE, DRAINAGE BOX, & FITTINGS REQUIRED ARE INCLUDED IN THE SERVICE LINE INSTALLATION.
 2. MUST HAVE POSITIVE DRAINAGE FOR ALL PIPE & FITTINGS.
 3. ALL PIPE & FITTINGS SHALL BE SDR 35 PVC. GASKETED FITTINGS.
 4. LOCATIONS AND NUMBER OF SERVICES TO BE DETERMINED IN FIELD BY ENGINEER. QUANTITY MAY BE INCREASED OR DECREASED BY ANY AMOUNT.
 5. IF UNDERGROUND SUMP PUMP LINE DOES NOT CURRENTLY EXIST, CAP 1.5" PVC PIPE 2' OUTSIDE SUMP PUMP BOX.



- ### GATE VALVE BOX INSTALLATION





WATER QUALITY FLOW RATE	1.9 CFS
PEAK FLOW RATE	13.5 CFS
RETURN PERIOD OF PEAK FLOW	5 YRS



OUTSIDE BOTTOM
ELEV. 1418.39'

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com
3. CASCADE SEPARATOR WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
4. STRUCTURE SHALL MEET AASHTO HS-20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 2', AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
5. CASCADE SEPARATOR STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-478 AND AASHTO LOAD FACTOR DESIGN METHOD.

- A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
- B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CASCADE SEPARATOR MANHOLE STRUCTURE.
- C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
- D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN. ALL PIPE CENTERLINES TO MATCH PIPE OPENING CENTERLINES.
- E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH
PROPOSAL
DRAWING

1 OF 1

CS-5 - 647915-10
STORM LAKE HDS UNIT
STORM LAKE, IA



CONTECH
ENGINEERED SOLUTIONS LLC

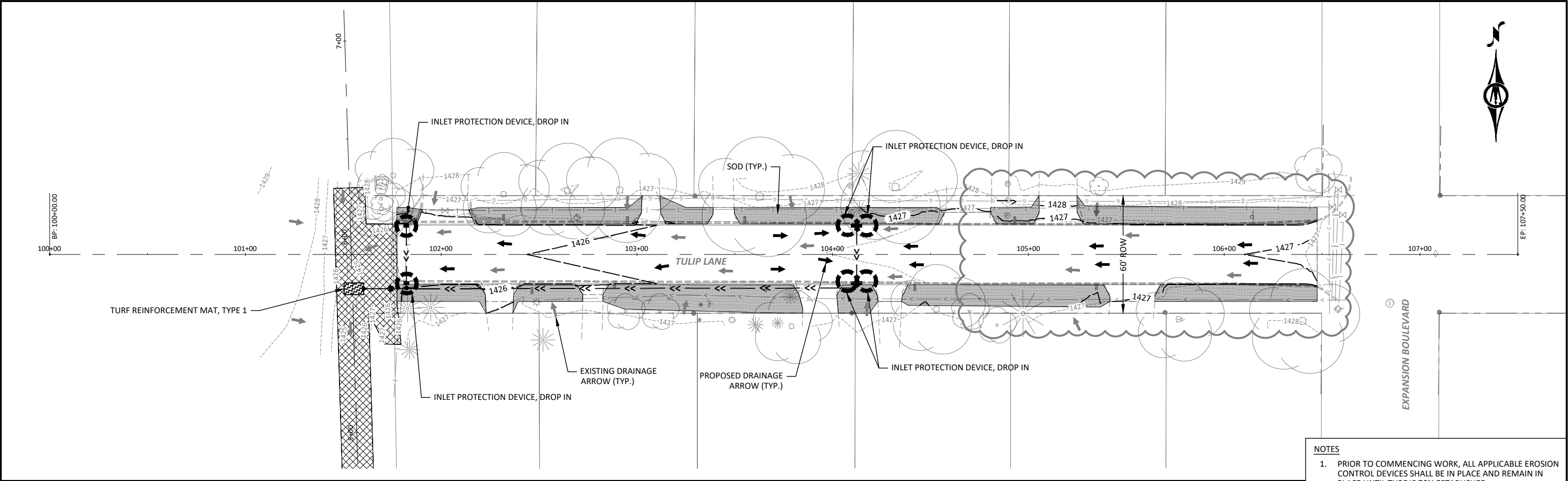
www.Conteches.com

11815 NE Glarm Drive Portland, OR 97220
503-561-5353
503-561-1271 FAX

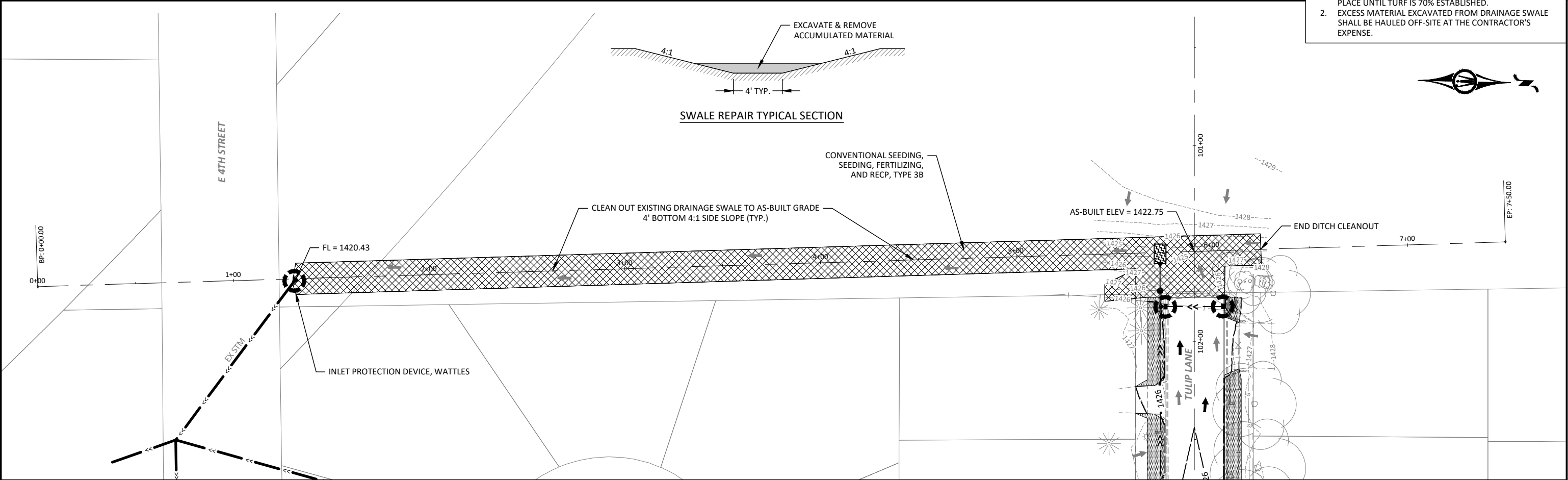
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CASCADE
separator™

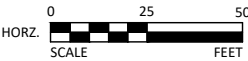
DESIGNED: GHH	DRAWN: GHH
CHECKED: GHH	APPROVED: GHH
PROJECT No.: 647915	SEQUENCE No.: 10
SHEET: 1 OF 1	



- NOTES**
1. PRIOR TO COMMENCING WORK, ALL APPLICABLE EROSION CONTROL DEVICES SHALL BE IN PLACE AND REMAIN IN PLACE UNTIL TURF IS 70% ESTABLISHED.
 2. EXCESS MATERIAL EXCAVATED FROM DRAINAGE SWALE SHALL BE HAULED OFF-SITE AT THE CONTRACTOR'S EXPENSE.



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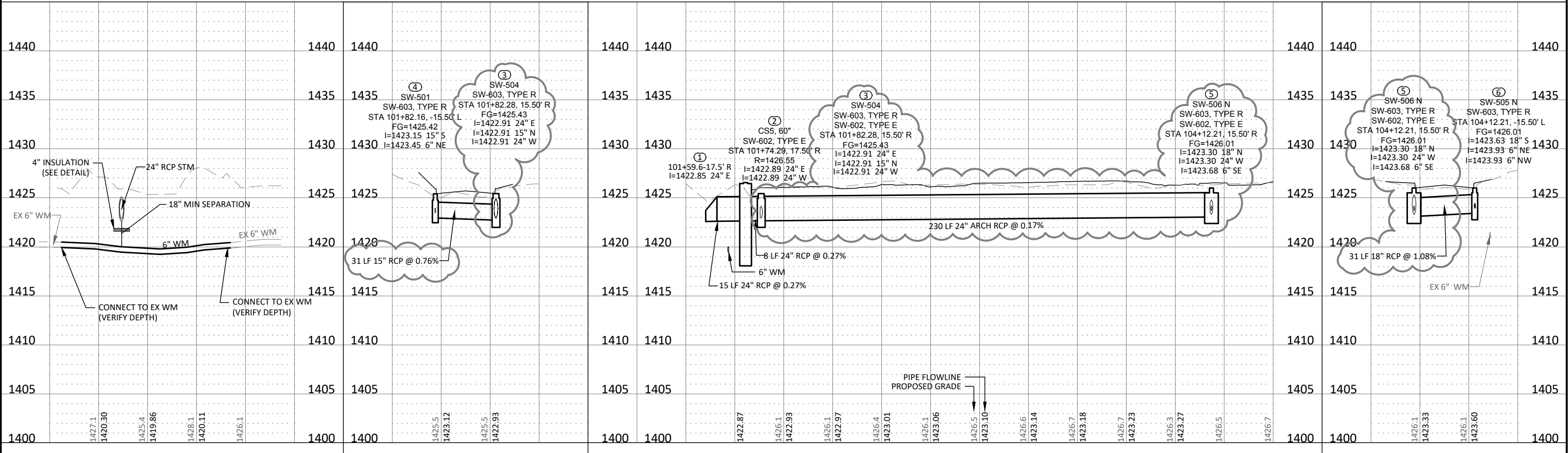
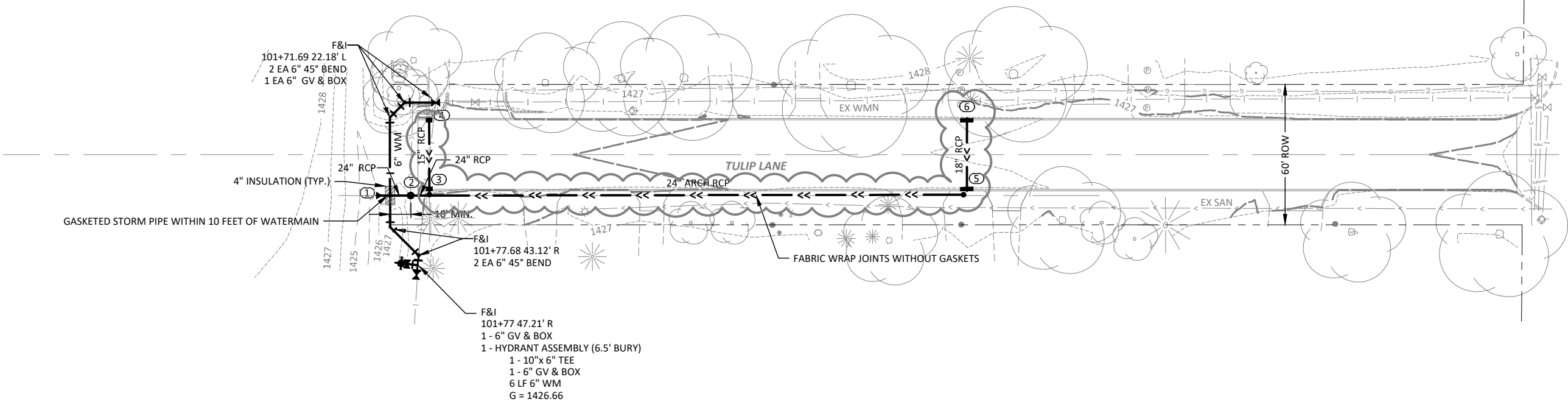


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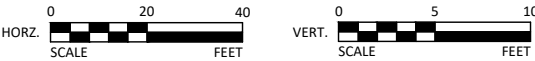
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JJD	1	CON	07/16/2020
JAP		CO 1	08/03/2020
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CLIENT PROJ. NO.			

CITY OF STORM LAKE, IOWA
TULIP LANE STORMWATER IMPROVEMENTS
EROSION CONTROL PLAN
STORMWATER SWALE & TULIP LANE

SHEET
C2.01



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**BOLTON
& MENK**

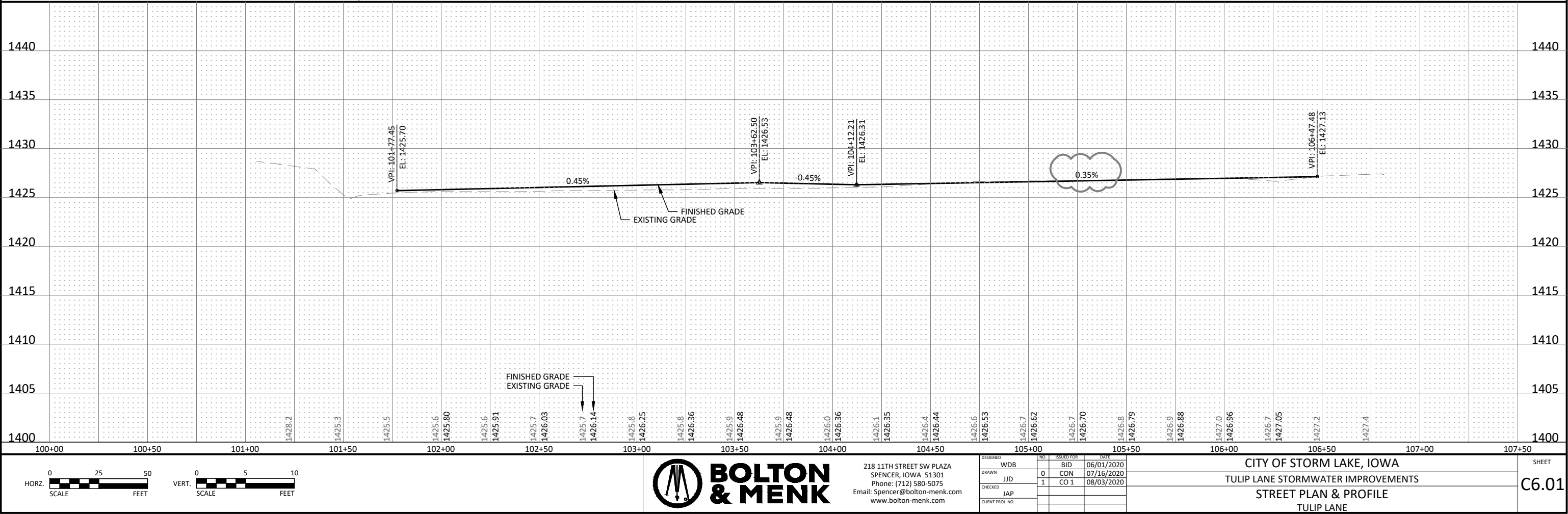
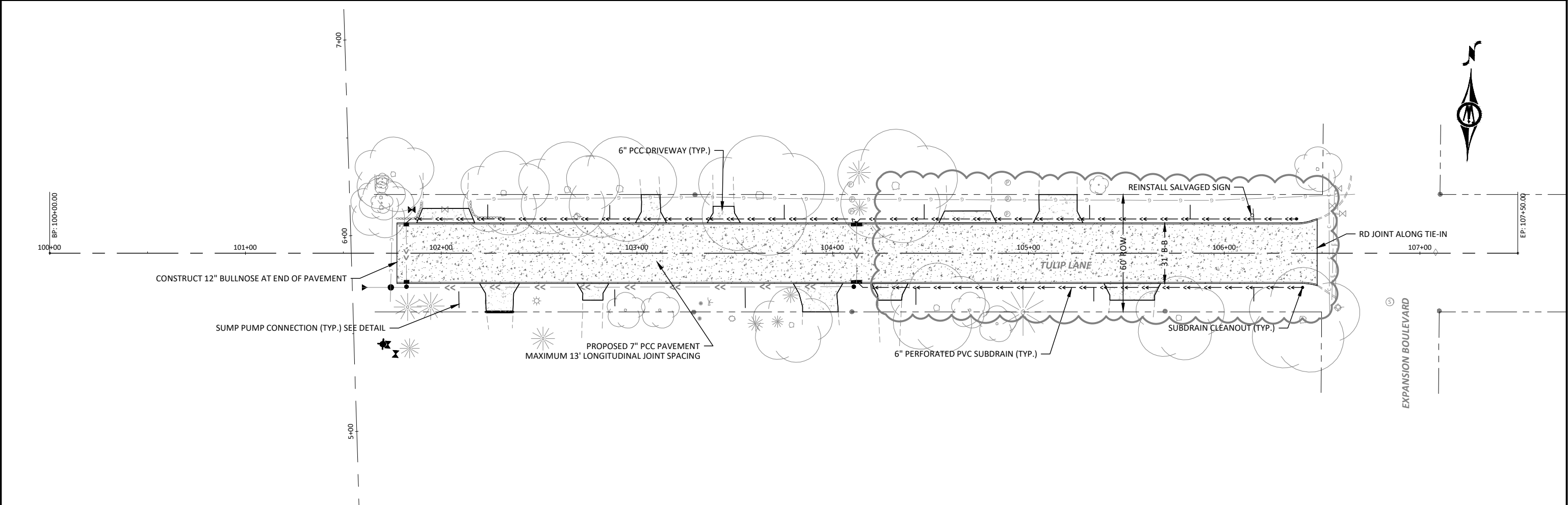
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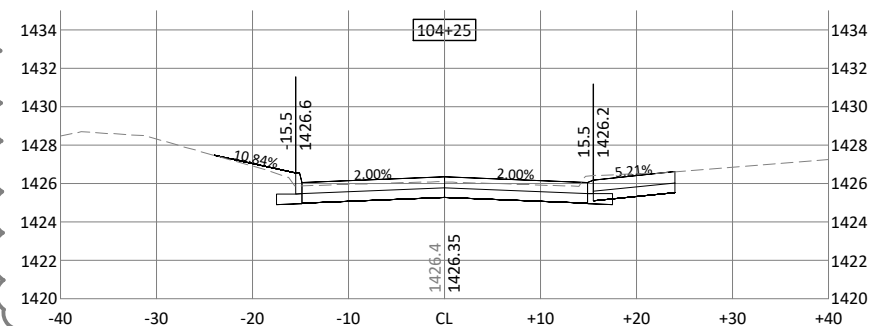
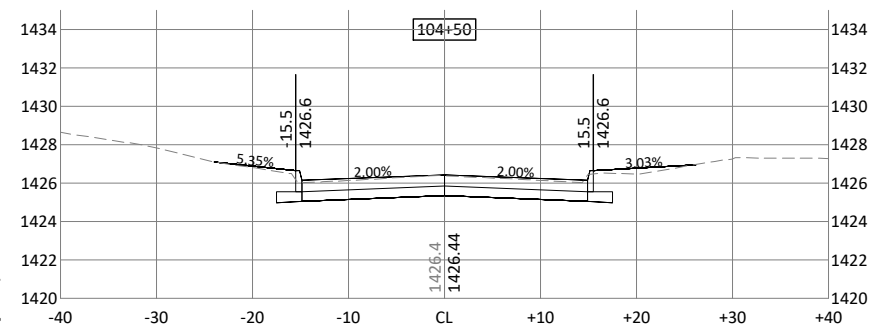
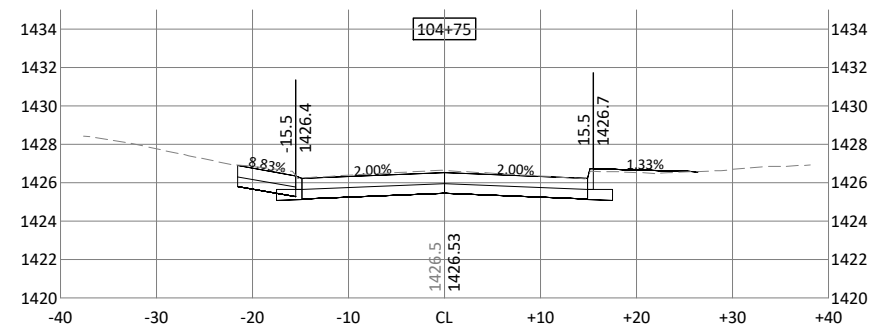
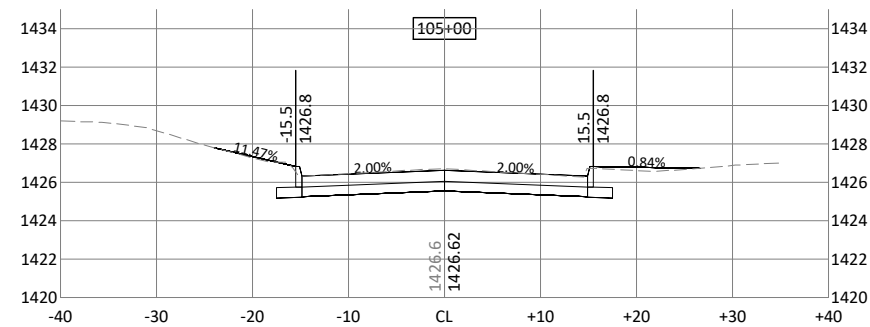
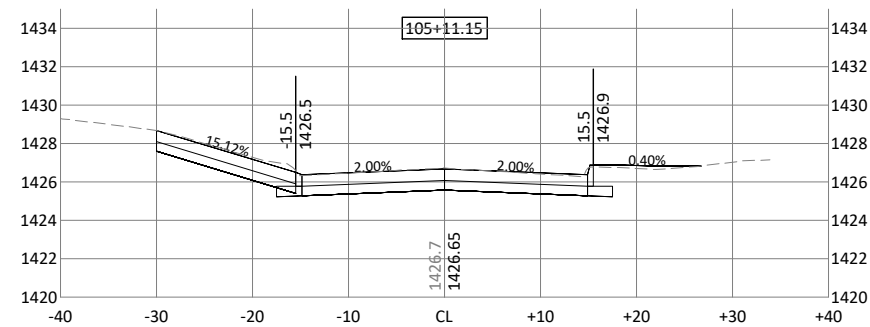
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WDB	0	BID	06/01/2020
DRAWN	1	CON	07/16/2020
CHECKED		CO 1	08/03/2020
JAP			
CLIENT PROJ. NO.			

CITY OF STORM LAKE, IOWA
TULIP LANE STORMWATER IMPROVEMENTS
STORM SEWER PLAN & PROFILE
TULIP LANE

SHEET

C5.01



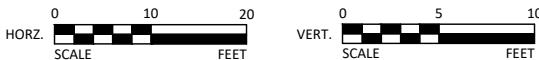
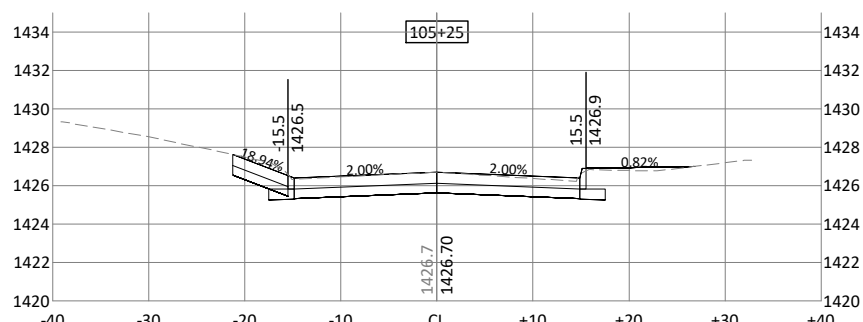
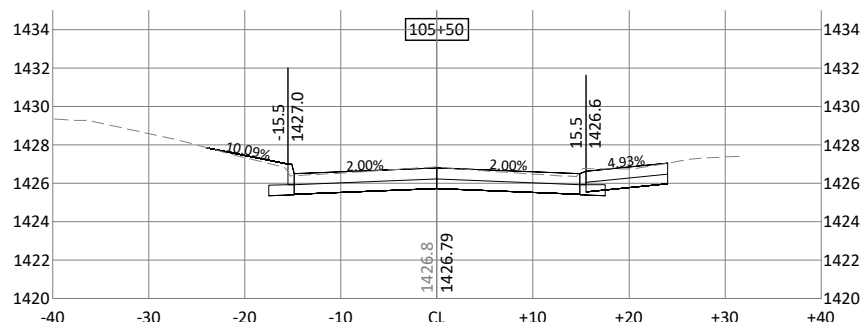
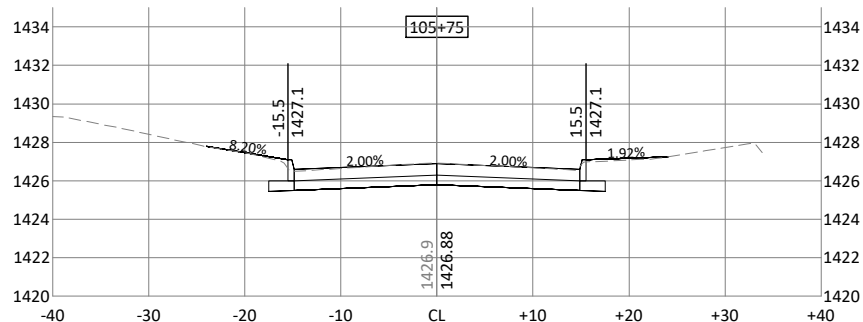
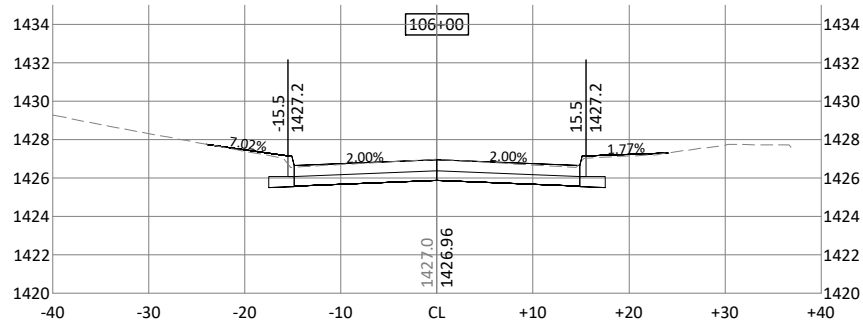
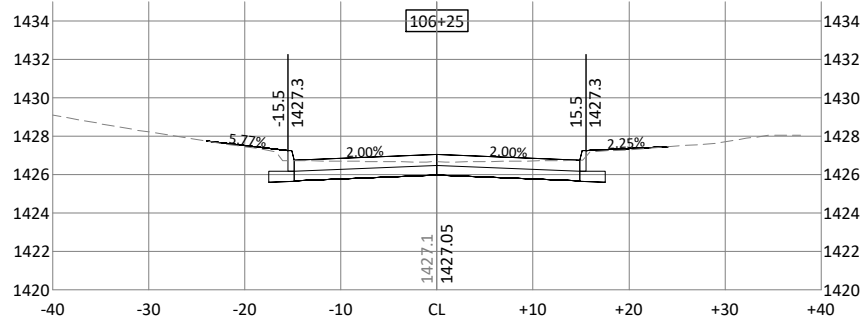


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CLIENT PROJ. NO.			

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DESIGNED	NO.	ISSUED FOR	DATE
WDB	0	BID	06/01/2020
JJD	1	CON	07/16/2020
JAP		CO 1	08/03/2020
CLIENT PROJ. NO.			

CITY OF STORM LAKE, IOWA
TULIP LANE STORMWATER IMPROVEMENTS
CROSS SECTIONS
TULIP LANE

SHEET

C9.02

RESOLUTION NO. 19-R-2020-2021

RESOLUTION ADOPTING CHANGE ORDER NO. 1 FOR THE TULIP LANE STORM WATER IMPROVEMENT PROJECT

WHEREAS, the plans, specifications, form of contract, estimate of cost, and award bid were filed with the CITY for the construction of certain public improvements described in general as the Tulip Lane Stormwater Improvement Project; and

WHEREAS, notice of hearing on plans, specifications, form of contract and estimate of cost for said public improvements was published as required by law; and

WHEREAS, a contract in the amount of \$292,995.50 was awarded to Redig's Gravel & Excavating Inc. for the project; and

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF STORM LAKE, IOWA;

Section 1. Change Order No. 1 increased the project cost in the amount of \$95,251.50 making the new contract amount \$388,247.00.

Section 2: That the Mayor and Clerk are hereby directed to execute this Change Order No. 1 with the contractor.

PASSED AND APPROVED this 19th day of October 19, 2020.

Michael Porsch, Mayor

ATTEST:

Mayra A. Martinez, City Clerk

Staff Summary

10/19/2020

Agenda Item # 6.



City of Storm Lake
PO Box 1086
Storm Lake, IA 50588
p (712) 732-8000
f (712) 732-4114

REPORT TO: Honorable Mayor and City Council

FROM: Scott Olesen, Building Official

SUBJECT: **Motion to Award A Bid To Schoon Construction, LLC, of Cherokee, Iowa for the Early Elementary Water Main Extension Project**

BACKGROUND: The City of Storm Lake must extend a water main from the existing 6 inch water main located at the intersection of Abner Bell Road and West Milwaukee. The main extension will be installed in the west ditch of Abner Bell Road and then be bored under the road to the east where it will terminate on the site of the new Early Childhood Center.

City Staff sent out an RFQ for the water main extension project and the City received one bid. The lowest bidder was Schoon Construction LLC, of Cherokee, Iowa. They provided a bid of \$34,595. The Engineers estimate was \$46,700.

The site plan sheet for the project, the Contractor's estimate, and the Engineer's letter of recommendation are attached to this staff summary.

FISCAL IMPACT: The bid for this project is \$34,595.

RECOMMENDATION: Award the bid for the Early Elementary Water Main Extension project to Schoon Construction & Excavation, LLC, of Cherokee, Iowa.

ATTACHMENTS:

Description	Type
☐ Letter of Recommendation	Letter
☐ Bid - SCE	Backup Material
☐ Bid Tabulation	Backup Material
☐ Plans and Profile - Early Elementary Water Main Extension	Map



RE: RECOMMENDATION OF AWARD – EARLY ELEMENTARY WATER MAIN EXTENSION

Dear Council Members,

Quotes were received for the above referenced project on October 15, 2020 at which time one proposal was received for the project. The provided proposal tab provides a detailed breakdown of the proposal, which is summarized below.

- | | |
|-------------------------------|-------------|
| 1. SCE, LLC of Cherokee, Iowa | \$34,595.00 |
|-------------------------------|-------------|

The only proposal was from SCE, LLC of Cherokee, Iowa for \$34,595.00. Our original estimate of cost on the project was \$46,700.00. The low proposal is 26% less than our original estimate.

Based on our review of the proposal received, the costs of the contractor are reasonable, fair, and worthy of consideration for acceptance by the City. ISG recommends that the City award the contract to SCE, LLC of Cherokee, Iowa at their meeting on October 19, 2020.

If you have any questions, please don't hesitate to reach out to me at 712.732.7745.

Sincerely,

A handwritten signature in black ink, reading "Amanda Goodenow", with a long horizontal flourish extending to the right.

Amanda Goodenow, PE
Civil Engineer
Amanda.Goodenow@ISGInc.com

WORK PROPOSAL

PROPOSAL OF: SCE, LLC
(hereinafter called "Contractor"), organized and existing under the
laws of the State of Iowa, doing business as a
LLC

(corporation, partnership, individual, joint venture)

TO: **CITY OF STORM LAKE** (hereinafter called "OWNER")

FOR: **EARLY ELEMENTARY WATER MAIN EXTENSION**

The City of Storm Lake is extending a 6-inch water main on 90th Avenue from the intersection of Highway 7.

Types of construction included in this project are as follows:

Extension of 6" water main (open cut and directional drill), seeding, and miscellaneous work to complete the project.

I+S Group, Inc., per the direction of the City of Storm Lake, has prepared plans and specifications for the work along with an estimate of quantities. The City of Storm Lake is now requesting proposals for the performance of the work. Please utilize this proposal form in submitting your quote. Only completed and signed proposals will be accepted.

I. PROPOSAL

- A. Proposal is to be returned to the **CITY OF STORM LAKE (ATTN: KERI NAVRATIL) 620 ERIE STREET, STORM LAKE, IOWA 50588** on or before **OCTOBER 15, 2020 by 10:00 AM.**
- B. CONTRACTOR understands that the estimated quantities of work to be done are approximate only and are intended principally to serve as a guide in evaluating the proposals.
- C. In submitting this proposal, the CONTRACTOR has:
 1. Examined and carefully studied the notes in the request of proposals letter, construction notes in the Contract Documents, and other related data identified in the Contract Documents. Contract Documents include this Work Proposal, the Performance Bond, and Plan Sheets.
 2. Visited the Site and become familiar with and is satisfied as to the general, local and site conditions that may affect cost, progress, and performance of the Work.

- D. CONTRACTOR agrees to furnish and deliver all materials described in the CONTRACT DOCUMENTS for the following unit prices and lump sum:

PROJECT QUANTITY SCHEDULE

OWNER is exempt from Sales and Use Tax and the Contractor is not required to include taxes in their bid amounts.

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	BID PRICE
1	TRAFFIC CONTROL	LS	1	750 ⁻	750 ⁻
2	WATER MAIN, 6", C900 PVC, OPEN CUT	LF	323	53 ⁻	17119 ⁻
3	WATER MAIN, 6", C900 PVC, DIRECTIONAL DRILL	LF	67	78 ⁻	5226 ⁻
4	CONNECT TO EXISTING WATER MAIN, TAPPING VALVE & SLEEVE, 6"	EA	1	5200 ⁻	5200 ⁻
5	CONNECT TO EXISTING WATER SERVICE	EA	1	650 ⁻	650 ⁻
6	SEEDING, FERTILIZING, AND MULCHING	LS	1	1500 ⁻	1500 ⁻
7	INLET PROTECTION DEVICE	EA	2	175 ⁻	350 ⁻
8	TESTING	LS	1	1350 ⁻	1350 ⁻
9	MOBILIZATION	LS	1	2450 ⁻	2450 ⁻
TOTAL BID PRICE \$					

II. INSURANCE

Contractor shall purchase and maintain such liability and other insurance as is appropriate for the work being performed and furnished and as will provide protection from claims which may arise out of or result from Contractor's performance and furnishing of the work and Contractor's other obligations under the Contract Documents, whether it is to be performed or furnished by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform or furnish any of the work, or by anyone for whose acts any of them may be liable. The following minimum limits of liability are required:

- A. Contractor's General Liability which shall include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody and control of Contractor:

Combined single limit of - \$1,000,000.00

with an annual aggregate of - \$2,000,000.00

B. Personal Injury:

Annual aggregate - \$1,000,000.00

C. Property Damage liability insurance will provide explosion, collapse, and underground coverages.

D. Automobile Liability:

Bodily Injury and Property Damage
Combined single limit of - \$1,000,000.00
with and annual aggregate of \$2,000,000.00

E. OWNER Liability:

With respect to insurance required above, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner, and any other individuals or entities identified in this Work Proposal, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide Non-Contributory coverage for all claims covered thereby.

F. UMBRELLA Liability: \$1,000,000.00 Occurrence/\$1,000,000.00 Aggregate

III. PERFORMANCE BOND

- A. Contractor shall furnish performance bond in an amount at least equal to the Contract Price as security for the faithful performance of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in this Work Proposal, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the

Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.

- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs B and D.
- D. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

IV. CONTRACT TIME FRAME

CONTRACTOR agrees, if this proposal is accepted, to enter into an agreement to complete all work in compliance with the CONTRACT DOCUMENTS, within the following time frame.

- A. The work shall be completed on or before **December 10, 2020**.
- B. BIDDER agrees to pay Owner liquidated damages of five hundred dollars (\$500) for every calendar day after the completion date, unless completion time is extended by the City of Storm Lake.

SUBMITTED on 6th day of October, 2020

Name (individual, partnership, or corporation): SCE, LLC

By: 
(Individual, General Partner, or Corporate Officer signature)

Name and Title (typed or printed): Cory Bouchard Member

Business Address: 5047 HWY 3 Cherokee, IA 51012

Phone No.: 712-225-6224 Fax No.: 712-225-6207

Proposal Tabulation

Early Elementary Water Main Extension

Storm Lake, IA

Project Number: 19-22354

Bid Letting Time + Date: 10:00 a.m., October 15, 2020

Bid Letting Location: Storm Lake City Hall, 620 Erie Street, Storm Lake, IA 50588

				SCE, LLC 5047 Hwy 3 Cherokee, IA 51012		Engineer's Estimate	
Item No.	Construction Item	Unit	Quantity	Unit Price	Amount	Unit Price	Amount
1	TRAFFIC CONTROL	LS	1	\$ 750.00	\$ 750.00	\$ 1,500.00	\$ 1,500.00
2	WATER MAIN, 6", C900 PVC, OPEN CUT	LF	323	\$ 53.00	\$ 17,119.00	\$ 50.00	\$ 16,150.00
3	WATER MAIN, 6", C900 PVC, DIRECTIONAL DRILL	LF	67	\$ 78.00	\$ 5,226.00	\$ 150.00	\$ 10,050.00
4	CONNECT TO EXISTING WATER MAIN, TAPPING VALVE & SLEEVE, 6"	EA	1	\$ 5,200.00	\$ 5,200.00	\$ 8,000.00	\$ 8,000.00
5	CONNECT TO EXISTING WATER SERVICE	EA	1	\$ 650.00	\$ 650.00	\$ 2,500.00	\$ 2,500.00
6	SEEDING, FERTILIZING, AND MULCHING	LS	1	\$ 1,500.00	\$ 1,500.00	\$ 1,500.00	\$ 1,500.00
7	INLET PROTECTION	EA	2	\$ 175.00	\$ 350.00	\$ 250.00	\$ 500.00
8	TESTING	LS	1	\$ 1,350.00	\$ 1,350.00	\$ 2,500.00	\$ 2,500.00
9	MOBILIZATION	LS	1	\$ 2,450.00	\$ 2,450.00	\$ 4,000.00	\$ 4,000.00
Total Construction Cost				\$	34,595.00	\$	46,700.00

CITY OF STORM LAKE EARLY ELEMENTARY WATER MAIN EXTENSION

STORM LAKE, IOWA

CONSTRUCTION PLANS

ISG PROJECT # 18-22354



LEGEND	
EXISTING	
	CITY LIMITS
	SECTION LINE
	QUARTER SECTION LINE
	RIGHT OF WAY LINE
	PROPERTY / LOTLINE
	EASEMENT LINE
	ACCESS CONTROL
	WATER EDGE
	WETLAND BOUNDARY
	WETLAND / MARSH
	FENCE LINE
	CULVERT
	STORM SEWER
	SANITARY SEWER
	SANITARY SEWER FORCEMAIN
	WATER
	GAS
	OVERHEAD ELECTRIC
	UNDERGROUND ELECTRIC
	UNDERGROUND TELEPHONE
	UNDERGROUND TV
	OVERHEAD UTILITY
	UNDERGROUND UTILITY
	UNDERGROUND FIBER OPTIC
	CONTOUR (MAJOR)
	CONTOUR (MINOR)
	DECIDUOUS TREE
	CONIFEROUS TREE
	TREE LINE
	MANHOLE/STRUCTURE
	CATCH BASIN
	HYDRANT
	VALVE
	CURB STOP
	POWER POLE
	UTILITY PEDESTAL / CABINET
PROPOSED	
	LOT LINE
	RIGHT OF WAY
	EASEMENT
	CULVERT
	STORM SEWER
	STORM SEWER (PIPE WIDTH)
	SANITARY SEWER
	SANITARY SEWER (PIPE WIDTH)
	WATER
	GAS
	OVERHEAD ELECTRIC
	UNDERGROUND ELECTRIC
	UNDERGROUND TV
	CONTOUR
	MANHOLE
	CATCH BASIN
	HYDRANT
	VALVE



LOCATION MAP

SCALE IN FEET
0 250 500

ABBREVIATIONS:

AC Acre	CMP Corrugated Metal Pipe	FDN Foundation	HR Hour	MB Mail Box	PVC Polyvinyl Chloride	TEL Telephone
ADA Americans with Disabilities Act	CO Cleanout	FFE Finished Floor Elevation	HWL High Water Level	MECH Mechanical	PVMT Pavement	TEMP Temporary
ADD Addendum	CONC Concrete	FSM Feet per minute	HWY Highway	MH Manhole	QTY Quantity	THRU Through
AFF Above Finished Floor	CONST Construction	FPS Feet per Second	HYD Hydrant	MIN Minimum	RAD Radius	TNRF Top Nut of Fire Hydrant
AGG Aggregate	CONT Continuous	FT Foot, Feet	I Invert	MISC Miscellaneous	RCP Reinforced Concrete Pipe	TRANS Transformer
APPROX Approximate	CY Cubic Yard	FTG Footing	ID Inside Diameter	NO Number	RD Roof Drain	TV Television
ARCH Architect, Architectural	C&G Curb and Gutter	GA Gauge	IN Inch	NTS Not To Scale	REBAR Reinforcing Bar	T/W Top of Wall
BFE Basement Floor Elevation	DEMO Demolition	GAL Gallon	INV Invert	NWL Normal Water Level	REM Remove	TYP Typical
BIT Bituminous	DIA Diameter	GALV Galvanized	IP Iron Pipe	OC On Center	ROW Right of Way	UT Utility, Underground Telephone
CAD Computer-Aided Design	DIM Dimension	GC General Contractor	IPS Iron Pipe Size	OCEW On Center Each Way	R/W Right of Way	VCP Vitrified Clay Pipe
CB Catch Basin	DS Downspout	GFE Garage Floor Elevation	J-BOX Junction Box	OH Overhead	SAN Sanitary	W/O Without
CFS Cubic Feet per Second	EA Each	GL Gutter Line	JOINT Joint	OHD Overhead Door	SCH Schedule	W/ With
CF Cubic Foot	ELEC Electrical	GPM Gallons Per Minute	LF Linear Feet	OZ Ounce	SF Square Foot	YD Yard
CI Cast Iron	ELEV Elevation	GV Gate Valve	LIN Linear	PED Pedestal, Pedestrian	SPEC Specification	YR Year
CIP Cast Iron Pipe	EQ Emergency Overflow	HDPE High Density Polyethylene	LPS Low Pressure Steam	PERF Perforated	SQ Square	
CIPC Cast In Place Concrete	EQ Equal	HD Heavy Duty	LS Lump Sum	PL Property Line	STA Station	
CJ Control Joint	EX Existing	HH Handhole	ISO Lowest Structural Opening	PP Polypropylene	SY Square Yard	
CL Centerline	FDC Fire Department Connection	HORIZ Horizontal	MAX Maximum	PSI Pounds per square inch	T/C Top of Curb	

PROJECT INDEX:

OWNER:

CITY OF STORM LAKE
620 ERIE STREET
STORM LAKE, IA 50588
PH: (712)732-8000

PROJECT

ADDRESS / LOCATION:

SECTIONS 32 AND 33, T-91N, R-37W,

WASHINGTON TWP
STORM LAKE, IOWA

MANAGING OFFICE:

STORM LAKE OFFICE
1725 LAKE AVE. NORTH
STORM LAKE, IA 50588
PHONE: 712.732.7745

PROJECT MANAGER: AMANDA GOODENOW, PE
EMAIL: AMANDA.GOODENOW@ISGINC.COM

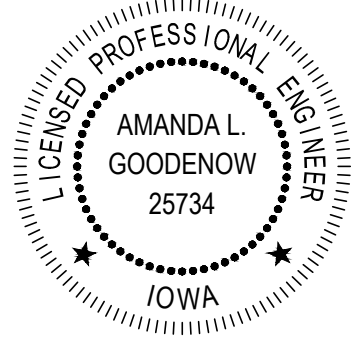
Sheet List Table

A.01	TITLE SHEET
B.01	CONSTRUCTION NOTES AND DETAILS
B.02	ESTIMATE REFERENCE AND QUANTITIES
C.01	EXISTING SITE AND REMOVALS
C.02	PLAN AND PROFILE

PROJECT GENERAL NOTES

- ALL WORK SHALL CONFORM TO THE CONTRACT DOCUMENTS, WHICH INCLUDE, BUT ARE NOT LIMITED TO, THE OWNER - CONTRACTOR AGREEMENT, THE PROJECT MANUAL (WHICH INCLUDES GENERAL SUPPLEMENTARY CONDITIONS AND SPECIFICATIONS), DRAWINGS OF ALL DISCIPLINES AND ALL ADDENDA, MODIFICATIONS AND CLARIFICATIONS ISSUED BY THE ARCHITECT/ENGINEER.
- CONTRACT DOCUMENTS SHALL BE ISSUED TO ALL SUBCONTRACTORS BY THE GENERAL CONTRACTOR IN COMPLETE SETS IN ORDER TO ACHIEVE THE FULL EXTENT AND COMPLETE COORDINATION OF ALL WORK.
- WRITTEN DIMENSIONS TAKE PRECEDENCE OVER SCALED DIMENSIONS. NOTIFY ENGINEER OF ANY DISCREPANCIES OR CONDITIONS REQUIRING INFORMATION OR CLARIFICATION BEFORE PROCEEDING WITH THE WORK.
- FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS. NOTIFY ENGINEER OF ANY DISCREPANCIES OR CONDITIONS REQUIRING INFORMATION OR CLARIFICATION BEFORE PROCEEDING WITH THE WORK.
- DETAILS SHOWN ARE INTENDED TO BE INDICATIVE OF THE PROFILES AND TYPE OF DETAILING REQUIRED THROUGHOUT THE WORK. DETAILS NOT SHOWN ARE SIMILAR IN CHARACTER TO DETAILS SHOWN. WHERE SPECIFIC DIMENSIONS, DETAILS OR DESIGN INTENT CANNOT BE DETERMINED, NOTIFY ENGINEER BEFORE PROCEEDING WITH THE WORK.
- ALL MANUFACTURED ARTICLES, MATERIALS AND EQUIPMENT SHALL BE APPLIED, INSTALLED, CONNECTED, ERECTED, CLEANED AND CONDITIONED ACCORDING TO MANUFACTURERS' INSTRUCTIONS. IN CASE OF DISCREPANCIES BETWEEN MANUFACTURERS' INSTRUCTIONS AND THE CONTRACT DOCUMENTS, NOTIFY ENGINEER BEFORE PROCEEDING WITH THE WORK.
- ALL DISSIMILAR METALS SHALL BE EFFECTIVELY ISOLATED FROM EACH OTHER TO AVOID GALVANIC CORROSION.
- THE LOCATION AND TYPE OF ALL INPLACE UTILITIES SHOWN ON THE PLANS ARE FOR GENERAL INFORMATION ONLY AND ARE ACCURATE AND COMPLETE TO THE BEST OF THE KNOWLEDGE OF I & S GROUP, INC. (ISG). NO WARRANTY OR GUARANTEE IS IMPLIED. THE CONTRACTOR SHALL VERIFY THE SIZES, LOCATIONS AND ELEVATIONS OF ALL INPLACE UTILITIES PRIOR TO CONSTRUCTION. CONTRACTOR SHALL IMMEDIATELY NOTIFY ENGINEER OF ANY DISCREPANCIES OR VARIATIONS FROM PLAN.
- THE CONTRACTOR IS TO CONTACT "IOWA ONE CALL" FOR UTILITY LOCATIONS. MINIMUM 2 BUSINESS DAYS PRIOR TO ANY EXCAVATION / CONSTRUCTION (1-800-292-8989).

SEAL



I hereby certify that this engineering document was prepared by me or under direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

Amanda Goodenow 9/15/2020
(signature) (date)

Printed or typed name AMANDA L. GOODENOW

License number 25734

My license renewal date is December 31, 2020

Pages or sheets covered by this seal:
ALL SHEETS

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1-800-292-8989
www.iowaonecall.com

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PROJECT

CITY OF STORM
LAKE

EARLY ELEMENTARY
WATER MAIN
EXTENSION

STORM LAKE IOWA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	18-22354
FILE NAME	22354 TITLE
DRAWN BY	JAP/TDS
DESIGNED BY	ALG
REVIEWED BY	ALG
ORIGINAL ISSUE DATE	09/15/2020
CLIENT PROJECT NO.	---

TITLE

TITLE SHEET

SHEET

A.01

SPECIFICATIONS REFERENCE

ALL CONSTRUCTION SHALL COMPLY WITH THE CITY OF STORM LAKE REQUIREMENTS AND WITH THE 2020 EDITION OF THE STATEWIDE URBAN DESIGN AND SPECIFICATIONS (SUDAS) FOR PUBLIC IMPROVEMENTS, UNLESS DIRECTED OTHERWISE.

PROJECT DATUM

HORIZONTAL COORDINATES HAVE BEEN REFERENCED TO THE NORTH AMERICAN DATUM OF 1983 (NAD83), ZONE 4 SIOUX CITY-IOWA FALLS, ON THE IOWA REGIONAL COORDINATE SYSTEM, IN U.S. SURVEY FEET. ELEVATIONS HAVE BEEN REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88). RTK GPS METHODS WERE USED TO ESTABLISH HORIZONTAL AND VERTICAL COORDINATES FOR THIS PROJECT.

TOPOGRAPHIC SURVEY

THIS PROJECT'S TOPOGRAPHIC SURVEY CONSISTS OF DATA COLLECTED IN JULY 2020 BY ISG.

B.M. ELEVATION=1446.52

TOP OF MAG NAIL IN NORTH END OF RCP
CULVERT UNDER THE NORTH DRIVEWAY
OF CHURCH ALONG 90TH AVENUE

CONSTRUCTION NOTES

1.

ALL WORK SHALL BE IN ACCORDANCE WITH OSHA CODES AND STANDARDS. NOTHING INDICATED ON THE DRAWINGS SHALL RELIEVE THE CONTRACTOR FROM COMPLYING WITH ANY APPROPRIATE SAFETY REGULATIONS.
2.

ALL WORK SHALL CONFORM TO THE CONTRACT DOCUMENTS WHICH INCLUDE, BUT ARE NOT LIMITED TO, THE OWNER - CONTRACTOR AGREEMENT, DRAWINGS AND ALL ADDENDA, AND MODIFICATIONS AND CLARIFICATIONS ISSUED BY THE ENGINEER.
3.

CONTRACT DOCUMENTS SHALL BE ISSUED TO ALL SUBCONTRACTORS BY THE GENERAL CONTRACTOR IN COMPLETE SETS IN ORDER TO ACHIEVE THE FULL EXTENT AND COMPLETE COORDINATION OF ALL WORK.
4.

ALL PROPERTY PINS SHALL BE PROTECTED FROM GRADING OR OTHER OPERATIONS. ANY PINS DISTURBED SHALL BE RESET AT THE CONTRACTOR'S EXPENSE.
5.

THE 2020 EDITION OF THE STATEWIDE URBAN DESIGN AND SPECIFICATIONS (SUDAS) SHALL APPLY TO THE CONSTRUCTION WORK ON THE PROJECT, PLUS THE CONTRACT PROVISIONS. A FULL IOWA SUDAS SPECIFICATIONS MANUAL CAN BE FOUND ONLINE FOR FREE AT WWW.IOWASUDAS.COM.
6.

THE WORK TO BE ACCOMPLISHED FOR THE CONSTRUCTION OF THIS PROJECT WILL OCCUR ON OWNER'S PROPERTY. THE CONTRACTOR SHOULD CONFINE OPERATION, PEOPLE, AND EQUIPMENT TO THE OWNER'S PROPERTY.
7.

IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE WASTE AREAS OR DISPOSAL SITES FOR EXCESS MATERIALS NOT TO BE INCORPORATED IN THE WORK INVOLVED IN THE PROJECT (UNSUITABLE EXCAVATION, WASTE PIPE, ETC.).
8.

THE LOCATION AND TYPE OF ALL INPLACE UTILITIES SHOWN ON THE PLANS ARE FOR GENERAL INFORMATION ONLY AND ARE ACCURATE AND COMPLETE TO THE BEST OF THE KNOWLEDGE OF ISG (I+S GROUP, INC.). NO WARRANTY OR GUARANTEE IS IMPLIED. THE CONTRACTOR SHALL VERIFY THE SIZES, LOCATIONS AND ELEVATIONS OF ALL INPLACE UTILITIES PRIOR TO CONSTRUCTION AND AVOID DAMAGE THERETO. NO CLAIM FOR ADDITIONAL COMPENSATION WILL BE ALLOWED FOR ANY INTERFERENCE OR DELAY CAUSED BY SUCH WORK. CONTRACTOR SHALL IMMEDIATELY NOTIFY ENGINEER OF ANY DISCREPANCIES OR VARIATIONS FROM PLAN. ANY NECESSARY FIXTURE ADJUSTMENTS SHALL BE INCIDENTAL.
9.

PUBLIC UTILITY FIXTURES ARE EXISTING WITHIN THE CONSTRUCTION AREA. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO NOTIFY THE OWNERS OF THESE UTILITIES PRIOR TO THE BEGINNING OF ANY CONSTRUCTION. THE CONTRACTOR SHALL AFFORD ACCESS TO THESE FACILITIES FOR ANY NECESSARY MODIFICATION OF SERVICES. NO ADDITIONAL COMPENSATION WILL BE ALLOWED TO THE CONTRACTOR FOR ANY INTERFERENCE OR DELAY CAUSED BY SUCH WORK.
10.

IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO SECURE ALL NECESSARY TRAFFIC CONTROL SIGNS, DEVICES, ETC., AND TO PLACE, MAINTAIN, AND REMOVE SAME AS CONSTRUCTION COMMENCES AND IS COMPLETED IN ACCORDANCE WITH THE CURRENT EDITION OF THE IOWA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS & HIGHWAYS. FAILURE TO COMPLY WITH THIS PORTION OF THE SPECIFICATIONS WILL RESULT IN SUSPENSION OF WORK UNTIL THE SITUATION IS CORRECTED. A REDUCTION IN THE LUMP SUM TO BE PAID WILL BE MADE FOR EXCESSIVE NONCOMPLIANCE WITH REQUIRED TRAFFIC CONTROL. NO WORK SHALL COMMENCE IN ANY GIVEN AREA UNTIL ALL APPROPRIATE TRAFFIC CONTROL IS IN PLACE.
11.

THE CONTRACTOR SHALL NOT DISTURB GRASSED AREAS AND TREES OUTSIDE THE CONSTRUCTION LIMITS. THE CONTRACTOR WILL NOT BE PERMITTED TO PARK SERVICE VEHICLES AND EQUIPMENT OR USE THESE AREAS FOR STORAGE OF MATERIALS. STORAGE, PARKING AND SERVICE AREA(S) WILL BE SUBJECT TO APPROVAL OF THE ENGINEER.
12.

THE CONSTRUCTION OPERATIONS ARE TO TAKE PLACE IN A RESIDENTIAL AREA. THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE REQUIREMENTS INCLUDED IN THE SPECIFICATIONS IN REGARD TO POSITIVE DUST CONTROL DURING ALL OPERATIONS TO INCLUDE REMOVAL, CLEAN UP, ETC.
13.

EXISTING STORM SEWERS, SANITARY SEWERS, AND WATER MAINS ARE LOCATED BASED ON CITY RECORDS AND ACTUAL LOCATION MAY VARY GREATLY FROM THAT SHOWN.
14.

ELEVATIONS GIVEN ON THE PLAN AND PROFILE SHEETS ARE TO CENTERLINE UNLESS OTHERWISE NOTED.
15.

CONTRACTOR(S) SHALL BE RESPONSIBLE FOR SECURING THE SERVICES OF AN INDEPENDENT TESTING LABORATORY FOR ALL MATERIAL TESTING FOR THIS PROJECT.
16.

PROPOSED WATER DISTRIBUTION LINE SHALL BE INSTALLED WITH A MINIMUM OF SIX FEET (6') OF COVER. IN LOCATIONS WITH A SEPARATION DISTANCE OF LESS THAN TEN FEET (10') FROM SANITARY SEWER OR STORM SEWER, THE SANITARY SEWER OR STORM SEWER SHALL BE INSTALLED EIGHTEEN INCHES (18") BELOW THE BOTTOM OF THE WATER MAIN AND SHALL BE PLACED IN A SEPARATE TRENCH AT A MINIMUM HORIZONTAL SEPARATION OF THREE FEET PER SUDAS SPECIFICATIONS.
17.

AT ALL SEWER AND WATER MAIN CROSSEOVERS, MAINTAIN A MINIMUM OF 18" SEPARATION BETWEEN BOTTOM OF WATER MAIN AND TOP OF SEWER. PLACE ONE FULL LENGTH OF WATER PIPE, LOCATED SO BOTH JOINTS ARE AS FAR AS POSSIBLE FROM SEWER. USE LOW PERMEABILITY SOIL FOR BACKFILL WITHIN 10' OF CROSSEOVER.
18.

THRUST BLOCKS SHALL BE POURED CONCRETE, INSTALLED BEHIND ALL BENDS, TEES AND DEAD ENDS IN ACCORDANCE WITH SPECIFICATIONS.
19.

FLUSH WATER FROM DISINFECTION PROCESS SHALL BE DISPOSED OF BY DIRECTING FLUSH WATER TO SANITARY SEWER SYSTEM. DECHLORINATE HIGHLY CHLORINATED WATER FROM TESTING BEFORE RELEASING INTO THE SANITARY SEWER SYSTEM.
20.

GRANULAR BEDDING IS REQUIRED FOR ANY TYPE OF PIPE USED AND SHALL BE AS SPECIFIED.
21.

CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING LOCATIONS OF ALL WATER SERVICES AND WATER CONNECTIONS.
22.

THE CONTRACTOR SHALL GIVE THE IDOT 48 HOURS NOTICE OF INTENTION TO START CONSTRUCTION WITHIN ROW.

CONTACT: MICHAEL THAYER, IDOT UTILITY/ACCESS SPECIALIST

PHONE: (712) 732-4549
23.

ALL WORK PERFORMED WITHIN THE IDOT ROW SHALL BE RESTRICTED TO A TIME FRAME OF 30 MINUTES AFTER SUNRISE TO 30 MINUTES BEFORE SUNSET.
24.

ANY DEWATERING NECESSARY FOR CONSTRUCTION SHALL BE CONSIDERED INCIDENTAL TO INDIVIDUAL CONSTRUCTION ITEM.
25.

THE CONTRACTOR SHALL INSPECT AND VERIFY SOIL CONDITIONS AS NECESSARY IN ORDER TO DETERMINE THE TYPE OF CONSTRUCTION TO EMPLOY. NATURAL OBSTRUCTIONS TYPICAL TO THIS AREA MAY BE ENCOUNTERED IN THE SOIL. THESE CONTRACT DOCUMENTS DO NOT WARRANT THE NATURE OR CONDITIONS OF THE SOILS, AND DO NOT WARRANT THAT NATURAL OBSTRUCTIONS WILL NOT BE ENCOUNTERED, NOR GUARANTEE THE EXTENT TO WHICH ROCKS, BOULDERS, OR OTHER OBSTRUCTIONS, REGARDLESS OF SIZE, MAY BE ENCOUNTERED DURING BORING OPERATIONS. THE CONTRACTOR SHALL NOT BE ENTITLED TO ADDITIONAL COMPENSATION FOR ANY NATURAL OBSTRUCTIONS TYPICAL TO THIS AREA ENCOUNTERED DURING CONSTRUCTION.
26.

CONCRETE AND GROUT WASHOUT AREA SHALL REMAIN WITHIN CONFINES OF PROJECT AREA AND SHALL BE PROPERLY REMOVED UPON PROJECT COMPLETION.
27.

PROJECT ITEMS TO BECOME PROPERTY OF CONTRACTOR FOR PROPER DISPOSAL UNLESS OTHERWISE NOTED ON PLANS OR CITY/ENGINEER NOTIFIES CONTRACTOR OTHERWISE.
28.

OWNER WILL PROVIDE CONSTRUCTION STAKING FOR PROJECT THROUGH ISG (I+S GROUP, INC.) AND CONTRACTOR SHALL PROVIDE A MINIMUM OF 48 HOURS NOTICE BEFORE STAKING IS REQUIRED.
29.

CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING LOCATIONS AND ELEVATIONS OF WATER CONNECTION. REPAIR AND RELOCATION OF CONFLICTING OR DAMAGED UTILITIES SHALL BE INCIDENTAL TO WATER MAIN INSTALLATION.

UTILITIES

(ANW) ALLIANT ENERGY
CONTACT NAME: ALLIANT ENERGY FIELD ENGINEER
CONTACT PHONE: 800-255-4268
CONTACT EMAIL: LOCATE_IPL@ALLIANTENERGY.COM

(CTLIA01) CENTURY LINK
CONTACT NAME: TOM STURMER
CONTACT PHONE: 303-453-9927
CONTACT EMAIL: THOMAS.STURMER@CENTURYLINK.COM

(LBIA07) LONG LINES BROADBAND
CONTACT NAME: MILES PATTON
CONTACT PHONE: 712-271-5550
CONTACT EMAIL: MILES.PATTON@LONGLINES.BIZ

(M56E) MIDAMER-ELEC
CONTACT NAME: SHANNON FITCH
CONTACT PHONE: 712-749-7116
CONTACT EMAIL: SJFITCH@MIDAMERICAN.COM

(M56G) MIDAMER-GAS
CONTACT NAME: SHANNON FITCH
CONTACT PHONE: 712-749-7116
CONTACT EMAIL: SJFITCH@MIDAMERICAN.COM

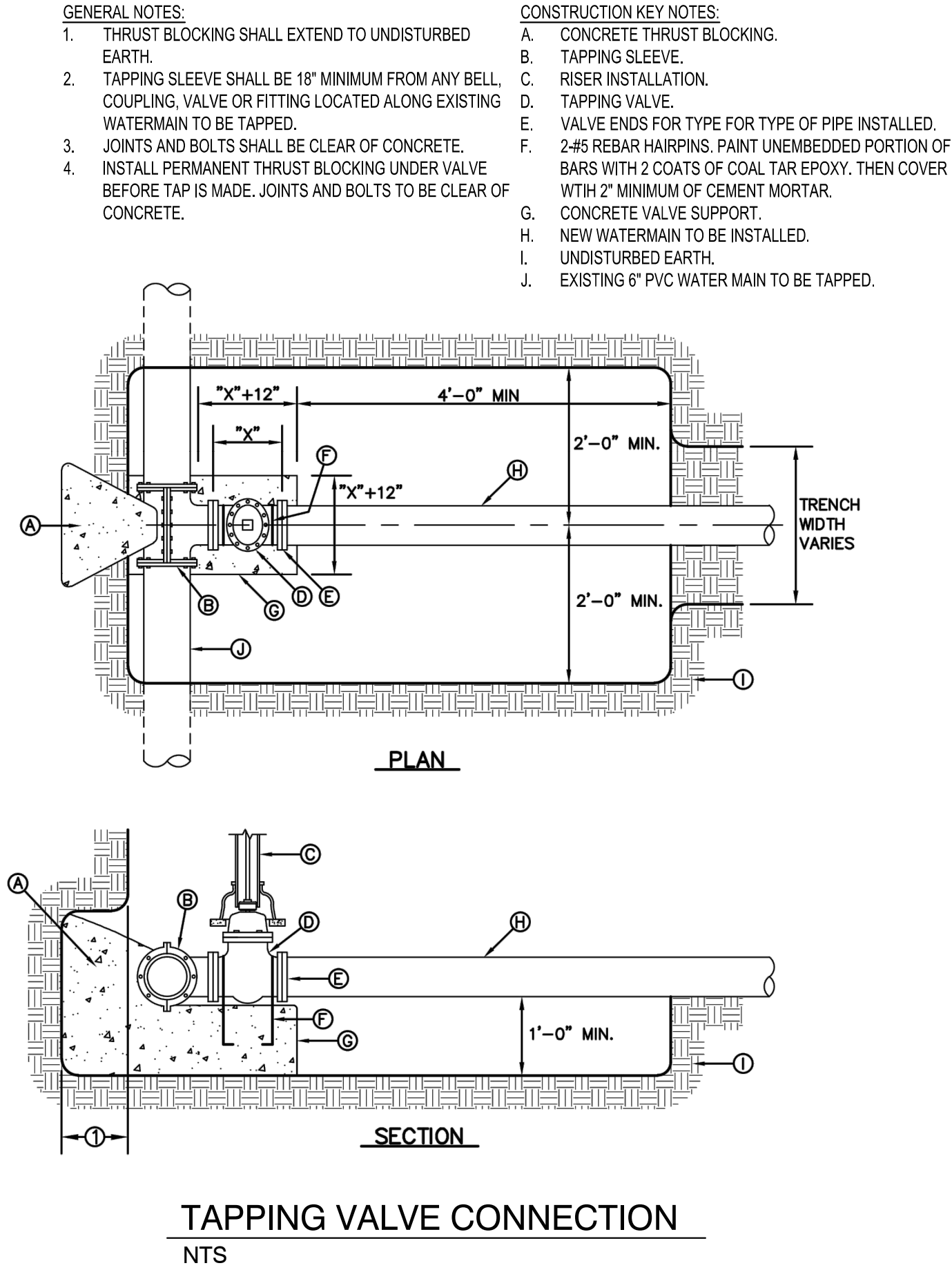
(MC1) VERIZON
CONTACT NAME: JOHN BACHELDER
CONTACT PHONE: 972-729-7000
CONTACT EMAIL: JOHN.BACHELDER@VERIZON.COM

(STL) CITY OF STORM LAKE
CONTACT NAME: KIM NIDAY
CONTACT PHONE: 712-732-8029

CONTACT EMAIL: NIDAY@STORMLAKE.ORG

(T11) MEDIACOM
CONTACT NAME: MIKE LAWLER
CONTACT PHONE: 515-571-2183
CONTACT EMAIL: MLAWLER@MEDIACOMCC.COM

(W28) IOWA DEPARTMENT OF TRANSPORTATION
CONTACT NAME: MICHAEL THAYER
CONTACT PHONE: 712-732-4549
CONTACT EMAIL: MICHAEL.THAYER@DOT.IOWA.GOV



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PROJECT

CITY OF
STORM LAKE

EARLY ELEMENTARY
WATER MAIN
EXTENSION

STORM LAKE IOWA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	18-22354
FILE NAME	22354 CONSTRUCTION NOTES
DRAWN BY	JAP/TDS
DESIGNED BY	ALG
REVIEWED BY	ALG
ORIGINAL ISSUE DATE	09/15/2020
CLIENT PROJECT NO.	---

TITLE

CONSTRUCTION
NOTES AND
DETAILS

SHEET

B.01

ESTIMATE REFERENCE INFORMATION		
ITEM NO.	SUDAS SPECIFICATION ITEM CODE	DESCRIPTION
1	1070-206-A-0	TRAFFIC CONTROL REFER TO SECTION 1070-2.06 OF THE APPLICABLE VERSION OF THE STATEWIDE URBAN DESIGN AND SPECIFICATIONS (SUDAS) AND CONSTRUCTION NOTES. STAGING PLAN SHALL BE RESPONSIBILITY OF CONTRACTOR TO MINIMIZE DISTURBANCE.
2	5010-108-A-0	WATER MAIN, 6", C900 PVC, OPEN CUT ITEM INCLUDES ALL THRUST BLOCKS FITTINGS, TRACER WIRE, AND TRACER WIRE STATION. INSTALLED BY OPEN CUT. ITEM ALSO INCLUDES ALL SHORING/BRACING REQUIRED FOR SURROUNDING UTILITIES AND STRUCTURES TO PROPERLY INSTALL WATER MAIN. ADDITIONALLY, CONTRACTOR IS TO PULL TWO TRACER WIRES, EACH OF DIFFERENT COLORS, ALONG ENTIRE LENGTH OF NEW WATER MAIN AND SHALL DEMONSTRATE TO OWNER THEIR PERFORMANCE. PIPE BEDDING SHALL FOLLOW SUDAS P-1.
3	5010-108-A-0	WATER MAIN, 6", C900 PVC, DIRECTIONAL DRILL ITEM INCLUDES ALL THRUST BLOCKS FITTINGS, TRACER WIRE, AND TRACER WIRE STATION. INSTALLED BY DIRECTIONAL DRILL. ITEM ALSO INCLUDES ALL SHORING/BRACING REQUIRED FOR SURROUNDING UTILITIES AND STRUCTURES TO PROPERLY INSTALL WATER MAIN. ADDITIONALLY, CONTRACTOR IS TO PULL TWO TRACER WIRES, EACH OF DIFFERENT COLORS, ALONG ENTIRE LENGTH OF NEW WATER MAIN AND SHALL DEMONSTRATE TO OWNER THEIR PERFORMANCE.
4	5020-108-B-0	CONNECT TO EXISTING WATER MAIN, TAPPING VALVE & SLEEVE, 6" ITEM INCLUDES CONNECTING NEW WATER MAIN TO EXISTING MAIN. CONNECTION SHALL BE A TAPPING VALVE AND SLEEVE ASSEMBLY. ITEM INCLUDES ALL LABOR, EQUIPMENT, MATERIALS, AND ANY FITTINGS, WATER REDUCERS OR OTHER ITEMS NECESSARY TO COMPLETE CONNECTION.
5	PER EST. REF.	CONNECT TO EXISTING WATER SERVICE ITEM INCLUDES CONNECTING NEW WATER MAIN TO EXISTING SERVICE. CONNECTION SHALL INCLUDE A TAPPING SADDLE AND CORPORATION STOP. ITEM INCLUDES ALL LABOR, EQUIPMENT, MATERIALS, AND ANY FITTINGS, WATER REDUCERS OR OTHER ITEMS NECESSARY TO COMPLETE CONNECTION. INCLUDES CAPPING AND ABANDONING EXISTING WATER SERVICE TO SOUTH.
6	9010-108-A-0	SEEDING, FERTILIZING, AND MULCHING INCLUDES ALL MATERIALS, EQUIPMENT AND LABOR REQUIRED TO PREPARE SEED BED, CONVENTIONAL SEED, FERTILIZE AND MULCH AND ESTABLISH GROWTH IN ALL DISTURBED AREAS. USE SUDAS TYPE 1 URBAN SEED MIXTURE. INCLUDES SUPPLEMENTAL WATERING AS REQUIRED AND RESEEDING AREAS OF NON-GERMINATION.
7	9040-108-T-0	INLET PROTECTION DEVICE TO BE USED AT INTAKES AS NEEDED FOR EROSION CONTROL. INCLUDES PLACEMENT, MAINTENANCE, REMOVAL AND OFFSITE DISPOSAL OF SEDIMENT, AND REMOVAL OF DEVICE.
8	5030-108-A-0	TESTING ITEM INCLUDES ALL TESTING REQUIRED PER SUDAS SPECIFICATIONS FOR WATER MAIN AND TRENCH COMPACTION
9	11,020-108-A-0	MOBILIZATION REFER TO SECTION 11,020-108-A-0 OF THE URBAN STANDARD SPECIFICATIONS.

ESTIMATED PROJECT QUANTITIES				
SPECIFICATION ITEM CODE REFERS TO THE CURRENT EDITION OF THE STATEWIDE URBAN DESIGN AND SPECIFICATIONS MANUAL (SUDAS).				
ITEM NO.	SPEC. ITEM CODE	CONSTRUCTION ITEM	UNIT	QUANTITY
1	1070-206-A-0	TRAFFIC CONTROL	LS	1
2	5010-108-A-0	WATER MAIN, 6", C900 PVC, OPEN CUT	LF	323
3	5010-108-A-0	WATER MAIN, 6", C900 PVC, DIRECTIONAL DRILL	LF	67
4	5020-108-B-0	CONNECT TO EXISTING WATER MAIN, TAPPING VALVE & SLEEVE, 6"	EA	1
5	PER EST. REF.	CONNECT TO EXISTING WATER SERVICE	EA	1
6	9010-108-A-0	SEEDING, FERTILIZING, AND MULCHING	LS	1
7	9040-108-T-0	INLET PROTECTION DEVICE	EA	2
8	5030-108-A-0	TESTING	LS	1
9	11,020-108-A-0	MOBILIZATION	LS	1



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PROJECT

**CITY OF
STORM LAKE**

**EARLY ELEMENTARY
WATER MAIN
EXTENSION**

STORM LAKE IOWA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	18-22354
FILE NAME	22354 CONSTRUCTION NOTES
DRAWN BY	JAP/TDS
DESIGNED BY	ALG
REVIEWED BY	ALG
ORIGINAL ISSUE DATE	09/15/2020
CLIENT PROJECT NO.	---

TITLE

**ESTIMATE
REFERENCE AND
QUANTITIES**

SHEET

B.02



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PROJECT

**CITY OF
STORM LAKE**

**EARLY ELEMENTARY
WATER MAIN
EXTENSION**

STORM LAKE IOWA

REVISION SCHEDULE		
DATE	DESCRIPTION	BY

PROJECT NO.	18-22354
FILE NAME	22354 EXISTING SITE
DRAWN BY	JAP/TDS
DESIGNED BY	ALG
REVIEWED BY	ALG
ORIGINAL ISSUE DATE	09/15/2020
CLIENT PROJECT NO.	---

TITLE

**EXISTING SITE &
REMOVALS**

SHEET

C.01

Staff Summary

10/19/2020

Agenda Item # 7.



City of Storm Lake
PO Box 1086
Storm Lake, IA 50588
p (712) 732-8000
f (712) 732-4114

REPORT TO: Honorable Mayor and City Council

FROM: Scott Olesen, Building Official

SUBJECT: **Resolution No. 20-R-2020-2021 Setting A Public Hearing On A Proposal To Amend The City Code By Updating The National Electrical Code To The 2020 Edition.**

BACKGROUND: The City Code adopts by reference the National Electrical Code.

This code is produced by the National Fire Protection Association. This organization updates their code on a three year cycle.

At this time, City staff is proposing to update from the 2017 version of the National Electrical Code, to the 2020 version.

Updating to the current code editions will bring the City into line with the electrical code adopted by the State of Iowa. Additionally, the City of Storm Lake is reviewed every three years by the Insurances Services Offices (ISO), which provides ratings for building departments which is then used for setting insurance rates. A City's ISO rating is also used by FEMA in responding to natural disasters. Adopting more current codes will help to maintain our current rating.

Council must hold a Public Hearing on the proposed amendments to the current City Code. The Hearing will be held at the regular Council meeting at 5:00 PM Monday, November 2nd, 2020 at City Hall.

FISCAL IMPACT: Legal fees and publication are estimated to be \$500.00

RECOMMENDATION: Approve Resolution No. 20-R-2020-2021 to Set the Public Hearing for Monday, November 2nd, 2020 at 5:00 PM

ATTACHMENTS:

Description

Type

RESOLUTION NO. 20-R-2020-2021

RESOLUTION SETTING HEARING ON A PROPOSAL TO ADOPT BY REFERENCE PARTS OR ALL OF A CERTAIN STATEWIDE OR NATIONALLY RECOGNIZED STANDARD CODE AND IOWA CODE SECTIONS AS PART OF AN ORDINANCE AMENDING THE CITY'S ELECTRICAL CODE AND PRESCRIBING NOTICE

WHEREAS, the City Council of the City of Storm Lake, Iowa has, from time to time, adopted by reference the provisions of certain statewide or nationally recognized standard codes or portions of such codes by ordinances which identify the codes by subject matter, source, and date, without setting them forth in full, as permitted by Iowa Code Section 380.10;

WHEREAS, the City Council of the City of Storm Lake, Iowa has, from time to time, adopted by reference the provisions of certain portions of the Code of Iowa related to such statewide or nationally recognized standard codes or portions of such codes by ordinances without setting them forth in full, also as permitted by Iowa Code Section 380.10;

WHEREAS, the City's Electrical Code is included among such codes that are adopted in whole or part by reference to statewide or nationally recognized standard codes and portions of the Code of Iowa;

WHEREAS, the City Council now intends to consider adopting an ordinance that amends and updates the City's Electrical Code by reference to an updated statewide or nationally recognized standard code and portions of the Code of Iowa;

WHEREAS, the updated statewide or nationally recognized standard code to be adopted in whole or part by reference is the National Electrical Code, 2020 Edition;

WHEREAS, the Iowa Code sections to be adopted in whole or part by reference are sections 103.1 and 103.6;

WHEREAS, Iowa Code Section 380.10 requires the Council to hold a public hearing on

any proposed standard code or on the portion of the standard code to be adopted by reference and to hold a public hearing on any portion of the Code of Iowa to be adopted by reference; and

WHEREAS, copies of the standard code or portions thereof and the portions of the Iowa Code proposed to be adopted by reference are available for review by members of the public at the office of the City Clerk of the City of Storm Lake, City Hall, 620 Erie Street, Storm Lake, Iowa.

NOW, THEREFORE, be it hereby resolved that this proposal to adopt by reference parts or all of such statewide or nationally recognized standard code and Iowa Code sections as part of an Ordinance amending the City's Electrical Code shall be scheduled for public hearing at the Council Chambers at City Hall at the regular council meeting scheduled November 2, 2020, at 5:00 p.m. The City Clerk is directed to have a copy of this Resolution published in the Storm Lake Times on a date not less than four (4) days nor more than twenty (20) days prior to said meeting. The City Clerk is further directed to have available in the City Clerk's office at the Clerk's address shown above copies of the standard codes or portions thereof and the portions of the Iowa Code proposed to be adopted by reference for review by members of the public.

Passed and approved this 19th day of October, 2020.

Michael Porsch, Mayor

ATTEST:

Mayra A. Martinez, City Clerk

Staff Summary

10/19/2020

Agenda Item # 8.



City of Storm Lake
PO Box 1086
Storm Lake, IA 50588
p (712) 732-8000
f (712) 732-4114

REPORT TO: Honorable Mayor and City Council

FROM: Keri Navratil, City Manager

SUBJECT: **Motion to Approve Memorandum of Understanding between the Iowa Department of Natural Resources and City of Storm Lake for the Nutrient Reduction Program**

BACKGROUND: The purpose of this MOU is to establish a framework for the City to implement a watershed-based Nutrient Reduction Program within the North Raccoon watershed (Watershed) and credit quantifiable nutrient reductions for the benefit of the City's nutrient reduction targets through National Pollutant Discharge Elimination System (NPDES) permitting. The City may use this framework to achieve compliance with current and future permit requirements arising from the Iowa Nutrient Reduction Strategy (NRS). In exchange for utilizing this framework, the City shall receive certainty regarding compliance with future nutrient reduction permit requirements.

FISCAL IMPACT: These nutrient load reductions may be applied to the nutrient reduction goals committed to by the City, and ongoing practices may continue to be used for offsets.

RECOMMENDATION: Approve Memorandum of Understanding

ATTACHMENTS:

Description	Type
☐ Memorandum of Understanding	Contract

**MEMORANDUM OF UNDERSTANDING
BETWEEN
THE IOWA DEPARTMENT OF NATURAL RESOURCES
AND
THE CITY OF STORM LAKE, IOWA**

This Memorandum of Understanding (MOU) between the Iowa Department of Natural Resources (DNR) and the City of Storm Lake, Iowa (City) is effective on the ____ day of _____, 2020.

1. **Purpose.** The purpose of this MOU is to establish a framework for the City to implement a watershed-based Nutrient Reduction Program within the North Raccoon watershed (Watershed) and credit quantifiable nutrient reductions for the benefit of the City's nutrient reduction targets through National Pollutant Discharge Elimination System (NPDES) permitting. The City may use this framework to achieve compliance with current and future permit requirements arising from the Iowa Nutrient Reduction Strategy (NRS). In exchange for utilizing this framework, the City shall receive certainty regarding compliance with future nutrient reduction permit requirements.
2. **Background.** Iowa developed a NRS to reduce excess nutrients in Iowa's surface waters and tasked wastewater treatment plants with specific nutrient reduction goals. The NRS supports the development of water quality credit trading between two or more entities, commonly a point source which is mandated to achieve a permit goal and one or more nonpoint sources who voluntarily collaborate with the point source to reduce the amounts of nitrogen and phosphorus entering a water body. Trading can provide a means to improve water quality, especially in cases where the technology does not exist or is not affordable or feasible to allow a point source discharger to comply with permit requirements or where the same or greater pollutant reductions can be achieved more quickly or at lower cost through implementing Best Management Practices (BMPs) or other nutrient reduction efforts.¹

In support of the NRS goals and policy statements, the DNR in partnership with the Iowa League of Cities established the Nutrient Reduction Exchange (NRE), a tool for registration of practices implemented in a watershed that reduce Nitrogen (N) and Phosphorus (P), registration of the modeled nutrient reductions of those practices, and that are thus available for offsets or trading. This MOU is designed to build on the NRS policy and goals, and the establishment of the NRE, to provide point source facilities with a well-defined option of achieving regulatory compliance and certainty through the implementation of watershed-based nutrient reduction practices.

¹ The United States Environmental Protection Agency also supports water quality trading, offsets and similar programs to achieve compliance with regulations, in particular using land management strategies for implementing market-based programs within a watershed, as most recently stated in the EPA February 6, 2019 Memorandum titled "Updating the Environmental Protection Agency's (EPA) Water Quality Trading Policy to Promote Market-Based Mechanisms for Improving Water Quality."

3. Goal. The goal of this MOU is to provide the City with regulatory certainty that allows the City to utilize nutrient load reductions achieved through BMP implementation in the Watershed to offset nutrient reduction targets required in future NPDES permits, or to bank environmental outcomes of nutrient reducing practices to offset future permit requirements.
4. General Areas of Agreement.

A. Use of Nutrient Reducing Practices as Offsets. Provided that the terms of this agreement are followed, the City shall be able to utilize nutrient reducing practices as offsets (Nutrient Reduction Offsets) toward its requirements for nutrient reduction under an NPDES permit issued by DNR for the City of Storm Lake Water Reclamation Facility (WRF) facility, in accordance with the terms of this MOU. Nutrient reducing practices (aka BMPs) built or implemented as part of a watershed-based nutrient reduction plan will be considered as described below.

B. Monitoring and Modeling. The City may develop a monitoring strategy to assess overall N and P concentrations in-stream and to document progress toward nutrient reductions within the watershed. However, progress toward nutrient reduction will be based on modeling using the Nutrient Tracking Tool (NTT) provided by the U.S. Department of Agriculture's Environmental Markets Division, or in another mutually-agreed upon model as further set forth below in this Section 4.B.

For urban practices, the City may present the DNR with a proposal for new infrastructure and an analysis, using one or more models in use by the civil engineering community, of the expected reduction in N, P or Total Suspended Solids ("TSS"). Based upon this presentation, the DNR and City shall work in good faith to agree upon a rate of Nutrient Reducing Offsets that may be applied toward the NPDES permit.

C. Baselines. Calculated point and nonpoint source loads of N,P, and sediment prior to implementation of BMPs by the City, as estimated using the NTT, will be utilized as the baseline for measuring environmental outcomes resulting from watershed management activities. For nutrient reducing practices, baseline conditions may be further defined in terms of geographic scale, existing conservation practices, and schedule of implementation to facilitate improved environmental performance to achieve nutrient load reductions. Agricultural nonpoint source (NPS) baselines will be established using pre-existing field management data. Baseline data will be verified using the NRE guidelines and will be stored within the NRE system as a part of the NTT model runs. Baseline conditions shall be established at the field scale prior to the City-connected implementation of any BMP on a given field.

D. Future Mandated Practices. In order to recognize investments made by municipalities towards NRS reduction goals, and to reward leadership, if a BMP or urban practice funded under a watershed project subsequently becomes mandated by local, state or federal law, the N, P, and TSS reductions associated with that BMP or urban practice will continue to be credited to the municipality if allowed under the new law, provided that the BMP or urban practice continues to be viable with ongoing maintenance or rehabilitation, verified, and within the useful life of the practice.

E. TSS. BMPs and urban practice put in place to address P will also generally be effective in reducing TSS. Where necessary and when correlated within a watershed, P-reductions will be used as a surrogate for TSS. TSS reductions, in addition to N and P reductions, can be considered, if allowed by and consistent with state and federal law.

F. At all times the City shall maintain its existing (or newly implemented) plant infrastructure at the optimal level of performance. This optimization of the structural WRP plant technology shall be an ongoing requirement for the City that shall be addressed in each five-year permit renewal.

5. Watershed-Based Nutrient Reduction Plan.

A. Outlining the City's Goals. In each NPDES permit application the City must submit a watershed-based nutrient reduction plan document that explains the City's approach for implementing BMPs within the Watershed to achieve nutrient reductions within the permit timeframe. This plan will outline a targeted strategy for implementing the City's Nutrient Reduction Program to ensure maximum efficiency in the use of City funds invested in BMPs. Existing HUC-8 and HUC-12 level Watershed Management Plans (WMP), such as the North Raccoon River Watershed Management Coalition Plan, may serve as the WMP provided the plan meets the Plan Requirements specified below.

B. Plan Requirements. The watershed-based nutrient reduction plan shall include the following: (1) identification of appropriate watershed management strategies within the Watershed, (2) the process to be used by the City or its partners to engage and recruit landowners to participate in the City's Nutrient Reduction Program, (3) an estimation of load reductions expected from implementation of new BMPs, (4) how the practices will be maintained over the design life of the practice (5) an expected project schedule during the permit term, and (6) a description of how the City will monitor and track the effectiveness of its BMP implementation schedule.

C. Location. The City may select a watershed planning area or multiple areas in the Watershed. These areas may be in any of the subbasins in the North Raccoon Watershed or in the portions of the watershed that lie within the City's municipal boundary.

D. Practice Criteria. BMPs identified in a watershed plan shall be installed and maintained according to Natural Resources Conservation Service (NRCS) or Iowa Department of Agriculture and Land Stewardship (IDALS) technical standards. Work shall be done in accordance with generally accepted engineering practices and shall document the NTT-modeled estimates of pounds/tons reduced as compared to nutrient and sediment loading conditions prior to the installation of the BMP. Novel practices not included in NRCS or IDALS standards may be used, as long as the nutrient reductions they produce can be modeled using the NTT, are consistent with the NRS, and approved by DNR and Iowa State University (ISU) technical reviewers.

For urban practices, the Iowa Storm Water Management Manual (ISWMM) will be used for technical guidance.

6. Partnerships, Contractual Relationships, Watershed Management Authorities, Third-Party Designees, and Other Arrangements. At any point during the timeframe of this MOU, the City may work through a partnership, contractual relationship, Watershed Management Authority, Third-Party Designee (such as the Soil and Water Outcomes Fund), or other arrangement to implement the activities defined by the Watershed-Based Nutrient Reduction Plan. In these instances, the City shall maintain the right to register practices implemented through these arrangements in which City funds were utilized as cost-share for BMP design or installation. Moreover, if the City is working with a farmer group or third party aggregator, such as a farmer-led watershed group or the Soil and Water Outcomes Fund, the third party may assign registered nutrient reduction Offsets for use in the City's NPDES permit compliance efforts, or transfer registration of the practices in the NRE to the City.

7. Determining Final Plan Compliance, Interim Progress, and Usable Nutrient Load Reductions.

A. Compliance Measurement. Interim progress, final compliance and usable nutrient load reductions will be determined using the best available modeling tools. Currently, BMPs will be modeled at the field scale using the NTT. Other models or methods may be substituted as deemed appropriate, subject to agreement by the parties to this MOU.

B. Offset and Practice Eligibility. Implemented BMPs shall be recorded on the NRE using the mutually-agreed upon Regulatory In-lieu Fee and Bank Information Tracking System (RIBITS). In general, the City shall provide experienced personnel to be trained in the NTT, and to model the BMPs through the NTT (or other approved model), obtain verification and approval from ISU or the DNR designee; and to confirm and document practice construction completion and record NTT results into the RIBITS system. The DNR shall accept the NTT-modeled load reductions of the BMPs within RIBITS and issue a letter establishing the validity of the practices and these may be used by the City as an offset in a one-to-one ratio (i.e., one pound of NPS pollutant reduced in the watershed by a City-

implemented BMP shall be equivalent to one pound of point source pollutant reduced at the City's WRP facility outfall) to contribute to its NRS goal, or may be used in other regulatory formats so long as the practice has been maintained and is functioning as designed. Upon receipt of the verification and approval of the model run by ISU (or the DNR designee), the DNR shall have sixty (60) days to review, comment, and issue a letter establishing the validity of the nutrient load reductions claimed or request modifications.

C. Interim Progress for NRS Goals. During the term of this MOU, the City shall provide annual progress reports to the DNR detailing its progress in the Watershed, the BMPs implemented, verification of ongoing practices, and the nutrient load reductions obtained. To the extent nutrient load reductions were committed as offsets towards use in the City's NPDES permit requirements, the progress report shall identify overall progress towards the 5-year goals for N and P reductions, as well as what percentage of reductions come from technological improvements versus work in the watershed. DNR also expects the report to sum the load reductions (i.e., pounds) in each year for each of the pollutants at issue (e.g., N and P). This should not require additional calculations, instead merely summing already quantified pounds of nutrient load reductions used as reported in the state's NRE registry/tracking system.

D. Achieving Total NRS Goals. The City is committing to reaching the nutrient reduction goals outlined within the NRS using a combination of technological approaches and watershed offsets, if this is achievable under a feasibility and reasonableness analysis under IAC 567-62.8(5), by 2035 or the date otherwise feasible under a technology analysis, whichever is earlier. If the City is relying primarily on watershed-based nutrient reducing practices to achieve these goals, progress must be shown consistent with commitments and timeframes detailed in the watershed plan for each permit cycle toward achieving the total NRS nutrient reduction goals.

E. Future Requirements. If the City implements a watershed-based nutrient reduction plan in accordance with this MOU, DNR shall not impose any additional nutrient reduction requirements during the plan implementation term unless required to do so by law.

F. Look Back Period. The City initiated its voluntary efforts in watershed work in 2002. For purposes of nutrient reducing practices, the City may record modeled nutrient reductions from BMPs implemented since May of 2013 in the NRE, as outlined above. However, the City must be able to fully document the field conditions prior to the City-initiated BMPs. These nutrient load reductions may be applied to the nutrient reduction goals committed to by the City, and ongoing practices may continue to be used for offsets.

8. Modification and Termination of Agreement. This agreement shall be in effect unless modified or terminated by mutual agreement of the parties, or the DNR elects to terminate this MOU to coincide with the expiration of the City's next NPDES permit by

submitting written notice to the City one-hundred eighty (180) days in advance of the current permit's expiration.

CITY OF STORM LAKE, IOWA

IOWA DEPARTMENT OF NATURAL
RESOURCES

By: _____
Michael Porsch

By: _____

Its: Mayor _____

Its: _____

ATTEST:

Mayra A. Martinez, City Clerk

Staff Summary

10/19/2020

Agenda Item # 9.



City of Storm Lake
PO Box 1086
Storm Lake, IA 50588
p (712) 732-8000
f (712) 732-4114

REPORT TO: Honorable Mayor and City Council

FROM: Keri Navratil, City Manager

SUBJECT: **Public hearing on proposed plans and specifications, form of contract and estimate of cost for the construction of Memorial Lift Station Improvements Project**

BACKGROUND: Notice was given that the City Council of Storm Lake, Iowa, would meet at City Hall, 620 Erie Street, Storm Lake, Iowa on the 19th day of October, 2020, at 5:00 p.m., at which time and place a hearing will be held on the proposed plans and specifications, form of contract and estimate of cost for Memorial Lift Station Improvements, Storm Lake, Iowa in and for said City. Any interested person may appear at said hearing and file objections to the proposed plans, specifications, form of contract and estimated costs for said improvements.

The general description of types of construction and their limits for which bids will be received shall be as follows:

Memorial Lift Station Improvements

Lift station improvements which generally include replacement of the existing 60HP dry pit centrifugal pumps, valves, and related piping; replacement of the electrical MCC, variable frequency drives, controls, lighting and related work; replacement and relocation of HVAC ventilation and heating system; structural rehabilitation, roof replacement, and access modifications.

The general project location is as follows: 299 Memorial Road, Storm Lake, IA 50588

FISCAL IMPACT: N/A

RECOMMENDATION: Hold the public hearing; Open hearing, take comments, close hearing.

ATTACHMENTS:

Description	Type
📎 Notice of Public Hearing	Backup Material
📎 Project Manual	Backup Material
📎 Project Plans	Backup Material
📎 Project Schedule	Backup Material

NOTICE OF PUBLIC HEARING

NOTICE OF PUBLIC HEARING ON PROPOSED PLANS AND SPECIFICATIONS, FORM OF
CONTRACT AND ESTIMATE OF COST FOR THE CONSTRUCTION OF MEMORIAL LIFT
STATION IMPROVEMENTS FOR THE CITY OF STORM LAKE, IOWA

Notice is hereby given that the City Council of Storm Lake, Iowa, will meet at City Hall, 620 Erie Street, Storm Lake, Iowa on the **19th day of October, 2020, at 5:00 p.m.**, at which time and place a hearing will be held on the proposed plans and specifications, form of contract and estimate of cost for Memorial Lift Station Improvements, Storm Lake, Iowa in and for said City. Any interested person may appear at said hearing and file objections to the proposed plans, specifications, form of contract and estimated costs for said improvements.

The general description of types of construction and their limits for which bids will be received shall be as follows:

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Lift station improvements which generally include replacement of the existing 60HP dry pit centrifugal pumps, valves, and related piping; replacement of the electrical MCC, variable frequency drives, controls, lighting and related work; replacement and relocation of HVAC ventilation and heating system; structural rehabilitation, roof replacement, and access modifications.

The general project location is as follows: 299 Memorial Road, Storm Lake, IA 50588.

Plans and specifications governing the construction of the proposed improvements have been prepared by the Engineer. These plans and specifications, and the proceedings of the City referring to and defining said improvements, are hereby made a part of this Notice and the proposed contract by reference, and the proposed contract shall be executed to comply therewith.

Published upon order of the City of Storm Lake, Iowa.

CITY OF STORM LAKE, IOWA

BY /s/ Mike Porsch
Mayor

ATTEST:

BY /s/ Keri Navratil
City Manager

City of Storm Lake

Memorial Lift Station Improvements

October 2020—Project No. 19-22797



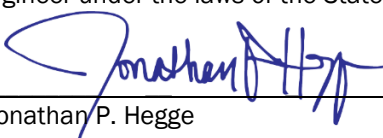
Architecture
Engineering
Environmental
Planning
ISGInc.com

CITY OF STORM LAKE

620 Erie Street
Storm Lake, IA 50588
Buena Vista County

CERTIFICATIONS PAGE
FOR
MEMORIAL LIFT STATION IMPROVEMENTS
CITY OF STORM LAKE
STORM LAKE, IA
JUNE 2020
PROJECT NO. 19-22797

	I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Iowa.  _____ Walter C. Eshenaur 10/02/2020 Date License Number: 25518 My License Renewal Date is 12/31/2020 Pages or sheets covered by this seal: <u>Specification Division 00, 01, and 46</u>
---	--

	I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Iowa.  _____ Jonathan P. Hegge 10/02/2020 Date License Number: 25782 My License Renewal Date is 12/31/2021 Pages or sheets covered by this seal: <u>Specification Division 00, 01, 22, and 23</u>
---	--



I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Iowa.

Michael D. Nelson

Michael D. Nelson

10/02/2020

Date

License Number: 20425

My License Renewal Date is 12/31/2020

Pages or sheets covered by this seal: Specification Division 00, 01, and 26



I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Iowa.

Bradley W. Penar

Bradley W. Penar

10/02/2020

Date

License Number: 19508

My License Renewal Date is 12/31/2020

Pages or sheets covered by this seal: Specification Division 00, 01, 03, 04, 05, and 06



I hereby certify that the portion of this technical submission described below was prepared by me or under my direct supervision and responsible charge. I am a duly licensed architect under the laws of the state of Iowa.

Alyssa F. Campbell

Alyssa F. Campbell

10/02/2020

Date

License Number: 06595

My License Renewal Date is 6/30/2020

Pages or sheets covered by this seal: Specification Division 00, 01, 03, 04, 05, 06, 07, 08, and 09

ISG

1725 N LAKE AVE
STORM LAKE, IA 50588

END OF CERTIFICATION PAGE

**PROJECT MANUAL
FOR
MEMORIAL LIFT STATION IMPROVEMENTS
CITY OF STORM LAKE
STORM LAKE, IA
OCTOBER 2020
PROJECT NO. 19-22797**

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- A. CDBG Project Construction Sign

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- A. Plan Set (Separate Attachment)

NOTE: Applicable portions of the Statewide Urban Design and Specifications (SUDAS), 2020 Edition, with all latest revisions and the Recommended Standards for Wastewater Facilities (10 States Standards), 2014 Edition shall apply to this project.

Where there may be a variation between the plans, procurement and contracting requirements, specifications, and the referenced SUDAS and 10 States Standards, the order of procedure shall be:

1. Detailed Plans
2. Quantity and Estimate Reference
3. Procurement and Contracting Requirements, and Specifications
4. Recommended Standards for Wastewater Facilities (10 States Standards), 2014
5. Statewide Urban Design and Specifications (SUDAS), 2020

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DIVISION 00: Procurement and Contracting Requirements

NOTICE OF PUBLIC HEARING

NOTICE OF PUBLIC HEARING ON PROPOSED PLANS AND SPECIFICATIONS, FORM OF
CONTRACT AND ESTIMATE OF COST FOR THE CONSTRUCTION OF MEMORIAL LIFT
STATION IMPROVEMENTS FOR THE CITY OF STORM LAKE, IOWA

Notice is hereby given that the City Council of Storm Lake, Iowa, will meet at City Hall, 620 Erie Street, Storm Lake, Iowa on the **19th day of October, 2020, at 5:00 p.m.**, at which time and place a hearing will be held on the proposed plans and specifications, form of contract and estimate of cost for Memorial Lift Station Improvements, Storm Lake, Iowa in and for said City. Any interested person may appear at said hearing and file objections to the proposed plans, specifications, form of contract and estimated costs for said improvements.

The general description of types of construction and their limits for which bids will be received shall be as follows:

Memorial Lift Station Improvements

Lift station improvements which generally include replacement of the existing 60HP dry pit centrifugal pumps, valves, and related piping; replacement of the electrical MCC, variable frequency drives, controls, lighting and related work; replacement and relocation of HVAC ventilation and heating system; structural rehabilitation, roof replacement, and access modifications.

The general project location is as follows: 299 Memorial Road, Storm Lake, IA 50588.

Plans and specifications governing the construction of the proposed improvements have been prepared by the Engineer. These plans and specifications, and the proceedings of the City referring to and defining said improvements, are hereby made a part of this Notice and the proposed contract by reference, and the proposed contract shall be executed to comply therewith.

Published upon order of the City of Storm Lake, Iowa.

CITY OF STORM LAKE, IOWA

BY /s/ Mike Porsch
Mayor

ATTEST:

BY /s/ Keri Navratil
City Manager

NOTICE TO BIDDERS

FOR THE CONSTRUCTION OF MEMORIAL LIFT STATION IMPROVEMENTS FOR THE CITY OF STORM LAKE, IOWA

Sealed bids will be received by the City Manager of Storm Lake, Iowa at City Hall, 620 Erie Street, Storm Lake, Iowa before **2:00 p.m.** on the **19th day of November, 2020**, for the construction of the Memorial Lift Station Improvements in and for the City of Storm Lake, Iowa. At the above time and place all bids received by the City will be opened and publicly read with the results being reported to the Storm Lake City Council at their meeting on **December 7th, 2020, at 5:00 p.m.**, at City Hall, 620 Erie Street, Storm Lake, Iowa, at which time and place the Council may take action on the proposals submitted or at such time as may then be fixed.

A **mandatory pre-bid conference** for the Memorial Lift Station Improvements project will be held at **10:00 a.m., CDST on November 10th, 2020** at the Project Site. Representatives of Owner and Engineer will be present to discuss the Project. Engineer will transmit to all prospective Bidders of record such Addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective. **YOUR COMPANY MUST BE REPRESENTED AT THE PRE-BID MEETING OR YOUR BID WILL BE CONSIDERED NON-RESPONSIVE.**

The general description of types of construction and their limits for which bids will be received shall be as follows:

Memorial Lift Station Improvements

Lift station improvements which generally include replacement of the existing 60HP dry pit centrifugal pumps, valves, and related piping; replacement of the electrical MCC, variable frequency drives, controls, lighting and related work; replacement and relocation of HVAC ventilation and heating system; structural rehabilitation, roof replacement, and access modifications.

The general project location is as follows: 299 Memorial Road, Storm Lake, IA 50588.

A more detailed description of the kinds and approximate quantities of materials and types of construction for which bids will be received are set forth in the Bid Form included in the specifications prepared by I+S Group, Inc. (ISG) of Storm Lake, Iowa, which, together with the proposed form of contract, have heretofore been approved by the City, and are now on file for public examination in the office of the City Manager, and are by this reference made part hereof as though fully set out and incorporated herein.

All proposals shall be made on official proposal forms furnished by the Engineer, and must be enclosed in a separate sealed envelope and plainly identified and addressed to the City of Storm Lake, Iowa.

Each proposal shall be accompanied by a cashier's check or certified check drawn on a state-chartered or federally chartered bank, or a certified share draft drawn on a state-chartered or federally chartered credit union, or a bidder's bond with corporate surety satisfactory to the City in an amount equal to Ten percent (10%) of the total amount of the proposal. If bid bond is submitted, it must be in the form provided in these specifications. Said check or share draft may be cashed, or the bid bond forfeited as liquidated damages in the event the successful bidder fails or refuses to enter into a contract within ten (10) days of issuance of a Notice of Award and post bond satisfactory to the City insuring the faithful fulfillment of the contract and maintenance of said improvements as required by law. The bid bond should be executed by a corporation authorized to contract as a surety in the State of Iowa, and must not contain any conditions either in the body or as an endorsement thereon.

The successful bidder will be required to furnish a corporate surety bond in an amount equal to one hundred per cent (100%) of the contract price, said bond to be issued by a responsible surety approved by the City, and shall guarantee the faithful performance of the contract and the terms and conditions therein contained, the payment for materials used in the project and the maintenance of said improvements in good repair for not less than one (1) year from the time of acceptance of said improvements by the City.

The City reserves the right to defer acceptance of any proposal for a period not to exceed sixty (60) calendar days from the date of receipt of bids. The City reserves the right to reject any or all bids and to waive informalities.

Payment of the cost of said project will be made from such cash funds of the City as may be legally used for said purpose at the discretion of the City, including but not limited to, the net revenues of the Water Department, the proceeds from the sale of Revenue or General Obligation Bonds, and/or the proceeds from the sale of warrants, as authorized by Section 384.57 of the Code of Iowa, made payable from any or all of the above-mentioned sources.

The Contractor will be paid ninety-five per cent (95%) of the Engineer's estimate of the value of acceptable work completed at the end of the preceding month. Final payment will be made not less than thirty-one (31) days after completion of the work and acceptance by the City, subject to the conditions and in accordance with the provisions of Chapter 573 of the Code of Iowa.

No such final payment will be due until the Contractor certifies to the City that the materials, labor, and services involved in the final estimate have been paid for in accordance with the requirements stated in the specifications. The City of Storm Lake is exempt from paying Sales and Use Tax and will supply Contractor with an "Iowa Sales Tax Exemption Certificate" and an authorization letter to allow the Contractor to buy equipment and material for the project tax free.

The work on this project shall commence within ten (10) days after receipt by the contractor of a written notice to proceed. The work shall be substantially completed by **November 26th, 2021**, subject to any changes in the contract period as provided for in these specifications.

Liquidated damages in the amount of **\$500** per calendar day will be assessed for each day that the work shall remain uncompleted after the **above referenced completion date** with due allowance for extensions of the contract period due to conditions beyond control of the Contractor.

By virtue of statutory authority, a preference will be given to products and provisions grown and coal produced within the State of Iowa.

In accordance with Iowa statutes, a resident bidder shall be allowed a preference as against a nonresident bidder from a state or foreign country if that state or foreign country gives or requires any preference to bidders from that state or foreign country, including but not limited to any preference to bidders, the imposition of any type of labor force preference, or any other form of preferential treatment to bidders or laborers from that state or foreign country. The preference allowed shall be equal to the preference given or required by the state or foreign country in which the nonresident bidder is a resident. In the instance of a resident labor force preference, a nonresident bidder shall apply the same resident labor force preference to a public improvement in this state as would be required in the construction of a public improvement by the state or foreign country in which the nonresident bidder is a resident.

Failure to submit a fully completed Bidder Status Form with the bid may result in the bid being deemed nonresponsive and rejected.

Plans and specifications governing the construction of the proposed improvements have been prepared by the Engineer. These plans and specifications, and the proceedings of the City referring to and defining said improvements, are hereby made a part of this Notice and the proposed contract by reference, and the proposed contract shall be executed to comply therewith.

Copies of said plans and specifications and form of contract are now on file in the office of the City Manager, for examination by bidders. Copies may be obtained from ISG, 1725 North Lake Avenue, Storm Lake, IA 50588, (712) 732-7745 upon deposit of one hundred dollars (\$100.00) which shall be refunded upon return of the plans and specifications within fourteen days after award of the project. If the plans and specifications are not returned within fourteen days after award of the project and in a reusable condition, the deposit shall be forfeited. Plans and specifications may also be obtained by download from the ISG website at www.is-grp.com.

Any bidder or equipment supplier whose firm or affiliate is listed in the GSA publication "List of Parties Excluded from Federal Procurement and Non-procurement Programs" will be prohibited from the bidding process. Anyone submitting a bid who is listed in this publication will be determined to be a non-responsive bidder in accordance with 40 CFR Part 31.

Section 3 clause

All section 3 covered contracts shall include the following clause (referred to as the section 3 clause):

A. The work to be performed under this contract is subject to the requirements of section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (section 3). The purpose of section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

B. The parties to this contract agree to comply with HUD's regulations in 24 CFR part 135, which implement section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 135 regulations.

C. The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.

D. The contractor agrees to include this section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 135. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 135.

E. The contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR part 135.

F. Noncompliance with HUD's regulations in 24 CFR part 135 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD assisted contracts.

G. With respect to work performed in connection with section 3 covered Indian housing assistance, section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450e) also applies to the work to be performed under this contract. Section 7(b) requires that to the greatest extent feasible (i) preference and opportunities for training and employment shall be given to Indians, and (ii) preference in the award of contracts and subcontracts shall be given to Indian organizations and Indian-owned Economic Enterprises. Parties to this contract that are subject to the provisions of section 3 and section 7(b) agree to comply with section 3 to the maximum extent feasible, but not in derogation of compliance with section 7(b).

Published upon order of the City of Storm Lake, Iowa.

CITY OF STORM LAKE, IOWA

BY /s/ Mike Porsch
Mayor

ATTEST:

BY /s/ Keri Navratil
City Manager

INSTRUCTIONS TO BIDDERS

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ARTICLE 1 – DEFINED TERMS

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
- A. *Issuing Office* – The office from which the Bidding Documents are to be issued and the bidding procedures are to be administered as outlined in the Advertisement for Bids for Construction Contracts.

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

- 2.01 Complete sets of the Bidding Documents may be obtained from the Issuing Office in the number and format stated in the advertisement or invitation to bid. The deposit will be refunded to each document holder of record who returns a complete set of Bidding Documents in good condition within 14 days after award of the project.
- 2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 2.03 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not authorize or confer a license for any other use.

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

- 3.01 To demonstrate Bidder's qualifications to perform the Work, after submitting its Bid and within five (5) days of Owner's request, Bidder shall submit (a) written evidence establishing its qualifications such as financial data, previous experience, and present commitments, and (b) the following additional information:
- A. Evidence of Bidder's authority to do business in the state where the Project is located.
- B. Bidder's state or other contractor license number, if applicable.
- C. Subcontractor and Supplier qualification information; coordinate with provisions of Article 12 of these Instructions, "Subcontractors, Suppliers, and Others."
- D. Other required information regarding qualifications
- 3.02 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.
- 3.03 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.
- 3.04 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

ARTICLE 4 – SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

- 4.01 *Site and Other Areas*
- A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any

additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.

4.02 *Existing Site Conditions*

A. Subsurface and Physical Conditions; Hazardous Environmental Conditions

1. The Supplementary Conditions identify:

- a. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site.
- b. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
- c. reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.
- d. Technical Data contained in such reports and drawings.

2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.

B. Underground Facilities: Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site are set forth in the Contract Documents and are based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.

C. Adequacy of Data: Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 5.03, 5.04, and 5.05 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 5.06 of the General Conditions.

4.03 *Site Visit and Testing by Bidders*

A. Bidder shall conduct the required Site visit during normal working hours, and shall not disturb any ongoing operations at the Site.

B. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.

- C. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site.
- D. Bidder shall comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
- E. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

4.04 *Owner's Safety Program*

- A. Site visits and work at the Site may be governed by an Owner safety program. As the General Conditions indicate, if an Owner safety program exists, it will be noted in the Supplementary Conditions.

4.05 *Other Work at the Site*

- A. Reference is made to Article 8 of the Supplementary Conditions for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 5 – BIDDER'S REPRESENTATIONS

5.01 It is the responsibility of each Bidder before submitting a Bid to:

- A. examine and carefully study the Bidding Documents, and any data and reference items identified in the Bidding Documents;
- B. visit the Site, conduct a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfy itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. become familiar with and satisfy itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work;
- D. carefully study all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings;
- E. consider the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations

obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs;

- F. agree, based on the information and observations referred to in the preceding paragraph, that at the time of submitting its Bid no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
- G. become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;
- H. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder;
- I. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work; and
- J. agree that the submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 6 – PRE-BID CONFERENCE

- 6.01 A pre-Bid conference will be held at the time and location stated in the Notice to Bidders. Representatives of Owner and Engineer will be present to discuss the Project. **Bidders are required to attend and participate in the conference.** Engineer will transmit to all prospective Bidders of record such Addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

ARTICLE 7 – INTERPRETATIONS AND ADDENDA

- 7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all parties recorded as having received the Bidding Documents. Questions received less than seven days prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.
- 7.02 Addenda may be issued to clarify, correct, supplement, or change the Bidding Documents.

ARTICLE 8 – BID SECURITY

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of 10% percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a certified check, bank money order, or a Bid bond (on the form included in

the Bidding Documents) issued by a surety meeting the requirements of Paragraphs 6.01 and 6.02 of the General Conditions.

- 8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract Documents, furnished the required contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults.
- 8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.
- 8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within seven days after the Bid opening.

ARTICLE 9 – CONTRACT TIMES

- 9.01 The number of days within which, or the dates by which, the Work is to be substantially completed and ready for final payment are set forth in the Agreement.

ARTICLE 10 – LIQUIDATED DAMAGES

- 10.01 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 11 – SUBSTITUTE AND "OR-EQUAL" ITEMS

- 11.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, and those "or-equal" or substitute materials and equipment subsequently approved by Engineer prior to the submittal of Bids and identified by Addendum. No item of material or equipment will be considered by Engineer as an "or-equal" or substitute unless written request for approval has been submitted by Bidder and has been received by Engineer at least 15 days prior to the date for receipt of Bids. Each such request shall comply with the requirements of Paragraphs 7.04 and 7.05 of the General Conditions. The burden of proof of the merit of the proposed item is upon Bidder. Engineer's decision of approval or disapproval of a proposed item will be final. If Engineer approves any such proposed item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner.
- 11.02 All prices that Bidder sets forth in its Bid shall be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of "or-equal" or substitution requests are made at Bidder's sole risk.

ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 12.01 A Bidder shall be prepared to retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of the Work if required by the Bidding Documents (most commonly in the Specifications) to do so. If a prospective Bidder objects to retaining any such Subcontractor, Supplier, or other individual or entity, and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.
- 12.02 Subsequent to the submittal of the Bid, Owner may not require the Successful Bidder or Contractor to retain any Subcontractor, Supplier, or other individual or entity against which Contractor has reasonable objection.
- 12.03 The apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of the Subcontractors or Suppliers proposed for the Work.
- If requested by Owner, such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, or other individual or entity. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder shall submit a substitute, Bidder's Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.
- 12.04 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, or other individuals or entities. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.06 of the General Conditions.

ARTICLE 13 – PREPARATION OF BID

- 13.01 The Bid Form is included with the Bidding Documents.
- A. All blanks on the Bid Form shall be completed in ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.
- B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words "No Bid" or "Not Applicable."
- 13.02 A Bid by a corporation shall be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation shall be shown.
- 13.03 A Bid by a limited liability company shall be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.
- 13.04 A Bid by an individual shall show the Bidder's name and official address.

- 13.05 A Bid by a joint venture shall be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be shown.
- 13.06 All names shall be printed in ink below the signatures.
- 13.07 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 13.08 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.
- 13.09 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder's state contractor license number, if any, shall also be shown on the Bid Form.

ARTICLE 14 – BASIS OF BID

14.01 *Unit Price*

- A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form.
- B. The "Bid Price" (sometimes referred to as the extended price) for each unit price Bid item will be the product of the "Estimated Quantity" (which Owner or its representative has set forth in the Bid Form) for the item and the corresponding "Bid Unit Price" offered by the Bidder. The total of all unit price Bid items will be the sum of these "Bid Prices"; such total will be used by Owner for Bid comparison purposes. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.
- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

14.02 *Allowances*

- A. For cash allowances the Bid price shall include such amounts as the Bidder deems proper for Contractor's overhead, costs, profit, and other expenses on account of cash allowances, if any, named in the Contract Documents, in accordance with Paragraph 13.02.B of the General Conditions.

ARTICLE 15 – SUBMITTAL OF BID

- 15.01 With each copy of the Bidding Documents, a Bidder is furnished one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 7 of the Bid Form.
- 15.02 A Bid shall be received no later than the date and time prescribed and at the place indicated in the advertisement or invitation to bid and shall be enclosed in a plainly marked package with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with

the notation "BID ENCLOSED." A mailed Bid shall be addressed to **City of Storm Lake, 620 Erie Street, Storm Lake, IA 50588.**

- 15.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID

- 16.01 A Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 16.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 16.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 16.03 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, that Bidder will be disqualified from further bidding on the Work.

ARTICLE 17 – OPENING OF BIDS

- 17.01 Bids will be opened at the time and place indicated in the advertisement or invitation to bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 18.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT

- 19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible. If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, then the Owner will reject the Bid as nonresponsive; provided that Owner also reserves the right to waive all minor informalities not involving price, time, or changes in the Work.
- 19.02 If Owner awards the contract for the Work, such award shall be to the responsible Bidder submitting the lowest responsive Bid.
- 19.03 Evaluation of Bids
- A. In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.

- B. For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.
- 19.04 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.
- 19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

ARTICLE 20 – BONDS AND INSURANCE

- 20.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the Agreement (executed by Successful Bidder) to Owner, it shall be accompanied by required bonds and insurance documentation.

ARTICLE 21 – SIGNING OF AGREEMENT

- 21.01 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 15 days thereafter, Successful Bidder shall execute and deliver the required number of counterparts of the Agreement (and any bonds and insurance documentation required to be delivered by the Contract Documents) to Owner. Within ten days thereafter, Owner shall deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 22 – SALES AND USE TAXES

- 22.01 Owner is exempt from Iowa state sales and use taxes on materials and equipment to be incorporated in the Work. Said taxes shall not be included in the Bid. Refer to Paragraph SC-7.09 of the Supplementary Conditions for additional information.

ARTICLE 23 – CONTRACTS TO BE ASSIGNED (NOT USED)

BID FORM

MEMORIAL LIFT STATION IMPROVEMENTS

Storm Lake, Iowa

Project No. 19-22797

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ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

***City of Storm Lake
Attn: Keri Navratil, City Manager
620 Erie Street
Storm lake, IA 50588***

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

<u>Addendum No.</u>	<u>Addendum, Date</u>
_____	_____
_____	_____
_____	_____
_____	_____

B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and

observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.

- F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.
- J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
 - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;
 - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 - 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and

4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5 – BASIS OF BID

- 5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

BID ITEM NO.	DESCRIPTION	TOTAL AMOUNT
1	ENTIRE WORK	
TOTAL BID		\$ _____ (NUMERICAL VALUE)
\$ _____ _____		
		(WRITTEN VALUE)

- 5.02 Bidder acknowledges that (1) each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item, and (2) estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.
- 5.03 Contract will be awarded to the lowest responsible bidder.

ARTICLE 6 – TIME OF COMPLETION

- 6.01 Bidder agrees that the Work will be substantially complete on or before November 26th, 2021, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before December 31st, 2021.
- 6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 – ATTACHMENTS TO THIS BID

- 7.01 The following documents are submitted with and made a condition of this Bid:
- A. Required Bid Security;
 - B. Intent to Comply with Section 3 Requirements Form;
 - C. SRF Required Front-End Specifications;
 - D. Required Bidder Status Form;
 - E. DUNS Number, Tax ID Number, and Iowa Contractor's License Number

ARTICLE 8 – DEFINED TERMS

- 8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 9 – BID SUBMITTAL

BIDDER: *[Indicate correct name of bidding entity]*

By:

[Signature]

[Printed name]

(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:

[Signature]

[Printed name]

Title:

Submittal Date:

Address for giving notices:

Telephone Number:

Fax Number:

Contact Name and e-mail address:

Bidder's License No.:

BID BOND

Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable.

BIDDER (*Name and Address*):

SURETY (*Name, and Address of Principal Place of Business*):

OWNER (*Name and Address*):

BID

Bid Due Date:

Description (*Project Name— Include Location*):

BOND

Bond Number:

Date:

Penal sum _____ \$ _____
(Words) (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

BIDDER

SURETY

Bidder's Name and Corporate Seal

Surety's Name and Corporate Seal

By: _____ By: _____
Signature Signature (Attach Power of Attorney)

Print Name Print Name

Title Title

Attest: _____ Attest: _____
Signature Signature

Title Title

Note: Addresses are to be used for giving any required notice.

Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
 - 3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
 - 3.2 All Bids are rejected by Owner, or
 - 3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after the Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

Bidder Status Form

To be completed by all bidders

Part A

Please answer "Yes" or "No" for each of the following:

☐ Yes ☐ No

My company is authorized to transact business in Iowa.
(To help you determine if your company is authorized, please review the worksheet on the next page).

☐ Yes ☐ No

My company has an office to transact business in Iowa.

☐ Yes ☐ No

My company's office in Iowa is suitable for more than receiving mail, telephone calls, and e-mail.

☐ Yes ☐ No

My company has been conducting business in Iowa for at least 3 years prior to the first request for bids on this project.

☐ Yes ☐ No

My company is not a subsidiary of another business entity or my company is a subsidiary of another business entity that would qualify as a resident bidder in Iowa.

If you answered "Yes" for each question above, your company qualifies as a resident bidder. Please complete Parts B and D of this form.

If you answered "No" to one or more questions above, your company is a nonresident bidder. Please complete Parts C and D of this form.

To be completed by resident bidders

Part B

My company has maintained offices in Iowa during the past 3 years at the following addresses:

Dates: _____ / _____ / _____ to _____ / _____ / _____

Address: _____

City, State, Zip: _____

Dates: _____ / _____ / _____ to _____ / _____ / _____

Address: _____

City, State, Zip: _____

Dates: _____ / _____ / _____ to _____ / _____ / _____

Address: _____

City, State, Zip: _____

You may attach additional sheet(s) if needed.

To be completed by non-resident bidders

Part C

1. Name of home state or foreign country reported to the Iowa Secretary of State:

2. Does your company's home state or foreign country offer preferences to bidders who are residents?

☐ Yes ☐ No

3. If you answered "Yes" to question 2, identify each preference offered by your company's home state or foreign country and the appropriate legal citation.

You may attach additional sheet(s) if needed.

To be completed by all bidders

Part D

I certify that the statements made on this document are true and complete to the best of my knowledge and I know that my failure to provide accurate and truthful information may be a reason to reject my bid.

Firm Name: _____

Signature: _____ Date: _____

Worksheet: Authorization to Transact Business

This worksheet may be used to help complete Part A of the Resident Bidder Status form. If at least one of the following describes your business, you are authorized to transact business in Iowa.

- ☐ Yes ☐ No My business is currently registered as a contractor with the Iowa Division of Labor.
- ☐ Yes ☐ No My business is a sole proprietorship and I am an Iowa resident for Iowa income tax purposes.
- ☐ Yes ☐ No My business is a general partnership or joint venture. More than 50 percent of the general partners or joint venture parties are residents of Iowa for Iowa income tax purposes.
- ☐ Yes ☐ No My business is an active corporation with the Iowa Secretary of State and has paid all fees required by the Secretary of State, has filed its most recent biennial report, and has not filed articles of dissolution.
- ☐ Yes ☐ No My business is a corporation whose articles of incorporation are filed in a state other than Iowa, the corporation has received a certificate of authority from the Iowa secretary of state, has filed its most recent biennial report with the secretary of state, and has neither received a certificate of withdrawal from the secretary of state nor had its authority revoked.
- ☐ Yes ☐ No My business is a limited liability partnership which has filed a statement of qualification in this state and the statement has not been canceled.
- ☐ Yes ☐ No My business is a limited liability partnership which has filed a statement of qualification in a state other than Iowa, has filed a statement of foreign qualification in Iowa and a statement of cancellation has not been filed.
- ☐ Yes ☐ No My business is a limited partnership or limited liability limited partnership which has filed a certificate of limited partnership in this state, and has not filed a statement of termination.
- ☐ Yes ☐ No My business is a limited partnership or a limited liability limited partnership whose certificate of limited partnership is filed in a state other than Iowa, the limited partnership or limited liability limited partnership has received notification from the Iowa secretary of state that the application for certificate of authority has been approved and no notice of cancellation has been filed by the limited partnership or the limited liability limited partnership.
- ☐ Yes ☐ No My business is a limited liability company whose certificate of organization is filed in Iowa and has not filed a statement of termination.
- ☐ Yes ☐ No My business is a limited liability company whose certificate of organization is filed in a state other than Iowa, has received a certificate of authority to transact business in Iowa and the certificate has not been revoked or canceled.

INTENT TO COMPLY WITH SECTION 3 REQUIREMENTS

(To be provided with procurement documents and returned with all submitted bids)

Section 3 of the Housing and Urban Development Act of 1968 [12 U.S.C. 1701u and 24 CFR Part 135] is HUD's legislative directive for providing preference to low-income residents of the local community (regardless of race or gender), and the businesses that substantially employ these persons, for new employment, training and contracting opportunities resulting from HUD-funded projects. The regulations seek to ensure that low- and very low-income persons, and the businesses that employ these individuals, are notified about the expenditure of HUD funds in their community and encouraged to seek opportunities, if created.

A Section 3 resident is defined as a public housing resident or someone with a household income that is less than 80% of the area median income.

A Section 3 business is defined as a business that is:

51% owned by Section 3 residents

Whose permanent, full-time staff is comprised of at least 30% Section 3 residents**

Has committed 25% of the dollar amount of its subcontracts to Section 3 businesses

Note: If your business meets the definition of a Section 3 business, you may register as a Section 3 Business through HUD's website here:

<https://portalapps.hud.gov/Sec3BusReg/BRegistry/RegisterBusiness>

Businesses who self-certify that they meet one of the regulatory definitions of a Section 3 business will be included in a searchable online database. The database can be used by agencies that receive HUD funds, developers, contractors, and others to facilitate the award of covered construction and non-construction contracts to Section 3 businesses.

Please complete the following:

1. If awarded a contract for this CDBG funded project, do you anticipate hiring new employees to complete the project? (Hiring would be specific to this project)
☐ Yes ☐ No If yes, please estimate the number of employees to be hired: _____
2. Is your business a Section 3 Business? ☐ Yes ☐ No
3. Is the bidder willing to consider hiring Section 3 residents for future employment opportunities that are a direct result of this CDBG funded project?
☐ Yes ☐ No
4. Is the bidder willing to consider subcontracting with Section 3 Businesses for this project?
☐ Yes ☐ No

I understand that this contracting opportunity is subject to HUD Section 3 requirements (24 CFR Part 135). I have read and understand the Section 3 requirements as generally described above and presented in the Section 3 contract language included in the procurement documents for this project. If awarded a contract, the business commits to following Section 3 requirements, as they apply to this project. If awarded a contract for this project, the business agrees to provide reports to (insert City/County) on Section 3 efforts and accomplishments.

Name of Contractor/Subcontractor

Address

Print Name

Title

Signature

Date



SRF Required Front-End Specifications

This packet includes the special requirements that apply only to projects subject to “American Iron and Steel” requirements enacted by Congress on January 17, 2014. Please consult with the DNR Project Manager to determine if the AIS requirements apply. If not, Attachment 9 may be removed.

- Attachment 1: Certification of Non-Segregated Facilities Form
(to be completed and signed by Prime Contractor and submitted with the bid)
- Attachment 2: Statement in Advertisement for Bids on Debarment and Suspension/Certification Regarding Debarment and Suspension Form *(to be completed and signed by Prime Contractor and submitted with the bid)*
- Attachment 3: Disadvantaged Business Enterprise Certification Form *(to be completed and signed by Prime Contractor and submitted with the bid)*
- Attachment 4: DBE Program Subcontractor Performance Form *(to be completed and signed by Prime and DBE Subcontractor for each subcontract and submitted with the bid)*
- Attachment 5: DBE Program Subcontractor Utilization Form *(to be completed and signed by Prime Contractor and submitted with the bid)*
- Attachment 6: DBE Program Subcontractor Participation Form *(for voluntary use of DBEs)*
- Attachment 7: Other Federal Requirements Language
- A. Standard Equal Employment Opportunity Specifications
 - B. Federal Labor Standards Provisions (including Davis-Bacon prevailing wage rates)
 - C. Preservation of Open Competition and Government Neutrality
 - D. Historical and Archeological Finds
 - E. Prohibitions on Procurement from Violating Facilities
- Attachment 8: Right of Entry and Records Retention
- Attachment 9: Use of American Iron and Steel

Please note: The Davis Bacon wage determination received from the Iowa Finance Authority must also be included in the front-end specifications.

Attachment 1
SRF Required Front-End Specifications
(This form must be completed and signed by Prime Contractor and submitted with the bid.)

U.S. Environmental Protection Agency
Certification of Non-Segregated Facilities

(Applicable to contracts, subcontracts, and agreements with applicants who are themselves performing Federally assisted construction contracts, exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause.)

By the submission of this bid, the bidder, offeror, applicant, or subcontractor certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. He certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The bidder, offeror, applicant, or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity clause in this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. He further agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause; that he will retain such certifications in his files; and that he will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods):

**NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR
CERTIFICATIONS OF NON-SEGREGATED FACILITIES**

A Certification of Non-segregated Facilities, as required by the May 9, 1967, order (33 F.R. 7808, May 28, 1968) on Elimination of Segregated Facilities, by the Secretary of Labor, must be submitted prior to the award of a subcontract exceeding \$10,000 which is not exempt from the provisions of the Equal Opportunity clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

Signature

Date

Name and Title of Signer (Please Type)

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

EPA-7 5720-4.2

Attachment 2
SRF Required Front-End Specifications

(This form must be completed and signed by the Prime Contractor and submitted with the bid.)

Debarments and Suspensions

Any bidder or equipment supplier whose firm or affiliate is listed in on the U.S. General Services Administration Excluded Parties List System web site at <https://www.sam.gov/SAM/> will be prohibited from the bidding process. Anyone submitting a bid who is listed on this web site will be determined to be a non-responsive bidder in accordance with 40 CFR Part 31.

United States Environmental Protection Agency Washington, DC 20460

**Certification Regarding Debarment, Suspension, and
Other Responsibility Matters**

The prospective participant certifies to the best of its knowledge and belief that it and the principals:

- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- (b) Have not within a three year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction: violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
- (c) Are not presently indicted for otherwise criminally or civilly charged by a government entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (1) (b) of this certification; and
- (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated or cause or default.

I understand that a false statement on this certification may be ground for rejection of this proposal or termination of the award. In addition, under 18 U SC Sec. 10 01, a false statement may result in a fine of up to \$10,000 or imprisonment for up to 5 years, or both.

Typed Name & Title of Authorized Representative

Signature of Authorized Representative

Date

☐ I am unable to certify to the above statements. My explanation is attached.

EPA Form 5700-49 (11-88)

Attachment 3
SRF Required Front-End Specifications
(This form must be completed and signed by Prime Contractor and submitted with the bid.)

Disadvantaged Business Enterprise (DBE) Solicitation

It is EPA's policy that recipients of EPA financial assistance through the State Revolving Fund programs award a "fair share" of subagreements to small, minority and women-owned businesses, collectively known as Disadvantaged Business Enterprises (DBEs). Iowa's Fair Share goals are:

	Minority-Owned Business Enterprise (MBE) Goal	Women-Owned Business Enterprise (WBE) Goal
Construction	1.7%	2.2%
Supplies	0.6%	5.6%
Services	2.5%	11.3%
Goods/Equipment	2.5%	10.4%
Average	1.8%	7.4%

Only work performed by certified DBEs can be counted toward the goals. In Iowa, DBEs must be certified through the Iowa Department of Transportation (IDOT). Information on certification requirements and a list of certified DBEs is on the IDOT website at http://www.iowadot.gov/contracts/contracts_eoaa.htm.

Prime contractors' DBE requirements for SRF projects include:

- Taking affirmative steps for DBE participation
- Documenting the efforts and the proposed utilization of certified DBEs

PROJECT INFORMATION

SRF Applicant:	
Bidder:	
Address:	
Contact Person:	
Signature:	
Phone Number:	
E-Mail Address:	
Check if Prime Contractor is:	☐ Minority-Owned ☐ Women-Owned

GOOD FAITH EFFORTS CHECKLIST

Please complete the checklist to determine if you have complied with the requirement to make good faith efforts to ensure that certified DBEs have the opportunity to compete for procurements funded by EPA financial assistance funds. Bidders/offerers must make good faith efforts prior to submission of bids/proposals.

1. Did you ensure that DBEs are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities? ☐ Yes ☐ No
2. Did you make information on forthcoming opportunities available to DBEs and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process? This includes, whenever possible, posting solicitation for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date. ☐ Yes ☐ No
3. Did you consider in the contracting process whether firms competing for large contracts could subcontract with DBEs? This will include dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by DBEs in the competitive process. ☐ Yes ☐ No
4. Did you encourage contracting with a consortium of DBEs when a contract is too large for one of these firms to handle individually? ☐ Yes ☐ No
5. Did you use the services of the Small Business Administration and the Minority Business Development Agency of the Department of Commerce to identify potential subcontractors? ☐ Yes ☐ No
6. List the potential DBE subcontractors that were contacted. Only list those that are certified through the Iowa Department of Transportation.

Name	How Contacted (e.g. letter, phone call, fax, e-mail)	Response (e.g. did not respond, not interested, not competitive)

PROPOSED UTILIZATION OF DBE SUBCONTRACTORS

Please include Attachments 4 and 5 to document the proposed utilization of certified DBE subcontractors.

CONTRACT ADMINISTRATION PROVISIONS

Several contract provisions are required to prevent unfair practices that adversely affect DBEs. These include:

1. Prime Contractor must pay its Subcontractor for satisfactory performance no more than 30 days from the Prime Contractor's receipt of payment from the SRF loan recipient.
2. Prime Contractor must notify the SRF loan recipient in writing prior to termination of a DBE subcontractor for convenience.
3. Prime Contractor must employ the six Good Faith Efforts to solicit a replacement subcontractor if a DBE subcontractor fails to complete work under a subcontract for any reason.

Attachment 4
SRF Required Front-End Specifications
*(This form must be completed and signed by Prime and DBE Subcontractor
for each subcontract and submitted with the bid.)*

OMB Control No: 2090-0030
Approved 8/13/2013
Approval Expires 8/31/2015

**United States Environmental Protection Agency Disadvantaged Business Enterprise Program
DBE Subcontractor Performance Form**

This form is intended to capture the DBE¹ subcontractor's² description of work to be performed and the price of the work submitted to the prime contractor. An EPA Financial Assistance Agreement recipient must require its prime contractor to have its DBE subcontractors complete this form and include all completed forms in the prime contractor's bid or proposal package.

Subcontractor Name		Project Name	
Bid/Proposal No.		Assistance Agreement ID No. (if known)	Point of Contact
Address			
Telephone No.		Email Address	
Prime Contractor Name		Issuing/Funding Entity	
Contract Item Number	Description of Work Submitted to the Prime Contractor Involving Construction, Services, Equipment or Supplies	Price of Work Submitted to the Prime Contractor	
DBE Certified by ___ DOT ___ SBA ___ Other: _____		Meets/exceeds EPA certification standards? ___ YES ___ NO ___ Unknown	

¹A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certification as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

²Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

**United States Environmental Protection Agency Disadvantaged Business Enterprise Program
DBE Subcontractor Performance Form**

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware of that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

Prime Contractor Signature	Print Name
Title	Date

Subcontractor Signature	Print Name
Title	Date

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

Attachment 5
SRF Required Front-End Specifications
(This form must be completed and signed by Prime Contractor and submitted with the bid if utilizing DBE subcontractors.)

OMB Control No: 2090-0030
Approved 8/13/2013
Approval Expires 8/31/2015

**United States Environmental Protection Agency Disadvantaged Business Enterprise Program
DBE Subcontractor Utilization Form**

This form is intended to capture the prime contractor's actual and/or intended use of identified certified DBE¹ subcontractors² and the estimated dollar amount of each subcontract. An EPA Financial Assistance Agreement Recipient must require its prime contractors to complete this form and include it in the bid or proposal package. Prime contractors should also maintain a copy of this form on file.

Prime Contractor Name		Project Name	
Bid/Proposal No.		Assistance Agreement ID No. (if known)	Point of Contact
Address			
Telephone No.		Email Address	
Issuing/Funding Entity			
I have identified potential DBE certified subcontractors _____ YES _____ NO			
If yes, please complete the table below. If no, please explain:			
Subcontractor Name/Company Name	Company Address/Phone/Email	Estimated Dollar Amount	Currently DBE Certified?

Continue on back if needed

¹A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certification as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

²Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

**United States Environmental Protection Agency Disadvantaged Business Enterprise Program
DBE Subcontractor Utilization Form**

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware of that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

Prime Contractor Signature	Print Name
Title	Date

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

Attachment 6
SRF Required Front-End Specifications
(This form is not required for bidding. It is for the voluntary use of DBE Subcontractors.)

OMB Control No: 2090-0030
Approved 8/13/2013
Approval Expires 8/31/2015

United States Environmental Protection Agency Disadvantaged Business Enterprise Program
DBE Subcontractor Participation Form

An EPA Financial Assistance Agreement Recipient must require its prime contractors to provide this form to its DBE subcontractors. This form gives a DBE¹ subcontractor² the opportunity to describe work received and/or report any concerns regarding the EPA-funded project (e.g. in areas such as termination by prime contractor, late payments, etc.). The DBE subcontractor can, as an option, complete and submit this form to the EPA DBE Coordinator at any time during the project period of performance.

Subcontractor Name		Project Name	
Bid/Proposal No.		Assistance Agreement ID No. (if known)	Point of Contact
Address			
Telephone No.		Email Address	
Prime Contractor Name		Issuing/Funding Entity	
Contract Item Number	Description of Work Received from the Prime Contractor Involving Construction, Services, Equipment or Supplies		Amount Received by Prime Contractor

¹A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certification as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

²Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

**United States Environmental Protection Agency Disadvantaged Business Enterprise Program
DBE Subcontractor Participation Form**

Please use the space below to report any concerns regarding the above EPA-funded project:

Subcontractor Signature	Print Name
Title	Date

EPA FORM 6100-2 (DBE Subcontractor Participation Form)
Return to: Regional Coordinator, Small Business Utilization, U.S. Environmental Protection Agency, Region 7, 11201
Renner Blvd., Lenexa, KS 66219

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

Attachment 7
SRF Required Front-End Specifications

Other Federal Requirements Language

A. Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246)

1. As used in these specifications:
 - a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;
 - b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;
 - c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
 - d. "Minority" includes:
 - (i) Black (all persons having origin in any of the Black African racial groups not of Hispanic origin);
 - (ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
 - (iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Sub-continent, or the Pacific Islands); and
 - (iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).
2. Whenever the Contractor, or any Subcontractor at any tier subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.
3. If the Contractor is participating (pursuant to 41 CFR 6-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.
4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employee in the covered area. Covered construction contractors performing construction work in geographical areas where they do not have a

Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

- a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor employees are assigned to work. The Contractor, where possible will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
- b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available and maintain a record of the organizations' responses.
- c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the Contractor may have taken.
- d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's effort, to meet its obligations.
- e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The

Contractor shall provide notice of these programs to the source complied under 7b above.

f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and test to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's workforce.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

1. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

10. The Contractor shall not use the goals and timetable or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps at least as extensive as those standards prescribed in paragraph 7 of these specifications so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

Federal Register, Vol. 43, No. 68 - Friday, April 7, 1978 (Corrected May 5, 1978).

Effective Date: May 8, 1978

Federal Register, Vol. 45, No. 194. Paragraph 4, revised October 3, 1980

Effective Date: September 30, 1980

APPENDICES A and B-80

Notice of Requirement for Affirmative Action To Ensure Equal Employment Opportunity (Executive Order 11246)

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Specifications" set forth herein.
2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:
(See Appendix B-80 and Appendix A Below)

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and non-federally involved construction.

The Contractor's compliance with the Executive Order and in the regulations in 41 CFR Part 60—4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60—4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60—4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor, employer Identification number of the subcontractor, estimated dollar amount of the subcontract, and the geographical area in which the subcontract is to be performed.

4. As used in this Notice, and in the contract resulting from this solicitation, the “covered area” is (State of Iowa).

APPENDIX A

The following goals and timetables for female utilization shall be included in all Federal and federally assisted construction contracts and subcontracts in excess of \$10,000. The goals are applicable to the contractor’s aggregate on-site construction workforce whether or not part of that workforce is performing work on a Federal or federally assisted construction contract or subcontract.

Area covered: Goals for Women apply nationwide.

Timetable Goals (percent)

From Apr. 1, 1978 until March 31, 19793.1

From Apr. 1, 1979 until March 31, 19805.0

From Apr. 1, 1980 until March 31, 19816.9

Published, Federal Register May 5, 1978

APPENDIX B-80

Until further notice, the following goals for minority utilization in each construction craft and trade shall be included in all Federal or federally assisted construction contracts and subcontracts in excess of \$10,000 to be performed in the respective geographical areas. The goals are applicable to each nonexempt contractor’s total onsite construction workforce, regardless of whether or not part of that workforce is performing work in a Federal, federally assisted or nonfederally related project, contract or subcontract. Construction contractors which are participating in an approved Hometown Plan (see 41 CFR 60—4.5) are required to comply with the goals of the Hometown Plan with regard to construction work they perform in the area covered by the Hometown Plan. With regard to all their other covered construction work, such contractors are required to comply with the applicable SMSA of EA goal contained in this appendix B-80.

Economic Areas

State: Iowa Goal %

096 Dubuque IA:

SMSA Counties:

2200 Dubuque, IA 0.6

IA Dubuque

Non-SMSA

Counties 0.5

IA Allamakee, IA Clayton, IA Delaware, IA, Jackson IA, Winneshiek

099 Davenport Rock Island Moline, IA-IL:

SMSA Counties:

1960 Davenport Rock Island Moline, IA-IL 4.6

IL Henry, IL Rock Island Moline, IA Scott

Non-SMA

Counties 3.4

IL Carroll, IL Hancock, IL Henderson, IL ,Mercer, IL Whiteside, IA Clinton, IA Des Moines, IA Henry, IA Lee, IA Louisa, IA, Muscatine, MO Clark

100 Cedar Rapids, IA:

SMSA Counties:

1360 Cedar Rapids, IA 1.7

IA Linn

Non-SMSA Counties 1.5

IA Benton, IA Cedar, IA Iowa, IA Johnson, IA, Jones, IA, Washington

101 Waterloo, IA:

SMSA Counties:

8920 Waterloo-Cedar Falls, IA 4.7

IA Black Hawk

Non-SMSA Counties 2.0

IA Bremer, IA Buchanan, IA Butler, IA Cerro Gordo, IA Chickasaw, IA Fayette, IA Floyd, IA Franklin, IA Grundy, IA Hancock, IA Hardin, IA Howard, IA Mitchell, IA Winnebago, IA Worth

102 Fort Dodge, IA:

Non-SMSA Counties 0.4

IA Buena Vista, IA Calhoun, IA Carroll, IA Clay, IA Dickinson, IA Emmet, IA Greene, IA Hamilton, IA Humboldt, IA Kossuth, IA Palo Alto, IA Pocahontas, IA Sac, IA Webster, IA Wright

103 Sioux City, IA:

SMSA Counties:

7720 Sioux City, IA-NE 1.9

IA Woodbury, NE Dakota

Non-SMSA Counties	1.2
IA Cherokee, IA Crawford, IA Ida, IA Monona, IA O'Brien, IA Plymouth, IA Sioux, NE Antelope, NE Cedar, NE Cuming, NE Dixon, NE Knox, NE Madison, NE Pierce, NE Stanton, NE Thurston, NE Wayne, SD Bon Homme, SD Clay, SD Union, SD Yankton	
104 Des Moines, IA:	
SMSA Counties:	
2120 Des Moines, IA	4.5
IA Polk, IA Warren	
Non SMSA Counties:	2.4
IA Adair, IA Appanoose, IA Boone, IA Clarke, IA Dallas, IA Davis, IA Decatur, IA Guthrie, IA Jasper, IA Jefferson, IA Keokuk, IA Lucas, IA Madison, IA Mahaska, IA Marion, IA Marshall, IA Monroe, IA Poweshiek, IA Ringgold, IA Story, IA Tama, IA Union, IA Van Buren, IA Wapello, IA Wayne	
143 Omaha, NE:	
SMSA Counties:	
5920 Omaha, NE-IA	7.6
IA Pottawattamie, NE Douglas, NE Sarpy	
Non-SMSA Counties	5.3
IA Adams, IA Audubon, IA Cass, IA Fremont, IA Harrison, IA Mills, IA Montgomery, IA Page, IA Shelby, IA Taylor, NE Burt, NE Cass, NE Colfax, NE Dodge, NE Platte, NE Saunders, NE Washington	

Published, Federal Register October 3, 1980

B. Federal Labor Standards Provisions (including Davis-Bacon prevailing wage rates)

Applicability

The Project or Program to which the construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

(1) Minimum wages. (i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill,

except as provided in Sec. 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) Withholding. The EPA shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the EPA may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records. (i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency). The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit them to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency), the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its

own records, without weekly submission to the sponsoring government agency (or the applicant, sponsor, or owner).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under Sec. 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under Sec. 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees--(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's

hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the (write in the name of the Federal agency) may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility. (i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

(b) Contract Work Hours and Safety Standards Act. The Agency Head shall cause or require the contracting officer to insert the following clauses set forth in paragraphs (b)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by Sec. 5.5(a) or 4.6 of part 4 of this title. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The loan recipient shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (b)(1) through (4) of this section and also a clause requiring the

subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.

(c) In addition to the clauses contained in paragraph (b), in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in Sec. 5.1, the Agency Head shall cause or require the contracting officer to insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Agency Head shall cause or require the contracting officer to insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the EPA and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

C. Preservation of Open Competition and Government Neutrality Towards Government Contractors' Labor Relations on Federal and Federally Funded Construction Projects (Executive Order 13202, as amended by Executive Order 13208)

Executive Order 13202, signed February 17, 2001 and amended April 4, 2001, requires all executive agencies that issue grants to ensure Government neutrality toward contractors' labor relations. This applies to recipients of SRF assistance. The Executive Order prohibits discrimination against contractors and their employees in construction contracts based upon labor affiliation or lack thereof.

SRF assistance recipients and any construction managers acting on their behalf must ensure that bidding specifications, project agreements, and other controlling documents do not require, prohibit, or otherwise discriminate, with respect to labor affiliation or lack thereof.

D. Historical and Archeological Finds

If, during the course of construction, evidence of deposits of historical or archeological interest is found, the contractor shall cease operations affecting the find. The owner shall then notify the State Revolving Fund Environmental Review Specialist, who shall in turn notify the State Historic Preservation Office. The SRF shall consult with the SHPO and other interested parties to determine the proper course of action regarding the discovery. No further disturbance of the deposits shall ensue until the SRF Environmental Review Specialist determines that the project activities in that area may proceed. Compensation to the contractor, if any, for lost time or changes in construction to avoid the find, shall be determined in accordance with changed conditions or change order provisions of the specifications.

Authority for this derives from the National Historic Preservation Act (16 U.S.C. §§ 470 *et seq.*) and 36 CFR Part 800. If human remains are discovered then state law also applies IC 263B.

E. Prohibitions on Procurement from Violating Facilities (Section 306, Clean Air Act; Section 508, Clean Water Act; Executive Order 11738)

Both the Clean Water Act and the Clean Air Act prohibit federal agencies from extending assistance by way of loans or contracts to persons who have been convicted of violations of either law. Executive Order 11738 was issued to coordinate enforcement by the U.S. Environmental Protection Agency, which shall designate facilities which have given rise to a conviction for an offense under the criminal provisions of the Clean Air Act and the Clean Water Act.

The Executive Order also prohibits agencies from extending assistance to facilities that are not in compliance with either Act.

SRF assistance recipients may not procure goods, services, or materials from suppliers listed by the EPA as violators.

The Excluded Parties Listing System is located at <http://epls.arnet.gov>.

**Attachment 8
SRF Required Front-End Specifications**

Right of Entry and Records Retention

The recipient shall provide access at all times for the Department of Natural Resources, the Iowa Finance Authority, the state auditor, and the U.S. EPA Office of the Inspector General to all project records and documents for inspection and audit purposes for a period of three years after the date of last loan payment. The same access to the project site(s) shall be provided for inspection purposes.

92.8 (2).6.e. State inspections. Personnel of the department shall have the right to examine all construction aspects of the project, including materials and equipment delivered and stored on site for use on the project.

Attachment 9

SRF Required Front-End Specifications

“American Iron and Steel” Requirements

H.R. 3547, the “Consolidated Appropriations Act, 2014,” enacted January 17, 2014 by the U.S. Congress, includes “American Iron and Steel” provisions that require Clean Water and Drinking Water State Revolving Fund assistance recipients of these funds to use iron and steel produced in the United States.

H.R. 3547 includes the following language in Division G, Title IV, under the heading, “Use of American Iron and Steel”:

Sec. 436. (a)(1) None of the funds made available by a State water pollution control revolving fund as authorized by title VI of the Federal Water Pollution Control Act (33 U.S.C. 1381 et seq.) or made available by a drinking water treatment revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42 U.S.C. 300j-12) shall be used for a project for the construction, alteration, maintenance, or repair of a public water system or treatment works unless all of the iron and steel products used in the project are produced in the United States.

(2) In this section, the term “iron and steel products” means the following products made primarily of iron and steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials.

(b) Subsection (a) shall not apply in any case or category of cases in which the Administrator of the Environmental Protection Agency (in this section referred to as the “Administrator”) find that—

- (1) applying subsection (a) would be inconsistent with the public interest;
- (2) iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quantity; or
- (3) inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

(c) If the Administrator receives a request for a waiver under this section, the Administrator shall make available to the public on an informal basis a copy of the request and information available to the Administrator concerning the request, and shall allow for informal public input on the request for at least 15 days prior to making a finding based on the request. The Administrator shall make the request and accompanying information available by electronic means, including on the official public Internet Web site of the Environmental Protection Agency.

The final guidance and any published waivers are found at:

http://water.epa.gov/grants_funding/aisrequirement.cfm. In particular the contractor should pay attention to the guidance for documentation of compliance. There is also a waiver for incidental items; in order to qualify for this waiver the total materials and costs for the project must be tracked and incidental items identified.

Sample “American Iron and Steel” Contract Language

In order to fulfill the requirements, the assistance recipient must in good faith design the project and solicit bids for construction with U.S.-made iron and steel. The following information will be included in any contracts resulting from this request for bids:

The Contractor acknowledges to and for the benefit of the City of _____ (“Purchaser”) and the State of Iowa (the “State”) that it understands the goods and services under this Agreement are being funded with monies made available by the Clean Water State Revolving Fund and/or Drinking Water State Revolving Fund and such law contains provisions commonly known as “American Iron and Steel;” that requires all of the iron and steel products used in the project to be produced in the United States (“American Iron and Steel Requirement”) including iron and steel products provided by the Contactor pursuant to this Agreement.

The Contractor hereby represents and warrants to and for the benefit of the Purchaser and the State that (a) the Contractor has reviewed and understands the American Iron and Steel Requirement, (b) all of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is approved, and (c) the Contractor will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by the Purchaser or the State.

Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Purchaser or State to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney’s fees) incurred by the Purchaser or State resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State or any damages owed to the State by the Purchaser). While the Contractor has no direct contractual privity with the State, as a lender to the Purchaser for the funding of its project, the Purchaser and the Contractor agree that the State is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the State.

Sample Certifications

As indicated in the contract language, it will be the responsibility of the Contractor to obtain certifications that the products and materials used in the project are U.S.-made. EPA recommends the use of a step certification process for documenting compliance with AIS requirements, similar to one used by the Federal Highway Administration. Step certification creates a paper trail which documents the location of the manufacturing process involved with the production of steel and iron materials. Each handler (supplier, fabricator, manufacturer, processor, coater, etc.) of the iron and steel products certifies that their step in the process was domestically performed.

The following information is provided as a sample letter of step certification for AIS compliance. Documentation must be provided on company letterhead. In this example, there may be multiple letters from different manufacturers if one manufacturer did not perform all of the steps.

Date

Company Name
Company Address
City, State Zip

Subject: American Iron and Steel Step Certification for Project (XXXXXXXXXX)

I, (company representative), certify that the (melting, bending, coating, galvanizing, cutting, etc.) process for (manufacturing or fabricating) the following products and/or materials shipped or provided for the subject project is in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. XXXX

2. XXXX

3. XXXX

Such process took place at the following location:

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

Alternatively, the final manufacturer that delivers the iron or steel product to the worksite, vendor, or contractor, may provide a certification asserting that all manufacturing processes occurred in the U.S. and providing detailed information on the steps involved.

The following is a template for this type of final certification.



Template American Iron and Steel Certification Letter



On Manufacturer's Letterhead

IRON & STEEL, INC.
1959 Steel Drive
Ironville, OH 12345

MATERIAL CERTIFICATION

April 30, 2015

RE: Job Name: Waterprojectville, Iowa – 2015 State Revolving Fund Water
Infrastructure Project
SRF Project Number: CS1920999 01

References the SRF Project

I certify that the processes for manufacturing or fabricating the following products and/or materials provided for the subject project took place at the following U.S. locations:

Quantity	Description	Manufacturing Processes	Location Where Processes Occurred
3 count	AB123456 4" Gate Valve	Melting, poured, machined	Ironville, OH
60 count	XY654321 Reinforced Concrete Manhole	Melted, rolled, fabricated	Steel City, IA
60 count	XZ123456 Manhole Cover	Melted, cast, finished	Stainless, MS
1200 linear feet	AB654321 4" Ductile Iron Water Pipe	Melted, rolled, finished	Pipetown, CA

I further certify that the products and/or materials are in full compliance with the American Iron and Steel requirements as mandated in the U.S. Environmental Protection Agency's State Revolving Fund programs. If any of the above compliance statements change while providing material to this project we will immediately notify the supplier, prime contractor, consulting engineer, or project owner.

Specifies the Products and Quantities

On behalf of IRON & STEEL, INC.,

Signature of
Manufacturer's
Representative

Jane Smith
Jane Smith
Product Quality Manager

Specifies the Manufacturing Processes and the U.S. Locations Where They Were Performed

Covered and Non-Covered Items

The EPA issued a waiver for de minimus incidental components of eligible water and wastewater infrastructure projects. Funds used for such de minimus incidental components cumulatively may comprise no more than a total of 5% of the total cost of the materials used in and incorporated into a project. The cost of an individual incidental item may not exceed 1% of the total cost of the materials used in and incorporated into a project.

De minimus incidental items include miscellaneous, generally low-cost components that are essential for, but incidental to, the construction and are incorporated into the physical structure of the project. For many of these incidental components, the country of manufacture and the availability of alternatives are not readily or reasonably identifiable prior to procurement in the normal course of business. For others, the country of manufacture may be known but the miscellaneous character in conjunction with the low cost, individually and (in total) as typically procured in bulk, mark them as properly incidental.

Examples of incidental components could include small washers, screws, fasteners (i.e., nuts and bolts), miscellaneous wire, corner bead, ancillary tube, etc. Examples of items that are clearly not incidental include significant process fittings (i.e., tees, elbows, flanges, and brackets), distribution system fittings and valves, force main valves, pipes, treatment and storage tanks, large structural supports, etc.

Assistance recipients should in consultation with their contractors determine the items to be covered by this waiver, must retain relevant documentation (i.e. invoices) as to those items, and must summarize in reports to the State of Iowa the types and/or categories of items to which this waiver is applied, the total cost of incidental components for each type or category, and the calculations by which they determined the total cost of materials used in and incorporated into the project.

The successful bidder will fill out the materials spreadsheet (shown below) and submit it to the assistance recipient to indicate covered and non-covered items proposed to be procured for the project.

American Iron and Steel Materials Spreadsheet – to be Submitted by Successful Bidder							
Iowa Department of Natural Resources - May 2014							
Based on EPA Memorandum (4/15/2014): De Minimus Waiver of Section 436 of P.L. 113-76, Consolidated Appropriation Acts (CAA), 2014							
Project:	Choose an item.						
Bidder:	Lined/unlined pipes or fittings		Date:				
	Manhole covers						
	Municipal castings						
* Covered Products	Pipes clamps or restraints		pipes or fittings; manhole covers; municipal castings; pipe clamps and restraints; valves; structural steel; hydrants, construction materials.				
	Valves						
	Structural steel						
** Incidental Items	Hydrants		Generally low-cost items, often procured in bulk, such as washers, screws, fasteners, small amounts of wire, etc.				
	Tanks						
	Flanges						
	Reinforced precast concrete						
	Construction materials		Description of Other Products if Not Included in Covered Products	Bid Amount Covered Products	Bid Amount Incidentals	Documentation Will be Obtained	Item is Incidental and will be Claimed under de Minimus Waiver**
1	Choose an item.						
2	Choose an item.						
3	Choose an item.						
4	Choose an item.						
5	Choose an item.						
6	Choose an item.						
7	Choose an item.						
8	Choose an item.						
9	Choose an item.						
10	Choose an item.						

At the end of construction, the contractor will submit a final list showing covered and non-covered items.

American Iron and Steel Materials Spreadsheet with de Minimus Items Iowa Department of Natural Resources - May 2014 Based on EPA Memorandum (4/15/2014): De Minimus Waiver of Section 436 of P.L. 113-76, Consolidated Appropriation Acts (CAA), 2014							
Project:							
Contractor:		Submitted By:					
Date:		Final De Minimus List					
Total Materials Cost:		Total Amount Covered Under de Minimus Waiver		Percent (must be 5% or less of total materials cost)			
* Covered Products include: Lined or unlined pipes or fittings; manhole covers; municipal castings; pipe clamps and restraints; valves; structural steel; hydrants, tanks; flanges; reinforced precast concrete; construction materials. ** Incidental items are miscellaneous, generally low-cost items, often procured in bulk, such as washers, screws, fasteners, small amounts of wire, etc.							
	Covered Products*	Description if Not Included in Covered Products	Date Purchased	Dollar Amount Covered Products	Dollar Amount Incidentals	Documentation Received	Incidental**
1	Choose an item.						
2	Choose an item.						
3	Choose an item.						
4	Choose an item.						
5	Choose an item.						
6	Choose an item.						

These documents are available on-line at http://www.iowasrf.com/about_srf/use-of-american-iron-and-steel/.

"General Decision Number: IA20200003 01/03/2020

Superseded General Decision Number: IA20190003

State: Iowa

Construction Type: Heavy Sewer/Water Treating Plant

Counties: Iowa Statewide.

EXCEPT SCOTT COUNTY

SEWER AND WATER TREATMENT PLANTS ONLY

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.80 for calendar year 2020 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.80 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2020. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/03/2020

* SUIA2002-004 12/01/2014

	Rates	Fringes
Carpenters (ALL OF THE STATE OF IOWA, except the named cities and counties listed below:)	\$ 27.26	13.68
Carpenters (BURLINGTON AND KEOKUK)	\$ 29.53	17.49
Carpenters (CLINTON COUNTY, City of Clinton)	\$ 29.53	17.49
Carpenters (CLINTON, DUBUQUE, JOHNSON, LOUISA, MUSCATNE, DES MOINES, CEDAR and LEE COUNTIES, Except any of the		

previously named cities).....\$ 25.45	15.49
Carpenters (COUNCIL BLUFFS).....\$ 33.33	13.68
Carpenters (DUBUQUE COUNTY (City of Dubuque)).....\$ 29.53	17.49
Carpenters (FORT MADISON).....\$ 29.53	17.49
Carpenters (IOWA CITY).....\$ 29.53	17.49
Carpenters (LINN COUNTY).....\$ 33.58	17.49
Carpenters (MUSCATINE COUNTY, City of Muscatine).....\$ 27.97	18.50
Carpenters (POLK COUNTY).....\$ 37.53	13.54
Carpenters (SIOUX CITY).....\$ 33.33	13.68
Carpenters (WATERLOO/CEDAR FALLS).....\$ 29.53	17.49
Cement mason (ALL OF THE STATE OF IOWA, except for the named cities and couties listed below:).....\$ 27.40	11.05
Cement mason (BURLINGTON AND KEOKUK).....\$ 36.89	11.05
Cement mason (CLINTON COUNTY, City of Clinton).....\$ 36.89	11.05
Cement mason (CLINTON, DUBUQUE, JOHNSON, LOUISA, MUSCATINE, DES MOINES, CEDAR and LEE COUNTIES, Except any of the previously named cities).....\$ 31.53	11.05
Cement mason (COUNCIL BLUFFS)....\$ 33.55	11.05
Cement mason (DUBUQUE COUNTY (City of Dubuque)).....\$ 36.98	11.05
Cement mason (FORT MADISON).....\$ 35.45	11.05
Cement mason (IOWA CITY).....\$ 36.89	11.05
Cement mason (LINN COUNTY).....\$ 36.89	11.05
Cement mason (MUSCATINE COUNTY).....\$ 36.89	11.05
Cement mason (POLK COUNTY).....\$ 36.89	11.05
Cement mason (SIOUX CITY).....\$ 34.17	11.05
Cement mason (WATERLOO/CEDAR FALLS).....\$ 31.68	11.05

IRONWORKER (ALL OF THE STATE
OF IOWA, except for the named
cities or counties listed

below:)\$ 23.75	16.37
IRONWORKER (BURLINGTON AND KEOKUK)\$ 28.58	16.37
IRONWORKER (CLINTON COUNTY, City of Clinton)\$ 35.04	16.37
IRONWORKER (CLINTON, DUBUQUE, JOHNSON, LOUISA, MUSCATINE, DES MOINES, CEDAR and LEE COUNTIES, Except any of the previously named cities)\$ 23.75	16.37
IRONWORKER (COUNCIL BLUFFS)\$ 24.15	16.37
IRONWORKER (DUBUQUE COUNTY (City of Dubuque))\$ 27.53	16.37
IRONWORKER (FORT MADISON)\$ 28.58	16.37
IRONWORKER (IOWA CITY)\$ 27.53	16.37
IRONWORKER (LINN COUNTY)\$ 27.53	16.37
IRONWORKER (MUSCATINE COUNTY)\$ 35.04	16.37
IRONWORKER (POLK COUNTY)\$ 27.37	16.37
IRONWORKER (SIOUX CITY)\$ 18.57	16.37
IRONWORKER (WATERLOO/CEDAR FALLS)\$ 27.53	16.37
LABORERS (ALL OF THE STATE OF IOWA, except for the named cities and counties listed below:)\$ 25.14	9.38
LABORERS (BURLINGTON AND KEOKUK)\$ 30.11	9.38
LABORERS (CLINTON COUNTY, City of Clinton)\$ 29.52	9.38
LABORERS (CLINTON, DUUQUE, JOHNSON, LOUISA, MUSCATINE, DES MOINES, CEDAR and LEE COUNTIES, Except any of the previously named cities)\$ 26.89	9.38
LABORERS (COUNCIL BLUFFS)\$ 26.89	9.38
LABORERS (DUBUQUE COUNTY (City of Dubuque))\$ 26.89	9.38
LABORERS (FORT MADISON)\$ 30.11	9.38
LABORERS (IOWA CITY)\$ 28.35	9.38
LABORERS (LINN COUNTY)\$ 30.87	9.38
LABORERS (MUSCATINE COUNTY (City of Muscatine))\$ 30.35	9.38

LABORERS (POLK COUNTY).....	\$ 30.77	9.38
LABORERS (SIOUX CITY).....	\$ 26.89	9.38
LABORERS (WATERLOO/CEDAR FALLS).....	\$ 26.89	9.38
OPERATOR: Power Equipment (POLK, WARREN, DALLAS, STORY & JASPER COUNTIES)		
SEWER		
Class A.....	\$ 36.00	14.55
Class B.....	\$ 34.30	14.55
Class C.....	\$ 31.91	14.55
WATER		
Class A.....	\$ 35.73	14.55
Class B.....	\$ 34.03	14.55
Class C.....	\$ 31.65	14.55
Power Equipment Operator (ALL OF THE STATE OF IOWA, except for the named cities and counties listed below:)		
Class A.....	\$ 35.73	14.55
Class B.....	\$ 34.03	14.55
Class C.....	\$ 31.65	14.55
Power Equipment Operator (BURLINGTON AND KEOKUK)		
Class A.....	\$ 34.50	31.85
Class B.....	\$ 31.85	31.85
Power Equipment Operator (CLINTON COUNTY, City of Clinton)		
Class A.....	\$ 34.50	31.85
Class B.....	\$ 31.85	31.85
Power Equipment Operator (CLINTON, LOUISA, MUSCATINE, DES MOINES, CEDAR and LEE COUNTIES, Except any of the previously named cities)		
Class A.....	\$ 34.50	31.85
Class B.....	\$ 31.85	31.85
Power Equipment Operator (COUNCIL BLUFFS)		
SEWER		
Class A.....	\$ 36.00	14.55
Class B.....	\$ 34.30	14.55
Class C.....	\$ 31.91	14.55
WATER		
Class A.....	\$ 35.73	14.55
Class B.....	\$ 34.03	14.55
Class C.....	\$ 31.65	14.55
Power Equipment Operator (DUBUQUE COUNTY (Including City of Dubuque) and JOHNSON COUNTY)		
SEWER		
Class A.....	\$ 36.00	14.55
Class B.....	\$ 34.30	14.55
Class C.....	\$ 31.91	14.55

WATER		
Class A.....	\$ 35.73	14.55
Class B.....	\$ 34.03	14.55
Class C.....	\$ 31.65	14.55
Power Equipment Operator (FORT MADISON)		
Class A.....	\$ 34.50	31.85
Class B.....	\$ 31.85	31.85
Power Equipment Operator (IOWA CITY)		
SEWER		
Class A.....	\$ 36.00	14.55
Class B.....	\$ 34.30	14.55
Class C.....	\$ 31.91	14.55
WATER		
Class A.....	\$ 35.73	14.55
Class B.....	\$ 34.03	14.55
Class C.....	\$ 31.65	14.55
Power Equipment Operator (LINN COUNTY)		
SEWER		
Class A.....	\$ 36.00	14.55
Class B.....	\$ 34.30	14.55
Class C.....	\$ 31.91	14.55
WATER		
Class A.....	\$ 35.73	14.55
Class B.....	\$ 34.03	14.55
Class C.....	\$ 31.91	14.55
Power Equipment Operator (MUSCATINE COUNTY)		
Class A.....	\$ 34.50	31.85
Class B.....	\$ 31.85	31.85
Power Equipment Operator (SIOUX CITY)		
SEWER		
Class A.....	\$ 36.00	14.55
Class B.....	\$ 34.30	14.55
Class C.....	\$ 31.91	14.55
WATER		
Class A.....	\$ 35.73	14.55
Class B.....	\$ 34.03	14.55
Class C.....	\$ 31.91	14.55
Power Equipment Operator (WATERLOO/CEDAR FALLS)		
SEWER		
Class A.....	\$ 36.00	14.55
Class B.....	\$ 34.30	14.55
Class C.....	\$ 31.91	14.55
WATER		
Class A.....	\$ 35.73	14.55
Class B.....	\$ 34.03	14.55
Class C.....	\$ 31.91	14.55
Truck drivers (ALL OF THE STATE OF IOWA, except for the named cities and counties listed below:)		
.....	\$ 21.66	10.50
Truck drivers (BURLINGTON AND		

KEOKUK).....\$ 24.59	10.50
Truck drivers (CLINTON COUNTY, City of Clinton).....\$ 25.03	10.50
Truck drivers (CLINTON, DUBUQUE, JOHNSON, LOUISA, MUSCATINE, DES MOINES, CEDAR and LEE COUNTIES, Except any of the previously named cities).....\$ 22.76	10.50
Truck drivers (COUNCIL BLUFFS)...\$ 25.68	10.50
Truck drivers (DUBUQUE COUNTY (City of Dubuque)).....\$ 24.06	10.50
Truck drivers (FORT MADISON).....\$ 24.59	10.50
Truck drivers (IOWA CITY).....\$ 26.34	10.50
Truck drivers (LINN COUNTY).....\$ 27.10	10.50
Truck drivers (MUSCATINE COUNTY).....\$ 24.59	10.50
Truck drivers (POLK COUNTY).....\$ 25.68	10.50
Truck drivers (SIOUX CITY).....\$ 23.28	10.50
Truck drivers (WATERLOO/CEDAR FALLS).....\$ 24.21	10.50

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

CLASS A: Asphalt laydown machine, Asphalt Plant Operator, Asphalt heater-planer unit, Backhoe, Bulldozer, Central Mix Plant, Concrete Pump, Crawler Tractor Pulling Scraper, Dredge Engineer, Dredge Leverman, Front-end Loader (over 2 yds), Group Equipment Greaser (unsupervised), Horizontal boring machine, Master Mechanic, Milling Machine, Motor Patrol, Portland Concrete Paver, Power Shovel, Crane & Dragline, Pushcat, Scraper (10 yards & over or finish), Self-propelled Elevation Grader or Similar Machine, Sideboom Tractor, Subgrader (or equivalent), Tow Push Boat or Work Boat, Trenching Machine (Cleveland 80 or similar capacity).

CLASS B: Asphalt Distributor, Asphalt Finish Roller, Asphalt Screed, Belt Loader or Similar Machine, Bullfloat, Churn or Rotary Drill, Concrete Widening Machine, Concrete Curbing Machine, Conveyor, Crawler Tractor - Pulling ripper, Disc, Sheepsfoot or Roller, Deckhand/Oiler, Finishing Machine (on concrete), Flex-plane, forklift, Form Grader, Front-end Loader (under 2 yards), Group greaser (supervised), Haiss loader or similar, Mechanic-welder, Offroad articulated hauler, Paving breaker pumps (over 3""), Screening & wash plant, Skid loader, Spreader Operator, Self-propell Roller (other than asphalt), Self-propelled vibrating compactor, shoulder machine, Trenching Machine (other than above), Water wagon on compaction.

CLASS C: Asphalt Roller (other than finish), Boiler, Boom & Winch Truck, Compressor, Concrete Spreader, Belt Placer, Farm Type or Utility Tractor with attachments (under 50

hp), Group Greaser Light plant, Mechanical Broom, Mechanical Heater, Oiler, Pile Hammer Power Unit, Pump (Other than Dredge), Pumps (3" and under), Pumps on well points & deep wells for dewatering, Safety Boat, Truck Crane combination Driver Oiler, Welding Machine.

FOOTNOTE:

IRONWORKERS: (Setting of all structural steel and reinforcing steel installation)

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number,

005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the

Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

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Applicability

The Project or Program to which the construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

A. 1. (i) Minimum Wages. All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section I(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible, place where it can be easily seen by the workers.

(ii) (a) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe

benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(b) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB control number 1215- 0140.)

(c) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1215- 0140.)

(d) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii)(b) or (c) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

2. Withholding. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any

other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work, all or part of the wages required by the contract, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or subcontractor to the respective employees to whom they are due. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

3. (i) Payrolls and basic records. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section I(b)(2)(B) of the Davis-bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5 (a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section I(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1215-0140 and 1215-0017.)

(ii) (a) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i). This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the

Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, DC 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. (Approved by the Office of Management and Budget under OMB Control Number 1215-0149.)

(b) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be maintained under 29 CFR 5.5 (a)(3)(i) and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(c) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph A.3.(ii)(b).

(d) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under subparagraph A.3.(i) available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and Trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where

appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage

determination for the work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under 29 CFR Part 5 shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR Part 3 which are incorporated by reference in this contract

6. Subcontracts. The contractor or subcontractor will insert in any subcontracts the clauses contained in subparagraphs 1 through 11 of this paragraph A and such other clauses as HUD or its designee may by appropriate instructions require, and a copy of the applicable prevailing wage decision, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this paragraph.

7. Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.

10. (i) Certification of Eligibility. By entering into this contract the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001. Additionally, U.S. Criminal Code, Section 1 01 0, Title 18, U.S.C., "Federal Housing Administration transactions", provides in part: "Whoever, for the purpose of ... influencing in any way the action of such Administration ... makes, utters or publishes any statement knowing the same to be false... shall be fined

not more than \$5,000 or imprisoned not more than two years, or both.”

11. Complaints, Proceedings, or Testimony by

Employees. No laborer or mechanic to whom the wage, salary, or other labor standards provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

B. Contract Work Hours and Safety Standards Act. The provisions of this paragraph B are applicable only where the amount of the prime contract exceeds \$100,000. As used in this paragraph, the terms “laborers” and “mechanics” include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in subparagraph (1) of this paragraph, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph (1) of this paragraph, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by the clause set forth in sub paragraph (1) of this paragraph.

(3) Withholding for unpaid wages and liquidated damages. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contract, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act which is held by the same prime contractor such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph (2) of this paragraph.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subpaagraph (1) through (4) of this paragraph and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in subparagraphs (1) through (4) of this paragraph.

C. Health and Safety. The provisions of this paragraph C are applicable only where the amount of the prime contract exceeds \$100,000.

(1) No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

(2) The Contractor shall comply with all regulations issued by the secretary of Labor pursuant to Title 29 Part 1926 and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act, 40 USC 3701 et seq.

(3) The Contractor shall include the provisions of this paragraph in every subcontract so that such provisions will be binding on each subcontractor. The Contractor shall take such action with respect to any subcontract as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

THE FOLLOWING SHOULD BE INCLUDED IN ALL CDBG PROJECT SPECIFICATIONS AND CONTRACTS:

A. Executive Orders 11246 and 11375.

The Contractor will comply with all provisions of Executive Orders 11246 and 11375. During the performance of this Contract, the Contractor agrees as follows:

- 1) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, transfer, recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.
- 2) The Contractor will, in all solicitations or advertisement for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.
- 3) The Contractor will send to each labor union or representative of workers with which they have a collective bargaining agreement or other Contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the Contractor's commitments under Section 202 of Executive Order No. 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- 4) The Contractor will comply with all provisions of Executive Order No. 11246 of September 24, 1965, and of the rules, regulations, and relevant order of the Secretary of Labor.
- 5) The Contractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to their books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- 6) In the event of the Contractor's noncompliance with the nondiscrimination clauses of this Contract or with any such rules, regulations or orders, this Contract may be canceled, terminated or suspended in whole or in part and the Contractor may be declared ineligible for further government Contracts in accordance with procedures authorized in Executive Order No. 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
- 7) The Contractor will include the provision of Paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions including sanctions for noncompliance; provided, however, that in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the Contractor

may request the United States to enter into such litigation to protect the interests of the United States.

B. Title VI of the Civil Rights Act of 1964 and Iowa Civil Right Act of 1965.

This act provides that no person shall be excluded from participation, denied benefits, or subjected to discrimination on the basis of race, color, or national origin under any program or activity receiving federal financial assistance. Iowa Civil Right Act mirrors the Federal Civil Rights Act.

C. Federal Executive Order 11063, as amended by Executive Order 12259 Equal Opportunity Housing

D. Section 109 of Title I of the Housing and Community Development Act.

This act provides that no person shall be excluded from participation, including employment, denied program benefits, or subjected to discrimination on the basis of race, color, physical or mental disabilities, national origin, sex, handicap, religion or religious affiliation, or age under any program or activity funded in whole or in part under Title I of this act.

E. Section 3 of the Housing and Urban Development Act of 1965 (as amended).

A. The work to be performed under this contract is subject to the requirements of section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (section 3). The purpose of section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

B. The parties to this contract agree to comply with HUD's regulations in 24 CFR part 135, which implement section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 135 regulations.

C. The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.

D. The contractor agrees to include this section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 135. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 135.

E. The contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR part 135.

F. Noncompliance with HUD's regulations in 24 CFR part 135 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD assisted contracts.

G. With respect to work performed in connection with section 3 covered Indian housing assistance, section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450e) also applies to the work to be performed under this contract. Section 7(b) requires that to the greatest extent feasible (i) preference and opportunities for training and employment shall be given to Indians, and (ii) preference in the award of contracts and subcontracts shall be given to Indian organizations and Indian-owned Economic Enterprises. Parties to this contract that are subject to the provisions of section 3 and section 7(b) agree to comply with section 3 to the maximum extent feasible, but not in derogation of compliance with section 7(b).

F. The Americans with Disabilities Act (P.L. 101-336, 42 U.S.C. 12101-12213).

This act guarantees equal opportunity for individuals with disabilities in public accommodations, employment, transportation, state and local government services and telecommunications.

G. Access to and Maintenance of Records. The Contractor must maintain all required records for five years after final payments are made and all other pending matters are closed. At any time during normal business hours and as frequently as is deemed necessary, the Contractor shall make available and furnish all information and reports required, and will permit access to books, records, and accounts by the Owner, Department of Housing and Urban Development, the Secretary of Labor, the Iowa Economic Development Authority or their authorized representatives, for purposes of investigation to ascertain compliance.

H. Termination. The Owner and/or the Contractor shall have the right to terminate this Contract at any time by giving at least ten (10) days notice in writing. The notice shall specify the effective date of such termination. Upon cancellation, the Owner will be responsible only for those costs incurred by the Contractor to the date of termination. In the event of termination, all finished or unfinished documents, data, studies, surveys, drawings, maps, models, photographs and reports prepared by the Contractor under this Contract shall, at the option of the City, become its property and the Contractor shall be entitled to receive just and equitable compensation for any work satisfactorily completed hereunder.

I. Awarding Agency Reporting Requirements. The Contractor must provide information as necessary and as requested by the Iowa Economic Development Authority for the purpose of fulfilling all reporting requirements related to the CDBG program.

J. Energy Efficiency. Mandatory standards and policies relating to energy efficiency which are contained in the State energy conservation plan issued in compliance with the Energy Policy and Conservation Act.

Pub. L 94-163, 89 Stat. 871

K. All Contracts in Excess of \$100,000.

In addition to the preceding provisions, Contracts in excess of \$100,000 shall require compliance with the following laws and regulations:

- Section 306 of the Clean Air Acts [42 U.S.C. 1857 (h)].
- Section 508 of the Clean Water Act [33 U.S.C. 1368].
- Executive Order 11738.
- EPA Regulations - 40 CFR, Part 15.

In accordance with the Clean Air and Water Act, the Contractor agrees as follows:

- 1) The Contractor will certify that any facility to be utilized in the performance of any nonexempt contract or subcontract is not listed on the List of Violating Facilities issued by the Environmental Protection Agency pursuant to 40 CFR 15.20.

- 2) The Contractor agrees to comply with all the requirements of Section 114 of the Clean Air Act, as amended, (42 U.S.C. 1857c-8) and Section 308 of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1318) relating to inspection, monitoring, entry, reports, and information, as well as all other requirements specified in said Section 114 and Section 308, and all regulations and guidelines issued thereunder.
- 3) The Contractor agrees that as a condition for the award of a Contract, prompt notice will be given of any notification received from the Director, Office of Federal Activities, Environmental Protection Agency, indicating that a facility utilized or to be utilized for the Contract is under consideration to be listed on the Environmental Protection Agency List of Violating Facilities.
- 4) The Contractor agrees that it will include or cause to be included the criteria and requirements in Paragraphs (1) through (4) of this section in every nonexempt subcontract and require every subcontractor to take such action as the Government may direct as a means of enforcing such provisions.

L. All Contracts in Excess of \$2,000.

In addition to the preceding provisions, all construction contracts in excess of \$2,000 must include the Federal Labor Standards Provisions:

- Davis-Bacon and Related Acts
- Contract Work Hours and Safety Standard Act
- Copeland Anti-kickback Act

NOTICE OF AWARD

Date of Issuance:

Owner:

Owner's Contract No.:

Engineer:

Engineer's Project No.:

Project:

Contract Name:

Bidder:

Bidder's Address:

TO BIDDER:

You are notified that Owner has accepted your Bid dated [] for the above Contract, and that you are the Successful Bidder and are awarded a Contract for:

The Contract Price of the awarded Contract is: \$ [] *[note if subject to unit prices, or cost-plus]*

[] unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents accompanies this Notice of Award, or has been transmitted or made available to Bidder electronically. *[revise if multiple copies accompany the Notice of Award]*

☐ a set of the Drawings will be delivered separately from the other Contract Documents.

You must comply with the following conditions precedent within 15 days of the date of receipt of this Notice of Award:

1. Deliver to Owner [] counterparts of the Agreement, fully executed by Bidder.
2. Deliver with the executed Agreement(s) the Contract security *[e.g., performance and payment bonds]* and insurance documentation as specified in the Instructions to Bidders and General Conditions, Articles 2 and 6.
3. Other conditions precedent (if any):

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within ten days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

Owner:

Authorized Signature

By:

Title:

Copy: Engineer

THIS AGREEMENT is by and between The City of Storm Lake (“Owner”) and
 (“Contractor”).

EJCDC® C-520, Agreement Between Owner and Contractor for Construction Contract (Stipulated Price).
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and American Society of Civil Engineers. All rights reserved. Page 1 of 7

and Milestones not achieved within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. Substantial Completion: Contractor shall pay Owner \$500 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 4.02.A above for Substantial Completion until the Work is substantially complete.
2. Completion of Remaining Work: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$500 for each day that expires after such time until the Work is completed and ready for final payment.
3. Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive and will not be imposed concurrently.

4.04 *Special Damages*

- A. In addition to the amount provided for liquidated damages, Contractor shall reimburse Owner (1) for any fines or penalties imposed on Owner as a direct result of the Contractor's failure to attain Substantial Completion according to the Contract Times, and (2) for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Substantial Completion (as duly adjusted pursuant to the Contract), until the Work is substantially complete.
- B. After Contractor achieves Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times, Contractor shall reimburse Owner for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Work to be completed and ready for final payment (as duly adjusted pursuant to the Contract), until the Work is completed and ready for final payment.

ARTICLE 5 – CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents the amounts that follow, subject to adjustment under the Contract:

- A. For all Unit Price Work, an amount equal to the sum of the extended prices (established for each separately identified item of Unit Price Work by multiplying the unit price times the actual quantity of that item):

The extended prices for Unit Price Work set forth as of the Effective Date of the Contract are based on estimated quantities. As provided in Paragraph 13.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer.

ARTICLE 6 – PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

- A. Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 20th day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.
 - 1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract
 - a. Ninety-five percent (95%) of Work completed (with the balance being retainage). If the Work has been 50 percent completed as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage; and
 - b. Ninety-five percent (95%) of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
- B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to Ninety-five percent (95%) percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less two hundred percent (200%) of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work in accordance with Paragraph 15.06 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 15.06.

ARTICLE 7 – INTEREST

- 7.01 All amounts not paid when due shall bear interest at the rate of 10% percent per annum.

ARTICLE 8 – CONTRACTOR’S REPRESENTATIONS

- 8.01 In order to induce Owner to enter into this Contract, Contractor makes the following representations:
- A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.
 - B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 - C. Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
 - D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.
 - E. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor’s safety precautions and programs.
 - F. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
 - G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
 - H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
 - I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
 - J. Contractor’s entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 *Contents*

- A. The Contract Documents consist of the following:

1. This Agreement (pages 1 to 7, inclusive).
 2. CDBG Required Contract Language (pages 1 to 4, inclusive).
 3. Performance bond (pages 1 to 3, inclusive).
 4. Payment bond (pages 1 to 3, inclusive).
 5. General Conditions (pages 1 to 65, inclusive; not attached but incorporated by reference and provided in the Project Manual).
 6. Supplementary Conditions (pages 1 to 10, inclusive; not attached but incorporated by reference and provided in the Project Manual).
 7. Specifications as listed in the table of contents of the Project Manual (not attached but incorporated by reference).
 8. Drawings (not attached but incorporated by reference) consisting of sheets with each sheet bearing the following general title: Memorial Lift Station Improvements
 9. Addenda (numbers to , inclusive; not attached but incorporated by reference and provided in the Project Manual).
 10. Exhibits to this Agreement (enumerated as follows):
 - a. Contractor's Bid (pages to , inclusive).
 11. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - a. Notice to Proceed.
 - b. Work Change Directives.
 - c. Change Orders.
- B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the General Conditions.

ARTICLE 10 – MISCELLANEOUS

10.01 Terms

- A. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

10.02 Assignment of Contract

- A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 *Severability*

- A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.05 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:
1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process or in the Contract execution;
 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

This Agreement will be effective on _____ (which is the Effective Date of the Contract).

OWNER:

CONTRACTOR:

By: _____

By: _____

Title: _____

Title: _____

(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest: _____

Attest: _____

Title: _____

Address for giving notices:

Title: _____

Address for giving notices:

License No.: _____

(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)

NOTICE TO PROCEED

Owner:	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer:	Engineer's Project No.:
Project:	Contract Name:
	Effective Date of Contract:

TO CONTRACTOR:

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on [REDACTED], 20[REDACTED]. *[see Paragraph 4.01 of the General Conditions]*

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work shall be done at the Site prior to such date. In accordance with the Agreement, [the date of Substantial Completion is _____], and the date of readiness for final payment is _____].

Before starting any Work at the Site, Contractor must comply with the following:
[Note any access limitations, security procedures, or other restrictions]

Owner:

Authorized Signature

By:

Title:

Date Issued:

Copy: Engineer

PERFORMANCE BOND

CONTRACTOR *(name and address):*

SURETY *(name and address of principal place of business):*

OWNER *(name and address):*

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location):*

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract):*

Amount:

Modifications to this Bond Form: ☒ None ☐ See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal

Surety's Name and Corporate Seal

By: _____
Signature

By: _____
Signature *(attach power of attorney)*

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after:

3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence,

to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

7.2 additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

7.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

14. Definitions

14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims

for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

16. Modifications to this Bond are as follows:

PAYMENT BOND

CONTRACTOR *(name and address):*

SURETY *(name and address of principal place of business):*

OWNER *(name and address):*

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location):*

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract):*

Amount:

Modifications to this Bond Form: ☒ None ☐ See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

(seal)

Contractor's Name and Corporate Seal

(seal)

Surety's Name and Corporate Seal

By: _____

Signature

By: _____

Signature *(attach power of attorney)*

Print Name

Print Name

Title

Title

Attest: _____

Signature

Attest: _____

Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond shall arise after the following:
 - 5.1 Claimants who do not have a direct contract with the Contractor,
 - 5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
 - 5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).
 - 5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
 - 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 - 7.2 Pay or arrange for payment of any undisputed amounts.
 - 7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. Definitions

16.1 **Claim:** A written statement by the Claimant including at a minimum:

1. The name of the Claimant;
2. The name of the person for whom the labor was done, or materials or equipment furnished;
3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
4. A brief description of the labor, materials, or equipment furnished;
5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
7. The total amount of previous payments received by the Claimant; and

8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4 **Owner Default:** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

18. Modifications to this Bond are as follows:

Contractor's Application for Payment No. _____

Application Period:		Application Date:
To (Owner):	From (Contractor):	Via (Engineer):
Project:	Contract:	
Owner's Contract No.:	Contractor's Project No.:	Engineer's Project No.:

Application For Payment

Change Order Summary

Approved Change Orders			1. ORIGINAL CONTRACT PRICE..... \$ _____
Number	Additions	Deductions	2. Net change by Change Orders..... \$ _____
			3. Current Contract Price (Line 1 ± 2)..... \$ _____
			4. TOTAL COMPLETED AND STORED TO DATE
			(Column F total on Progress Estimates)..... \$ _____
			5. RETAINAGE:
			a. 95% X _____ Work Completed..... \$ _____
			b. 95% X _____ Stored Material..... \$ _____
			c. Total Retainage (Line 5.a + Line 5.b)..... \$ _____
			6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5.c)..... \$ _____
			7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)..... \$ _____
			8. AMOUNT DUE THIS APPLICATION..... \$ _____
			9. BALANCE TO FINISH, PLUS RETAINAGE
			(Column G total on Progress Estimates + Line 5.c above)..... \$ _____
TOTALS			
NET CHANGE BY			
CHANGE ORDERS			

Contractor's Certification

The undersigned Contractor certifies, to the best of its knowledge, the following:
 (1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;
 (2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all Liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such Liens, security interest, or encumbrances); and
 (3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

Contractor Signature

By:	Date:
-----	-------

Payment of: \$ _____
 (Line 8 or other - attach explanation of the other amount)

is recommended by: _____
 (Engineer) (Date)

Payment of: \$ _____
 (Line 8 or other - attach explanation of the other amount)

is approved by: _____
 (Owner) (Date)

Approved by: _____
 Funding or Financing Entity (if applicable) (Date)

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner:	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer:	Engineer's Project No.:
Project:	Contract Name:

This [preliminary] [final] Certificate of Substantial Completion applies to:

☐ All Work ☐ The following specified portions of the Work:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work shall be as provided in the Contract, except as amended as follows: *[Note: Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.]*

Amendments to Owner's responsibilities: ☐ None
☐ As follows

Amendments to Contractor's responsibilities: ☐ None
☐ As follows:

The following documents are attached to and made a part of this Certificate: *[punch list; others]*

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract.

EXECUTED BY ENGINEER:	RECEIVED:	RECEIVED:
By: _____ (Authorized signature)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

NOTICE OF ACCEPTABILITY OF WORK

PROJECT:

OWNER:

CONTRACTOR:

OWNER'S CONSTRUCTION CONTRACT IDENTIFICATION:

EFFECTIVE DATE OF THE CONSTRUCTION CONTRACT:

ENGINEER:

NOTICE DATE:

To: _____
Owner

And To: _____
Contractor

From: _____
Engineer

The Engineer hereby gives notice to the above Owner and Contractor that Engineer has recommended final payment of Contractor, and that the Work furnished and performed by Contractor under the above Construction Contract is acceptable, expressly subject to the provisions of the related Contract Documents, the Agreement between Owner and Engineer for Professional Services dated _____, and the following terms and conditions of this Notice:

CONDITIONS OF NOTICE OF ACCEPTABILITY OF WORK

The Notice of Acceptability of Work ("Notice") is expressly made subject to the following terms and conditions to which all those who receive said Notice and rely thereon agree:

1. This Notice is given with the skill and care ordinarily used by members of the engineering profession practicing under similar conditions at the same time and in the same locality.
2. This Notice reflects and is an expression of the Engineer's professional opinion.
3. This Notice is given as to the best of Engineer's knowledge, information, and belief as of the Notice Date.

4. This Notice is based entirely on and expressly limited by the scope of services Engineer has been employed by Owner to perform or furnish during construction of the Project (including observation of the Contractor's work) under Engineer's Agreement with Owner, and applies only to facts that are within Engineer's knowledge or could reasonably have been ascertained by Engineer as a result of carrying out the responsibilities specifically assigned to Engineer under such Agreement.
5. This Notice is not a guarantee or warranty of Contractor's performance under the Construction Contract, an acceptance of Work that is not in accordance with the related Contract Documents, including but not limited to defective Work discovered after final inspection, nor an assumption of responsibility for any failure of Contractor to furnish and perform the Work thereunder in accordance with the Construction Contract Documents, or to otherwise comply with the Construction Contract Documents or the terms of any special guarantees specified therein.
6. This Notice does not relieve Contractor of any surviving obligations under the Construction Contract, and is subject to Owner's reservations of rights with respect to completion and final payment.

7.

By: _____

Title: _____

Dated: _____

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by



Issued and Published Jointly by



These General Conditions have been prepared for use with the Agreement Between Owner and Contractor for Construction Contract (EJCDC® C-520, Stipulated Sum, or C-525, Cost-Plus, 2013 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other.

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer

has declined to address. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. (“CERCLA”); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5501 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. (“RCRA”); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
12. *Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.
13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents. .
15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
17. *Cost of the Work*—See Paragraph 13.01 for definition.
18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
20. *Engineer*—The individual or entity named as such in the Agreement.
21. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.
23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
25. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work.
26. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
27. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
28. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
29. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
30. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.
31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or "RPR" includes any assistants or field staff of Resident Project Representative.
33. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals and the performance of related construction activities.
35. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
36. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

37. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands furnished by Owner which are designated for the use of Contractor.
38. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
39. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
40. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
43. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.
45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
46. *Unit Price Work*—Work to be paid for on the basis of unit prices.
47. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and

equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

48. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 *Terminology*

- A. The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:*
1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. *Day:*
1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:*
1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).
- E. *Furnish, Install, Perform, Provide:*
1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

- A. *Bonds*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.
- C. *Evidence of Owner’s Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise specifically required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.
- B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or

computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

3.02 *Reference Standards*

- A. Standards Specifications, Codes, Laws and Regulations
 - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 - 2. No provision of any such standard specification, manual, reference standard, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

- A. *Reporting Discrepancies:*
 - 1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict,

error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.
- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer is unable to provide a decision or

interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to such date.

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.
 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 2. abnormal weather conditions;
 3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
 4. acts of war or terrorism.
- D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.
- E. Paragraph 8.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

- F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.
- G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

- 1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
- 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute

resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading of Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
 - 1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and
 - 3. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
 - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 - 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site either:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or
 2. is of such a nature as to require a change in the Drawings or Specifications; or
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Possible Price and Times Adjustments:*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,

- c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- 2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise; or
 - b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 5.04.A.
- 3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
- 4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
 - 1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and
 - 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
 - c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 - d. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after

becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

- C. *Engineer's Review:* Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Possible Price and Times Adjustments:*
 - 1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and
 - d. Contractor gave the notice required in Paragraph 5.05.B.
 - 2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
 - 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

- A. *Reports and Drawings*: The Supplementary Conditions identify:
1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
 2. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in

question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.
- H. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.
- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.H shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.
- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.
- E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is

maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

- D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- E. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- F. If either party does not purchase or maintain all of the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
- G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.
- H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.
- I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.
- J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

- A. *Workers' Compensation:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
 - 2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).
 - 3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).

4. Foreign voluntary worker compensation (if applicable).
- B. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:
1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
 2. claims for damages insured by reasonably available personal injury liability coverage.
 3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- C. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage:
 - a. Such insurance shall be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
 2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Broad form property damage coverage.
 4. Severability of interest.
 5. Underground, explosion, and collapse coverage.
 6. Personal injury coverage.
 7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
 8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- D. *Automobile liability:* Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.
- E. *Umbrella or excess liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.
- F. *Contractor's pollution liability insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result

of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.

- G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.
- H. *Contractor's professional liability insurance*: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.
- I. *General provisions*: The policies of insurance required by this Paragraph 6.03 shall:
 - 1. include at least the specific coverages provided in this Article.
 - 2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.
 - 3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.
 - 4. remain in effect at least until final payment (and longer if expressly required in this Article) and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract Documents.
 - 5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.
- J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.
- B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

6.05 *Property Insurance*

- A. *Builder's Risk:* Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
 - 1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."
 - 2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.
 - 3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
 - 4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).

5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
 6. extend to cover damage or loss to insured property while in transit.
 7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
 8. allow for the waiver of the insurer's subrogation rights, as set forth below.
 9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
 10. not include a co-insurance clause.
 11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
 12. include performance/hot testing and start-up.
 13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.
- B. *Notice of Cancellation or Change:* All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.
- C. *Deductibles:* The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
- D. *Partial Occupancy or Use by Owner:* If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
- E. *Additional Insurance:* If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.
- F. *Insurance of Other Property:* If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

- A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for:
 - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.
- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the

policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and

guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.04 "Or Equals"

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment, or items from other proposed suppliers under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) it has a proven record of performance and availability of responsive service; and
 - 4) it is not objectionable to Owner.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense:* Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal", which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.

- D. *Effect of Engineer's Determination:* Neither approval nor denial of an "or-equal" request shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. *Treatment as a Substitution Request:* If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 Substitutes

- A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent possible such requests shall be made before commencement of related construction at the Site.
 - 1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of material or equipment from anyone other than Contractor.
 - 2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.
 - 3. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - a. shall certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design,
 - 2) be similar in substance to that specified, and
 - 3) be suited to the same use as that specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times,
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from that specified, and

- 2) available engineering, sales, maintenance, repair, and replacement services.
- d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- E. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination:* If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.
- B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.

- E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.
- F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.
- H. On a monthly basis Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.
- J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
- K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
- L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.
- N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.

O. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor
2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

7.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.08 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work

7.09 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.10 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Owner or Contractor may give notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.12 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
 - C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
 - D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
 - E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
 - F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
 - G. Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.13 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or

exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements:*

1. Before submitting a Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.
3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.

- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

- a. Contractor shall submit the number of copies required in the Specifications.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to

provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.

2. *Samples:*

- a. Contractor shall submit the number of Samples required in the Specifications.
- b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.

3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Other Submittals:* Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.
3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
4. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order.
5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.

8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.
2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 1. observations by Engineer;
 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. use or occupancy of the Work or any part thereof by Owner;
 5. any review and approval of a Shop Drawing or Sample submittal;
 6. the issuance of a notice of acceptability by Engineer;
 7. any inspection, test, or approval by others; or
 8. any correction of defective Work by Owner.

- D. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract shall govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 - 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.
- B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, and other submittals prepared by such professional. Shop

Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any utility work at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.
- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. an itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. the extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

- A. If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment shall take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract. When applicable, any such equitable adjustment in Contract Price shall be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.
- C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Contractor.

- D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents shall be that of the former Engineer.

9.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 *Lands and Easements; Reports, Tests, and Drawings*

- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during

or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

- A. Engineer has the authority to reject Work in accordance with Article 14.

10.05 *Shop Drawings, Change Orders and Payments*

- A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.
- B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.
- C. Engineer's authority as to Change Orders is set forth in Article 11.
- D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.07 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.08 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 15.06.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs (if any) of which Engineer has been informed.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
 - 1. *Change Orders:*
 - a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.
 - b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.
 - 2. *Work Change Directives:* A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an

adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

3. *Field Orders*: Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.03 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.

11.04 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:
 1. where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); or
 2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or
 3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on

the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).

- C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.01.C.2.a and 11.01.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;
 - d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
 - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

- A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under

the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.

1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.
 2. *Engineer's Action:* Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.
 3. *Binding Decision:* Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. *Resolution of Certain Change Proposals:* If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
1. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and
 4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.

- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12 – CLAIMS

12.01 *Claims*

- A. *Claims Process:* The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:
 - 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 - 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and
 - 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.
- B. *Submittal of Claim:* The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.
- C. *Review and Resolution:* The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation:*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim

submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
 1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or
 2. To determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:
 1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable

thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with

Paragraph 6.05), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

C. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
- 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
- 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee:* When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.

E. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

13.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

- B. *Cash Allowances*: Contractor agrees that:
 - 1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 - 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

13.03 *Unit Price Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of the following paragraph.
- E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:
 - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;
 - 2. there is no corresponding adjustment with respect to any other item of Work; and
 - 3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 14 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

14.01 Access to Work

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

14.02 Tests, Inspections, and Approvals

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
 - 1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 - 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 - 3. by manufacturers of equipment furnished under the Contract Documents;
 - 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 - 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests shall be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to

cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work shall be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require special inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
 - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 - 2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will

include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 Progress Payments

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments:*
1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
 2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
 3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.
- C. *Review of Applications:*
1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
 2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

- a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
- a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
- a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
- a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

- e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due:*

- 1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner:*

- 1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
 - b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. the Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. the Contract Price has been reduced by Change Orders;
 - i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
 - j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - l. there are other items entitling Owner to a set off against the amount recommended.
- 2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount

remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 15.01.C.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than seven days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which shall fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.
 - 2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 - 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.05 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

- A. *Application for Payment:*
 - 1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of

inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.
 - d. a list of all disputes that Contractor believes are unsettled; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.

D. *Payment Becomes Due:* Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation,

including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.
- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such other adjacent areas;
 - 2. correct such defective Work;
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

- E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
 - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and
 - 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses,

and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for

expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this Article:
 - 1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and
 - 2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this Article, Owner or Contractor may:
 - 1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or
 - 2. agree with the other party to submit the dispute to another dispute resolution process; or
 - 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
 - 1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or
 - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

18.07 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SUPPLEMENTARY CONDITIONS

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I. SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC® C-700 (2013 Edition). All provisions that are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

ARTICLE 2 – PRELIMINARY MATTERS

SC-2.02 Copies of Documents

SC-2.02.A. Amend the first sentence of Paragraph 2.02.A. to read as follows:

Owner shall furnish to Contractor [3] copies of the Contract Documents (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional copies will be furnished upon request at the cost of reproduction.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

SC-5.03 Subsurface and Physical Conditions

SC-5.03 Add the following new paragraphs immediately after Paragraph 5.03.B:

- A.** No reports of explorations or tests of subsurface conditions at or adjacent to the Site, or drawings of physical conditions relating to existing surface or subsurface structures at the Site are known to Owner.
- B.** Not used.

SC-5.06 Hazardous Environmental Conditions

SC 5.06 Delete Paragraphs 5.06.A and 5.06.B in their entirety and insert the following:

- A.** No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.
- B.** Not Used.

SC-5.07 Historic or Paleontological Conditions at Site

SC 5.07 Add the following new paragraph immediately following Paragraph 5.06:

- A.** Immediately upon discovery of potential historical objects of an archeological or paleontological nature with the Project Site do the following:

1. Restrict or suspend operations in the immediate area of the discovery to preserve the potential historical objects, and
 2. Notify Engineer of presence of potential historical objects.
- B. Engineer will make arrangements for objects disposition or record the desired relevant data.
 - C. Support the preservation and salvage effort directed by Engineer. Do not perform Work related to preservation and salvage efforts that Contractor considers Extra Work without written approval of Engineer.
 - D. Owner may restrict or suspend Contractor's operations in the immediate area of the historical objects for a period not to exceed 72-hours, without a Contractor claim for damages. Owner will not impose restrictions over 72-hours, unless agreed by Contractor and Owner in writing.

ARTICLE 6 – BONDS AND INSURANCE

SC-6.03 Contractor's Liability Insurance

SC 6.03 Add the following new paragraph immediately after Paragraph 6.03.J:

- K. The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers' Compensation, and related coverages under Paragraphs 6.03.A.1 and A.2 of the General Conditions:

State:	<u>Statutory</u>
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Federal, if applicable (e.g., Longshoreman's):	<u>Statutory</u>
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Jones Act coverage, if applicable:

Bodily injury by accident, each accident	\$ <u>1,000,000</u>
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Bodily injury by disease, aggregate	\$ <u>1,000,000</u>
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Employer's Liability:

Bodily injury, each accident	\$ <u>1,000,000</u>
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Bodily injury by disease, each employee	\$ <u>1,000,000</u>
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Bodily injury/disease aggregate	\$ <u>2,000,000</u>
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For work performed in monopolistic states, stop-gap liability coverage shall be endorsed to either the worker's compensation or commercial general liability policy with a minimum limit of:

	\$ <u>1,000,000</u>
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Foreign voluntary worker compensation	<u>Statutory</u>
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2. Contractor's Commercial General Liability under Paragraphs 6.03.B and 6.03.C of the General Conditions:

General Aggregate	\$ <u>2,000,000</u>
Products - Completed Operations Aggregate	\$ <u>2,000,000</u>
Personal and Advertising Injury	\$ <u>1,000,000</u>
Each Occurrence (Bodily Injury and Property Damage)	\$ <u>1,000,000</u>

3. Automobile Liability under Paragraph 6.03.D. of the General Conditions:

Bodily Injury:

Each person	\$ <u>1,000,000</u>
Each accident	\$ <u>2,000,000</u>

Property Damage:

Combined Single Limit of	\$ <u>2,000,000</u>
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4. Excess or Umbrella Liability under Paragraph 6.03.E. of the General Conditions:

Per Occurrence	\$ <u>1,000,000</u>
General Aggregate	\$ <u>2,000,000</u>

5. Contractor's Pollution Liability under Paragraph 6.03.F. of the General Conditions:



If box is checked, Contractor is not required to provide Contractor's Pollution Liability insurance under this Contract

6. Additional Insureds: The Owner and Engineer shall be named as additional insureds on the Contractor's general liability, automobile liability, umbrella or excess, and pollution liability policies. The inclusion of more than one named insured shall not operate to impair the rights of one insured against another insured, and the coverages afforded shall apply as though separate policies had been issued to each insured.

7. Any insurance agent shall have in force for any coverage provided by this Contract an Errors and Omissions Coverage with limits of not less than:

Per Occurrence	\$ <u>1,000,000</u>
Annual Aggregate	\$ <u>1,000,000</u>

- L. Prior to commencement of this agreement, the Contractor shall obtain certificates of all insurance required on a form approved by the Owner, signed by an authorized representative of the insurance carrier and stating that all provisions of the specified requirements are satisfied. The certificates shall be submitted directly to the Owner for review and approval with a record copy only to the Engineer for their files. The Contractor shall not begin any work until the Owner has reviewed and approved the insurance certificates and has so notified the Contractor directly in writing. Any notice to proceed that is issued shall be subject to such approval by the Owner.
- M. The insurance policy shall be a standard form policy provided for by a carrier approved by the State of Iowa and shall not contain any exclusions that will restrict coverage on any operations performed by the Contractor or any subcontractor hereof.
- N. The insurance policy shall provide full insurance to cover the Contractor's operating exposures including the picking up of materials, the operation of vehicles, the operation of collection and processing sites, explosion, remote borrow site activities, collapse, underground hazards, and contractual liability as required in Articles 7.17 and 7.18.
- O. It is a condition of the Contract that the policy waives any or all governmental immunity as a defense in any action brought against the insured or any other party to the Contract.
- P. Approval of the insurance by the Owner shall not in any way relieve or decrease the liability of the Contractor hereunder, and it is expressly understood that the Owner or Engineer does not in any way represent that the above specified insurance or limits of liabilities are sufficient or adequate to protect the Contractor's interest or liabilities.

SC-6.04 Owner's Liability Insurance

SC 6.04 Delete Paragraph 6.04.A in its entirety and reference is made to the additional Paragraph 6.03.K.6.

SC-6.05 Property Insurance

SC-6.05.A.1 Add the following new subparagraph after subparagraph 6.05.A.1:

- a. In addition to Owner, Contractor, and all Subcontractors, include as insureds the following:
Engineer – I+S Group, Inc.

SC-6.05.A. Add the following to the list of items in Paragraph 6.05.A, as numbered items:

- 14. include for the benefit of Owner loss of profits and soft cost coverage including, without limitation, fixed expenses and debt service for a minimum of 12 months with a maximum deductible of 30 days, plus attorney's fees and engineering or other consultants' fees, if not otherwise covered;

SC 6.05 Add the following new paragraphs immediately after Paragraph 6.05.F:

- G. All responsibility for maintaining property insurance on any project premises or structures owned, operated, or being constructed by the Contractor remains

solely with the Contractor, who may at their option insure against any other perils, and such responsibility shall remain with the Contractor until such time as this Contract is terminated. Before commencement of the Work, the Contractor shall submit written evidence that the Contractor has obtained and paid, for this period of the Contract, Builder's Risk "All-Risk" Completed Value Insurance Coverage upon entire project, which is the subject of this Contract, and including completed Work, Work in progress, and materials stored off site or in transit. Such insurance shall include as additional named insureds: Owner, Engineer and their consultants, and each of their officers, employees and agents, and any other persons with an insurable interest designated by the Owner.

- H. In the event of conflict between additional Paragraph 6.05.G with other provisions within Paragraph 6.05 of the General Conditions or Paragraph SC-6.05 of the Supplemental Conditions, Paragraph 6.05.G will assume precedence.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

SC-7.01 Supervision and Superintendence

SC 7.01 Add the following new paragraphs immediately after Paragraph 7.01.B:

- C. Contractor's assigned competent resident superintendent shall be personally available at the site of the work within 24 hour notice, and authorized to act in the Contractor's Behalf. This individual shall be fully authorized to:
1. Conduct all business with the subcontractors.
 2. Negotiate and execute all Supplemental Agreements.
 3. Execute the orders and directions of the Engineer without delay.
 4. Promptly supply the materials, equipment, tools, labor, and incidentals necessary for prosecution of the work.
- D. The Contractor shall have a complete set of Drawings and Specifications available on the Project at all times while work is in progress, and shall assume full responsibility for supervision of the work irrespective of the quantity of work subcontracted.
- E. At all times while work is actually being performed, the Contractor shall have at the site of the work a competent individual who is:
1. Authorized and fully capable of managing, directing, and coordinating the work in progress.
 2. Thoroughly experienced in the type of work being performed.
 3. Capable of reading and thoroughly understanding the Drawings and Specifications.
 4. Authorized to receive instructions from the Engineer.

SC-7.02 Labor; Working Hours

SC 7.02 Add the following new subparagraph immediately after Paragraph 7.02.A:

1. Any person employed by the Contractor or by any subcontractor who does not perform assigned work in a proper and skillful manner, or who is intemperate or disorderly, shall be removed from the Project forthwith by the Contractor upon written order of the Engineer, and shall not be employed again on any portion of the Work without Engineer's consent. Should Contractor fail to remove such person, or fail to furnish suitable and sufficient personnel for the proper prosecution of the Work, Engineer may suspend the Work until Contractor has complied with the orders.

SC-7.02.B. Add the following new subparagraphs immediately after Paragraph 7.02.B:

1. Regular working hours will be 7:00AM to 6:00PM, Monday through Friday.
2. Owner's legal holidays are New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving, and Christmas.

SC-7.02.C. Add the following new paragraph immediately after Paragraph 7.02.B:

- C. Contractor shall be responsible for the cost of any overtime pay or other expense incurred by the Owner for Engineer's services (including those of the Resident Project Representative, if any), Owner's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. If Contractor is responsible but does not pay, or if the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.
 1. For purposes of administering the foregoing requirement, additional overtime costs are defined as services performed by the Engineer (including the Resident Project Representative), Owner's representative, and materials testing laboratories considered routine to the project scope and not necessitated from a situation where the public welfare is put at risk.
- D. Upon request by the Engineer, Contractor shall submit satisfactory qualification evidence for any person engaged in special work requiring professional training.

SC-7.09 Taxes

SC 7.09 Add a new paragraph immediately after Paragraph 7.09.A:

- B. Owner is exempt from payment of sales and compensating use taxes of the State of Iowa and of cities and counties thereof on all materials to be incorporated into the Work.
 1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the Work.
 2. Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work.

ARTICLE 10 – ENGINEER’S STATUS DURING CONSTRUCTION

SC-10.03 Project Representative

SC-10.03 Add the following new paragraphs immediately after Paragraph 10.03.A:

- B.** The Resident Project Representative (RPR) will be Engineer's representative at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions.
- 1.** General: RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with Owner only with the knowledge of and under the direction of Engineer.
 - 2.** Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.
 - 3.** Conferences and Meetings: Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings, and prepare and circulate copies of minutes thereof.
 - 4.** Liaison:
 - a.** Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
 - b.** Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
 - c.** Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.
 - 5.** Interpretation of Contract Documents: Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.
 - 6.** Shop Drawings and Samples:
 - a.** Record date of receipt of Samples and Contractor-approved Shop Drawings.
 - b.** Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
 - c.** Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by Engineer.
 - 7.** Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report such suggestions,

together with RPR's recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.

8. Review of Work and Rejection of Defective Work:

- a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.
- b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

9. Inspections, Tests, and System Start-ups:

- a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.
- b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.

10. Records:

- a. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.
- b. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
- c. Maintain records for use in preparing Project documentation.

11. Reports:

- a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
- b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.

- c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.
- 12. **Payment Requests:** Review applications for payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.
- 13. **Certificates, Operation and Maintenance Manuals:** During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.
- 14. **Completion:**
 - a. Participate in Engineer's visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.
 - b. Participate in Engineer's final visit to the Site to determine completion of the Work, in the company of Owner and Contractor, and prepare a final punch list of items to be completed and deficiencies to be remedied.
 - c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the notice of acceptability of the work.
- C. **The RPR shall not:**
 - 1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
 - 2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
 - 3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
 - 4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's work.
 - 5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.

6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
8. Authorize Owner to occupy the Project in whole or in part.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

SC-17.01 Methods and Procedures

SC-17.01 Add the following new paragraphs immediately after Paragraph 17.01.B.

- C. In an effort to resolve any conflicts that arise during the design or construction of the project or following the completion of the project, the Contractor and the Engineer agree that all disputes between them arising out of or relating to this agreement shall be resolved, if possible, at the lowest possible staff level. If the dispute cannot be resolved between Contractor and Engineer staff, the presidents of the respective firms will meet to attempt to resolve the dispute(s). If resolution is not achieved, the dispute shall be submitted to non-binding mediation.
- D. The rights and remedies available to the Contractor shall be limited to breach of Contract, and no other cause of action, including, without limitation, negligence, misrepresentation or other tort theory. Any litigation concerning claims under the Contract shall be venued in the County District Court of the County the project is located within. Neither the Engineer, nor the Contractor shall be entitled to a jury trial in any such action. If the Owner or Engineer is a prevailing party the Contractor shall reimburse the Owner or Engineer its costs and reasonable attorney's fees. The right and remedies to the Owner hereunder shall be in addition to and shall not be construed in any way as a limitation of any rights and remedies available to the Owner which are otherwise available by law or contract, by special warranty or guarantee, or by other provision of the Contract documents. The provision of this paragraph shall be as effective as if repeated specifically in the contract documents in connection with each particular duty, obligation, right and remedy to which it may apply. All representations, warranties and guarantees made in the Contract documents shall survive final payment, termination or completion of this agreement.
- E. No waiver or failure to enforce any part or provision of the contract documents, including but not limited to the change order process, shall be deemed to be waiver by the Owner of any subsequent default or breach of the same or any other part of provision contained herein, or right to enforce the same or any other part or provision contained herein.

Date of Issuance: _____

Effective Date: _____

PROJECT:	ENGINEER'S PROJECT NUMBER:
OWNER:	DATE OF CONTRACT:
CONTRACTOR:	OWNER'S CONTRACT NUMBER:

The Contract Documents are modified as follows upon execution of this Change Order:

Description:

Attachments:

CHANGE IN CONTRACT PRICE:	CHANGE IN CONTRACT TIMES:
---------------------------	---------------------------

Original Contract Price:

Original Contract Times: ☐ Working Days ☐ Calendar Days

(Increase) (Decrease) from previously approved

Change Orders Number _____ to _____

Substantial Completion (day or dates): _____

Ready for Final Payment (day or dates): _____

(Increase) (Decrease) from previously approved

Change Orders Number _____ to _____

Substantial completion (day or dates): _____

Ready for Final Payment (day or dates): _____

Contract Price prior to this Change Order:

\$0.00

Contract Times prior to this Change Order:

Substantial Completion (day or dates): _____

Ready for Final Payment (day or dates): _____

(Increase) (Decrease) of this Change Order:

\$0.00

(Increase) (Decrease) of this Change Order:

Substantial Completion (day or dates): _____

Ready for Final Payment (day or dates): _____

Contract Price Incorporating this Change Order:

\$0.00

Contract Times with all approved Change Orders:

Substantial Completion (day or dates): _____

Ready for Final Payment (day or dates): _____

RECOMMENDED:

I +S GROUP

By:

Engineer (Authorized Signature)

ACCEPTED:

0

By:

Owner (Authorized Signature)

ACCEPTED:

0

By:

Contractor (Authorized Signature)

Date:

Date:

Date:

					Amount	
ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	Increase	Decrease

TOTALS

NET CHANGE IN CONTRACT PRICE
INCREASE (DECREASE) IN CONTRACT TIME, days

\$0.00	\$0.00
\$0.00	

Justification For Changes:

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SUDAS SPECIAL PROVISIONS

FOR THE PURPOSES OF THESE SPECIFICATIONS, SUDAS DIVISION 1 – GENERAL PROVISIONS AND COVENANTS SHALL GOVERN, EXCEPT WITH THE FOLLOWING MODIFICATIONS AND AMENDMENT(S):

1080 – PROSECUTION AND PROGRESS

SP-1.01 Subletting or Assignment of Contract

SP-1.01 Add the following new paragraphs immediately after Paragraph 1.01.C:

C. Subcontracts

3. The ENGINEER shall verify all unexecuted CONTRACTOR and SUBCONTRACTOR agreements, as well as unexecuted agreements between SUBCONTRACTORS & their subcontractors, prior to any agreement between the CONTRACTOR and SUBCONTRACTOR (& their subcontractors) being executed.
4. Prior to the verification of any and all unexecuted agreements, the CONTRACTOR shall submit a copy of the following SUBCONTRACTOR (& their subcontractor) agreement requirement items to the ENGINEER:
 - a. DUNS Number
 - b. Tax ID
 - c. Value of Contract
 - d. State of Iowa Contractor License (through Iowa Workforce Development)
5. Following the review of the SUBCONTRACTOR agreement requirement items, the CONTRACTOR shall submit a fully executed copy of the signed agreement between the CONTRACTOR & SUBCONTRACTOR, as well as any agreements between the SUBCONTRACTOR & their subcontractors to the ENGINEER for further review. ALL contracts must include the federal requirement language as included in the specifications.
6. The ENGINEER shall review all CONTRACTOR and SUBCONTRACTOR agreement requirement items to ensure they are approved to work on Federal Projects.

DIVISION 01: General Requirements

SECTION 01 1000

SUMMARY

PART 1 GENERAL

1.01 PROJECT

- A. Project Name: 22797 Memorial Lift Station Improvements
- B. Owner's Name: City of Storm Lake.
- C. The Project consists of the construction of: Lift station improvements which generally include replacement of the existing 60HP dry pit centrifugal pumps, valves, and related piping; replacement of the electrical MCC, variable frequency drives, controls, lighting and related work; replacement and relocation of HVAC ventilation and heating system; structural rehabilitation, roof replacement, and access modifications.
- D. Sales Tax:
 - 1. Owner is exempt from Iowa Sales and Use Tax and the following shall apply:
 - a. Owner will issue and "Iowa Sales Tax Exemption Certificate" and an authorization letter to the Contractor.
 - b. Contractor shall include "Iowa Sales Tax Exemption Certificate" and authorization with all subcontracts for project.
 - c. Contractor and subcontractors shall not therefore include sales and use tax in Contractor amounts.

1.02 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00 5200 - Agreement Form.

1.03 WORK UNDER OTHER CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.

1.04 SPECIFICATION FORMATS AND COVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 49-division format and CSI/CSC's "MasterFormat" numbering system.
 - 1. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.
- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates. Abbreviated or outlined type includes incomplete sentences.
 - 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - a. Omission of words or phrases, such as; "the Contractor shall", "in conformance with", "shall be", "shall comply with", "as noted on the plans", "according to the plans", "a", "an", "the", and "all", are intentional and depending on the context, are implied.
 - b. Supply omitted words or phrases by inference.
 - c. Part numbers are not intended to be consecutive, but represent standard specification titles.

1.05 OWNER OCCUPANCY

- A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.
- B. Owner intends to occupy a certain portion of the Project prior to the completion date for the conduct of normal operations.
- C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- D. Schedule the Work to accommodate Owner occupancy.

1.06 CONTRACTOR USE OF SITE AND PREMISES

- A. General: Contractor shall have full use of premises for construction operations, including use of Project site, during construction period unless limited as indicated on Drawings by the Contract limits.
- B. Use of Site: Limit use of premises to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Limits: Confine constructions operations to areas indicated on plans.
 - 2. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, the public, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
 - c. Access to lift station shall be maintained at all times.
- C. Provide access to and from site as required by law and by Owner:
 - 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
 - 2. Do not obstruct roadways, sidewalks, or other public ways without permit.

1.07 OWNER'S OCCUPANCY REQUIREMENTS

- A. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits, unless otherwise indicated.
 - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
- B. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.
 - 1. Subparagraphs below describe procedures and requirements necessary before partial occupancy of portions of Project.
 - 2. Engineer will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before Owner occupancy.
 - 3. Obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.
 - 4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions.

1.08 WASTE MATERIAL AND DISPOSAL

- A. Arrange for disposal of waste materials as required.
- B. Stockpile or dispose of salvageable items as directed by Engineer.
- C. Salvageable items remain property of Owner.

1.09 BARRICADES AND LIGHTS

- A. Erect and maintain barricades and lights and/or watchmen for protection and warning of pedestrians and vehicles, prevent access of unauthorized persons to portions of site where work is in progress.
- B. Location and arrangement: conform to ordinances and laws. Meet approval of Engineer and Owner.

1.10 CONSTRUCTION FACILITIES

- A. Storage:
 - 1. Arrange for storage space to suit needs.
 - 2. Store materials and equipment in manner which will preserve their quality and fitness; provide temporary storage buildings as required.
 - 3. Location of construction facilities, including construction plant and yard on site, shall be subject to approval by Engineer; remove upon completion of work.
- B. Service: arrange for water, electrical energy, compressed air, and other services to meet own requirements.
- C. Sanitary: provide suitable sanitary facilities for construction personnel.

1.11 HISTORICAL OR ARCHAEOLOGICAL DISCOVERY

- A. If during the course of construction, evidence of deposits of historical or archaeological interest is found, the Contractor shall cease operations affecting the find and shall notify the Owner who shall notify the Iowa Department of Natural Resources and the Director and Historic Preservation Officer, State Historical Department, E. 12th and Grand, Des Moines, Iowa 50319. No further disturbance of the deposits shall ensue until the Contractor has been notified by the Owner that he may proceed. The Owner will issue a Notice to Proceed only after the State official has surveyed the find and made a determination to this department and the Owner. Compensation to the Contractor, if any, for lost time or changes in construction to avoid the find, shall be determined in accordance with changed conditions or change order provisions of the specifications.

1.12 ENGINEERING SERVICES

- A. Engineer will furnish line and grade required to construct the work.
- B. Contractor shall preserve all monuments, bench marks, reference points and stakes established by the Engineer. In case of willful or careless destruction of the same, the Contractor will be charged with the resulting expense of replacement and shall be responsible for any mistakes or loss of time that may result from their unnecessary loss or disturbance.
- C. It shall be the duty of the Contractor to call to the attention of the Engineer any reference lines, points, or bench marks which may have been disturbed or which seem to be off line or grade.
- D. Contractor shall reimburse Owner for extra engineering cost necessitated by continuance of work beyond the completion date recognizing time extensions granted by Owner.
- E. Contractor shall reimburse Owner for extra engineering cost necessitated by use of equipment other than that detailed in plans and specifications

1.13 WASTE MATERIALS DISPOSAL

- A. Arrange for disposal of waste materials as required.
- B. Stockpile or dispose of salvageable items as directed by Engineer.
- C. Salvageable items remain property of Owner.

END OF SECTION

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General administrative requirements.
- B. Electronic document submittal service.
- C. Preconstruction meeting.
- D. Progress meetings.
- E. Construction progress schedule.
- F. Number of copies of submittals.
- G. Requests for Interpretation (RFI) procedures.
- H. Submittal procedures.

1.02 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Comply with requirements of Section 01 7000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
 - 1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
 - 2. Contractor and Engineer/Architect are required to use this service.
 - 3. It is Contractor's responsibility to submit documents in allowable format.
 - 4. Subcontractors, suppliers, and Engineer/Architect's consultants will be permitted to use the service at no extra charge.
 - 5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
 - 6. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
 - 7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.
- B. Project Closeout: Engineer/Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

3.02 PRECONSTRUCTION MEETING

- A. Attendance Required:
 - 1. Owner.
 - 2. Engineer/Architect.
 - 3. Contractor.
 - 4. Funding Representative.
- B. Agenda:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Submission of executed bonds and insurance certificates.

3. Distribution of Contract Documents.
 4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
 5. Designation of personnel representing the parties to Contract, _____ and Engineer/Architect.
 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 7. Scheduling.
- C. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer/Architect, Owner, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

- A. Attendance Required:
1. Contractor.
 2. Owner.
 3. Engineer/Architect.
 4. Contractor's superintendent.
 5. Major subcontractors.
- B. Agenda:
1. Review minutes of previous meetings.
 2. Review of work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems that impede, or will impede, planned progress.
 5. Review of submittals schedule and status of submittals.
 6. Review of RFIs log and status of responses.
 7. Review of off-site fabrication and delivery schedules.
 8. Maintenance of progress schedule.
 9. Corrective measures to regain projected schedules.
 10. Planned progress during succeeding work period.
 11. Coordination of projected progress.
 12. Maintenance of quality and work standards.
 13. Effect of proposed changes on progress schedule and coordination.
 14. Other business relating to work.
- C. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer/Architect, Owner, participants, and those affected by decisions made.

3.04 CONSTRUCTION PROGRESS SCHEDULE

- A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.

3.05 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
1. Product data.
 2. Shop drawings.
 3. Samples for selection.
 4. Samples for verification.
- B. Submit for review according to the procedures and purposes described herein.
- C. Samples will be reviewed only for aesthetic, color, or finish selection.

- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - CLOSEOUTSUBMITTALS.

3.06 REQUESTS FOR INTERPRETATION (RFI)

- A. Definition: A request seeking one of the following:
1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
 2. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.
- C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
1. Prepare a separate RFI for each specific item.
 - a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
 - b. Do not forward requests which solely require internal coordination between subcontractors.
 2. Prepare in a format and with content acceptable to Owner.
- D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.

3.07 NUMBER OF COPIES OF SUBMITTALS

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

3.08 SUBMITTAL PROCEDURES

- A. General Requirements:
1. Use a single transmittal for related items.
 2. Transmit using approved form.
 - a. Use form generated by Electronic Document Submittal Service software.
 3. Submittal number shall be in reference to Engineer's specification section. If there are multiple submittals to a singular specification section add a hyphen followed by a number. Re-submittals to have original number with an alphabetic suffix.
 4. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
 5. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
 6. Schedule submittals to expedite the Project, and coordinate submission of related items.
 - a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
 - b. For sequential reviews involving Engineer/Architect's consultants, Owner, or another affected party, allow an additional 7 days.
 7. Provide space for Contractor and Engineer/Architect review stamps.
 8. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
 9. Submittals not requested will be recognized, and will be returned "Not Reviewed",
- B. Product Data Procedures:
1. Submit only information required by individual specification sections.
 2. Collect required information into a single submittal.
- C. Shop Drawing Procedures:

1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
2. Do not reproduce Contract Documents to create shop drawings.
3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

3.09 ENGINEER'S REVIEW RESPONSIBILITIES, PROCEDURES AND DEFINITIONS

A. General

1. Review of shop drawings, data, and samples will be for general conformance with the design concept and Contract Documents. They shall not be construed:
 - a. As permitting any departure from the Contract requirements;
 - b. As relieving the Contractor of responsibility for any errors, including details, dimensions, and materials;
 - c. As approving departures from details furnished by the Engineer, except as otherwise provided herein;
 - d. As approving substitutions to specified products or manufacturers.
2. The Engineer does not review for verification of quantities, weights, dimensions, or means and methods.
3. Partial review status will not be given to a submittal. Entire submittal shall be either acceptable or the entire submittal must be resubmitted with corrections as clarified by status definitions below.
4. Submittals will be reviewed in order received unless Contractor requests a revised order of review, in writing. All submittals shall be submitted sufficiently in advance of construction requirements to provide no less than 21 calendar days for review from the time the Engineer receives them. No less than 30 calendar days will be required for major equipment that requires review by more than one engineering discipline.

3.10 RE-SUBMITALS

- A. Re-submittals will be handled in the same manner as first submittals. On re-submittals, direct specific attention, in writing on the transmittal letter and on re-submitted shop drawings by use of revision triangles or other similar methods, to revisions other than the corrections requested by the Engineer, on previous submissions. Any such revisions which are not clearly identified shall be made at the risk of the Contractor. Make corrections to any work done because of this type revision that is not in accordance to the Contract Documents as may be required by the Engineer.

END OF SECTION

SECTION 01 3216
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. AGC (CPSM) - Construction Planning and Scheduling Manual; 2004.
- B. M-H (CPM) - CPM in Construction Management - Project Management with CPM; 2015.

1.02 SUBMITTALS

- A. Within 10 days after date of Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Submit updated schedule with each Application for Payment.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

- A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.02 CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
 - 1. Show drawings, project data, and samples:
 - a. Submittal dates.
 - b. Dates reviewed copies will be required.
 - 2. Decision dates for:
 - a. Products specified by allowances.
 - b. Selection of finishes.
 - 3. Product procurement and delivery dates.
 - 4. Dates for beginning and completion of each element of construction, specifically:
 - a. Excavation work.
 - b. Subcontractor work.
 - c. Equipment installations.
 - d. Equipment tests.
 - e. Start up.
- B. Identify each item by specification section number.
- C. Identify work of separate stages and other logically grouped activities.
- D. Provide sub-schedules to define critical portions of the entire schedule.
- E. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
- F. Provide separate schedule of submittal dates for shop drawings, product data, and samples, owner-furnished products, products identified under Allowances, and dates reviewed submittals will be required from Engineer/Architect. Indicate decision dates for selection of finishes.
- G. Provide legend for symbols and abbreviations used.

3.03 REVIEW AND EVALUATION OF SCHEDULE

- A. Evaluate project status to determine work behind schedule and work ahead of schedule.
- B. After review, revise as necessary as result of review, and resubmit within 10 days.

3.04 UPDATING SCHEDULE

- A. Maintain schedules to record actual start and finish dates of completed activities.
- B. Indicate progress of each activity to date of revision, with projected completion date of each activity.
- C. Annotate diagrams to graphically depict current status of Work.

- D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
- E. Indicate changes required to maintain Date of Substantial Completion.
- F. Submit reports required to support recommended changes.

3.05 DISTRIBUTION OF SCHEDULE

- A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Engineer/Architect, Owner, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION

SECTION 01 3300
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. See Section 01 3216 "Construction Schedule" for submitting schedules and reports, including Contractor's Construction Schedule.
- C. See Section 01 4000 "Quality Requirements" for submitting test and inspection reports and for mockup requirements.
- D. See Section 01 7700 "Closeout Procedures" for submitting warranties.
- E. See Section 01 7839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

1.02 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Engineer's responsive action.
- B. Informational Submittals: Written information that does not require Engineer's responsive action. Submittals may be rejected for not complying with requirements.

1.03 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- B. Submittals Schedule: Comply with requirements in Section 01 3216 "Construction Schedule" for list of submittals and time requirements for scheduled performance of related construction activities.
- C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 - 3. Resubmittal Review: Allow 10 days for review of each resubmittal.
- D. Identification: Place a permanent label or title block on each submittal for identification.
 - 1. Indicate name of firm or entity that prepared each submittal on label or title block.
 - 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Engineer.
 - 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Engineer.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.

- 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06 1000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06 1000.01.A).
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
- E. Deviations and Substitutions: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.
1. Engineer's approval required. The Contract is based on the materials, equipment and methods described in the Contract Documents.
 2. The Engineer will consider proposals for substitution of materials, equipment, and methods only when such proposals have been made in writing and received by the Engineer **fourteen (14) days prior to bid date** are accompanied by full and complete technical data and all other information required by the Engineer to evaluate the proposed substitution.
 3. Do not substitute materials, equipment, or methods unless such substitution has been specifically approved for this work by the Engineer.
 4. "Or Equal"
 - a. Where the phrase "or equal," "approved equal," or "equal as approved by the Engineer" occurs in the Contract Documents do not assume that material, equipment or methods will be approved as equal by the Engineer unless the item has been specifically approved for this Work by the Engineer
 - b. The decision of the Engineer shall be final.
- F. Additional Copies: Unless additional copies are required for final submittal, and unless Engineer observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
- G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Engineer will return submittals, without review or discard submittals received from sources other than Contractor.
- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 3. Resubmit submittals until they are approved by the Engineer.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Use only final submittals signed and sealed by the Engineer.

1.04 CONTRACTOR'S USE OF ENGINEER'S CAD FILES

- A. General: At the discretion of the Engineer and upon the Contractor's written request, copies of Engineer's CAD files may be provided to Contractor for Contractor's use in connection with Project, subject to the following conditions:
1. Terms listed in the Engineer's "Electronic Media Transfer Agreement," that must be signed and returned prior to release of CAD files.

PART 2 PRODUCTS

2.01 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.

- b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Manufacturer's catalog cuts.
 - e. Wiring diagrams showing factory-installed wiring.
 - f. Printed performance curves.
 - g. Operational range diagrams.
 - h. Compliance with specified referenced standards.
 - i. Copy of all guarantees and warranties issued.
 - j. Testing by recognized testing agency.
- 4. Number of Copies: Submit five copies of Product Data, unless otherwise indicated. Engineer will return two copies. Mark up and retain one returned copy as a Project Record Document. Submit at least one copy of Product Data to Owner.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shopwork manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Notation of coordination requirements.
 - j. Notation of dimensions established by field measurement.
 - k. Relationship to adjoining construction clearly indicated.
 - l. Seal and signature of professional Engineer if specified.
 - m. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
 - 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches .
 - 3. Number of Copies: Submit number of copies of each submittal which contractor requires for distribution plus three (3) copies to be retained by the Engineer.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
 - 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 - 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of appropriate Specification Section.
 - 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - 4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Engineer will return submittal with options selected.
 - 5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the

following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

- a. Number of Samples: Submit three sets of Samples. Engineer will retain two Sample sets; remainder will be returned.
- E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location.
 1. Number of Copies: Submit one copy of product schedule or list, unless otherwise indicated.
- F. Submittals Schedule: Comply with requirements specified in Section 013216 "Construction Schedule."
- G. Application for Payment: Comply with requirements as specified by Engineer.
- H. Schedule of Values: Comply with requirements as specified by Engineer.
- I. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design.
 1. Number of Copies: Submit one copy of subcontractor list, unless otherwise indicated.

2.02 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
 1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Engineer will not return copies.
 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 3. Test and Inspection Reports: Comply with requirements specified in Section 01 4000 "Quality Requirements."
- B. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of Engineers and Owners, and other information specified.
- C. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- D. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- E. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- F. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- I. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- J. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

- K. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- L. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- M. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- N. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment.
- O. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- P. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.
- Q. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
 - 1. Statement on condition of substrates and their acceptability for installation of product.
 - 2. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
- R. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- S. Construction Photographs: Comply with requirements specified in Section 01 7839 "Project Record Documents."
- T. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Engineer.
 - 1. Engineer will not review submittals that include MSDSs and will return them for resubmittal.

2.03 DELEGATED DESIGN

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Engineer.
- B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit three copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 EXECUTION

3.01 CONTRACTOR'S REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
- C. Delay: Costs of delays occasioned by tardiness of submittals may be back-charged as necessary and shall not be borne by the Owner.

3.02 ENGINEER'S ACTION

- A. General: Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Engineer will review each submittal, make marks to indicate corrections or modifications required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken.
- C. Informational Submittals: Engineer will review each submittal and will not return it, or will return it if it does not comply with requirements. Engineer will forward each submittal to appropriate party.
- D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION

SECTION 01 3323
SUBMITTALS OF SHOP DRAWINGS

PART 1 GENERAL

1.01 GENERAL

- A. Submit shop drawings, project data, samples and requests for "or equal" approval, required by specification sections.
- B. Designate in construction schedule proposed submittal dates.

1.02 REFERENCE STANDARDS

- A. Section 01 3000 - Administrative Requirements: Submittal procedures, project meetings, progress schedules and documentation, reports, and coordination.
- B. Section 01 3323a - Requirements for Electronically Submitted Shop Drawings.
- C. Section 01 4000 - Quality Requirements: Product quality monitoring.
- D. Section 01 6000 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

1.03 REQUEST FOR "OR EQUAL" REVIEW

- A. By manufacturer's who wish to receive consideration of equipment other than that specified or named on the plans.
- B. Limited to major pieces of equipment.
- C. Requests and submittals from contractors or manufacturers.
- D. Information required may include but not be limited to:
 - 1. Name model/number and/or description.
 - 2. Drawings and details.
 - 3. Manufacturer's specifications.
 - 4. Catalog cuts.
 - 5. Performance charts.
 - 6. Independent laboratory testing results.
 - 7. Other pertinent data as required.
- E. Time Frame:
 - 1. Request received by Engineer not later than 14 days prior to bid letting.
 - 2. Determination of approval/disapproval not less than 7 days prior to bid letting.
 - 3. Approval to be distributed via Addendum to all plan holders.

1.04 SHOP DRAWINGS

- A. Submit drawings prepared by contractor, subcontractor, supplier or distributor which illustrate some portion of the work.
- B. Show fabrication, layout, setting or erection details.
- C. Identify details by reference to sheet and detail numbers shown on contract drawings.
- D. Minimum sheet size: 8 1/2" x 11".

1.05 PROJECT DATA

- A. Manufacturer's standard schematic drawings:
 - 1. Modify drawings to delete information which is not applicable to project.
 - 2. Supplement standard information to provide additional information applicable to project.
- B. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data.
 - 1. Clearly mark each copy to identify pertinent materials, products or models.
 - 2. Show dimensions and clearances required.
 - 3. Show performance characteristics and capacities.
 - 4. Show wiring diagrams and controls.

1.06 SUBMISSION REQUIREMENTS

- A. Schedule submissions at least ten (10) days before reviewed submittals will be needed.

- B. Submit number of copies of shop drawings, project data and samples which Contractor requires for distribution plus three (3) copies which will be retained by Engineer.
- C. Accompany submittals with transmittal letter containing:
 - 1. Date.
 - 2. Project title and number.
 - 3. Contractor's name and address.
 - 4. The number of each shop drawing, project data and sample submitted.
 - 5. Notification of deviations from Contract Documents.
 - 6. Other pertinent data.
- D. Submittals shall include:
 - 1. Date and revision dates.
 - 2. Project title and number.
 - 3. The names of:
 - a. Engineer.
 - b. Contractor.
 - c. Subcontractor.
 - d. Supplier.
 - e. Manufacturer.
 - f. Separate details when pertinent.
 - 4. Identification of product or material.
 - 5. Relation to adjacent structure or materials.
 - 6. Field dimensions clearly identified as such.
 - 7. Specification section number.
 - 8. Applicable standards such as ASTM number or Federal specification.
 - 9. A blank space 4" x 5" for the Engineer's stamp.
 - 10. Identification of deviations from Contract Documents.
 - 11. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements and compliance with Contract Documents.

1.07 RESUBMISSION REQUIREMENTS

- A. Shop Drawings
 - 1. Revise initial drawings as required and resubmit as specified for initial submittal.
 - 2. Indicate on drawings any changes which have been made other than those requested by Engineer.
- B. Project data and samples: submit new data and samples as required for initial submittal.

1.08 DISTRIBUTION OF SUBMITTALS AFTER REVIEW

- A. Distribute copies of shop drawings and project data which carry Engineer's stamp as needed.
- B. Distribute samples as directed.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 3323a -- ATTACHMENT

SHOP DRAWING SUBMITTAL FORM

Architects Project # 20-22797

Project Name: Storm Lake – Memorial Lift Station Improvements

Division Number: _____ Shop Drawing # _____

Division Name: _____ Date: _____

Item: _____

Subcontractor or Supplier Approval:	General Contractor Approval:
Architect / Engineer Review:	Other Reviews and Comments:

SECTION 01 3323b -- ATTACHMENT

REQUIREMENTS FOR ELECTRONICALLY SUBMITTED SHOP DRAWINGS:

1. The Contractor shall fill out and include the submittal cover sheet included in the project manual.
2. The shop drawings are to be reviewed by the Contractor before submitting. All field required verifications and missing information shall be completed and duly noted on the drawings. The Contractor shall review them and verify that the products submitted are acceptable per the specifications. The Contractor shall then affix their stamp on the submittal cover sheet. Contractor must review - No pass through drawings are permitted.
3. The Contractor shall prepare a single PDF file so that all sheets of the submittal are included in one document. Only ONE specifications section per submittal is permitted. Each PDF shall contain Bookmarks set to the destination of separate items contained within the file. If the Contractor elects to use their own transmittal sheet it shall be a separate attachment.
4. Scans shall be in color. All pages shall be oriented correctly. Actual sheet sizes for the submittal shall be 11x17 or 8 ½ x11 whenever possible. All print and details must be legible at those sizes. Larger file sheets such as 24x36 sheet size shall be identified in the e-mail.
5. The e-mail subject line shall list the five digit project number first followed by the project name. Then the section number and a brief description of the submittal contents shall follow the submittal number. Example: *22797 Memorial Lift Station – 26 2200 Transformers – Submittal #03.*
6. The PDF file or attachment shall be named as follows. Example: *26 2200 Transformers – Submittal #03.pdf*
7. Samples and color selections associated with the drawings shall be included in a separate attachment when practical. Actual samples, color selections shall be delivered to ISG and the shop drawings will not be reviewed until actual samples are received.
8. The Architect / Engineer will review the drawings, make notes as required on the drawings and stamp them. The PDF file shall then be renamed by adding the action required such as REVIEWED, FURNISH AS CORRECTED, REVISE AND RESUBMIT or REJECTED. Example: *22797 Memorial Lift Station – 26 2200 Transformers – Submittal #03 - REVIEWED.pdf*
9. The Architect / Engineer shall then use the original email and attach the reviewed drawings and forward back to the contractor. The e-mail that they are attached to will be considered the transmittal. Any notes in the body of the email from the engineer / architect shall be considered as written on the sheets of the PDF file.
10. No hard copies will be sent by the Architect / Engineer. Note: Hard copies will be required to be included in the O&M Manuals as part of the project close out submittals.

END OF ATTACHMENT

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Testing and inspection agencies and services.
- B. Control of installation.
- C. Defect Assessment.

1.02 DEFINITIONS

- A. Design Data: Design-related, signed and sealed drawings, calculations, specifications, certifications, shop drawings and other submittals provided by Contractor, and prepared directly by, or under direct supervision of, appropriately licensed design professional.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer/Architect before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 TESTING AND INSPECTION

- A. See individual specification sections for testing and inspection required.

3.03 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not complying with specified requirements.
- B. If, in the opinion of Engineer/Architect, it is not practical to remove and replace the work, Engineer/Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations.
- F. Procedures for Owner-supplied products.
- G. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

- A. Section 01 7419 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

1.03 SUBMITTALS

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.
- B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.
- C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

2.02 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. Use of products having any of the following characteristics is not permitted:
 - 1. Made outside of the United States.
 - 2. Made using or containing CFC's or HCFC's.
 - 3. Containing lead, cadmium, or asbestos.
- C. Where other criteria are met, Contractor shall give preference to products that:
 - 1. Are extracted, harvested, and/or manufactured closer to the location of the project.
 - 2. Have longer documented life span under normal use.
 - 3. Result in less construction waste. See Section 01 7419

2.03 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.
- D. Products that do not meet project specifications may be rejected at any time during the project.
- E. All costs associated with replacement product and delay in project schedule due to rejection shall be at the sole expense of the contractor.

2.04 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 TRANSPORTATION AND HANDLING

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.02 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 7419.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- G. Comply with manufacturer's warranty conditions, if any.
- H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- I. Prevent contact with material that may cause corrosion, discoloration, or staining.
- J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 6200
EQUIPMENT SUBSTITUTIONS

PART 1 GENERAL

1.01 "OR EQUAL" IMPLIED

- A. When manufacturer's names are used within these specification, they are used to establish a standard and the words "or equal", if not stated are implied.

1.02 PRE-BID EQUIPMENT SUBMITTALS

- A. Pre-bid approval of all equipment items listed in the Major Equipment List in the Bid is required except for those manufacturers listed in the respective specification section.
- B. Approval will be for conformance with performance, material, and configuration requirements of the plans and specifications.
 - 1. Submittals will be accepted only from contractors, manufacturers or their representatives holding plans on the project.
 - 2. Submittals will be accepted up to 14 days prior to the date for bid letting as set forth in the NOTICE.
 - 3. Contractors will be notified of approved manufacturers seven (7) days prior to bid letting via addendum.
- C. Pre-submittals shall include as a minimum the following information:
 - 1. Name and address of manufacturer.
 - 2. Trade name.
 - 3. Model and catalogue designation.
 - 4. Dimensional data.
 - 5. Materials of construction.
 - 6. Anchorages.
 - 7. Structural loadings.
 - 8. Horsepower.
 - 9. Electrical characteristics.
 - 10. Manufacturer's data:
 - a. Performance and test data.
 - b. Reference standards.
- D. Pre-Bid approval for equipment will not relieve manufacturer of shop drawings requirement.

1.03 SUBSTITUTION

- A. Equipment listed in Major Equipment List shall be used in the project, unless substitution is made in accordance with the provisions listed herein.
- B. Substitution of equipment following award of the contract must meet the following requirements:
 - 1. Manufacturer cannot follow through with prebid delivery and/or quality promises.
 - 2. Equipment is no longer in production.
 - 3. Project requirements have changed.
- C. Request for substitutions will be made in writing with complete data substantiating the need for substitution.
- D. Submit five (5) copies of request for substitution. Include in request:
 - 1. Complete data substantiating compliance of proposed substitution with Contract Document.
 - 2. For products:
 - a. Product identification, including manufacture's name and address.
 - b. Manufacturer's literature:
 - 1) Product description.
 - 2) Performance and test data.
 - 3) Reference standards.
 - 4) Product specifications.
 - c. Samples.
 - d. Name and address of similar projects on which product was used, and date of installation.
 - 3. For construction methods:

- a. Detailed description of proposed method.
 - b. Drawings illustrating methods.
4. Itemized comparison of proposed substitution with product or method specified.
5. Data relating to changes in construction schedule.
6. Relation to separate contracts.
7. Accurate cost data on proposed substitution in comparison with product or method specified.
- E. In making request for substitution, Bidder/Contractor represents:
 1. Contractor has personally investigated proposed product or method, and determined that it is equal or superior in all respects to that specified.
 2. Contractor will provide the same guarantee for substitution as for product or method specified.
 3. Contractor will coordinate installation of accepted substitution into work, making such changes as may be required for work to be complete in all respects.
 4. Contractor waives all claims for additional costs related to substitution which consequently becomes apparent.
 5. Cost data is complete and includes all related costs under Contractor's Contract, but excludes:
 - a. Costs under separate contracts.
 - b. Architect/Engineer's redesign.
- F. Substitutions will not be considered if:
 1. They are indicated or implied on shop drawings or project data submittals without formal request submitted in accord with Paragraph 1.03.
 2. Acceptance will require substantial revision of Contract Documents.
- G. Price increases in equipment items will not be grounds for product substitutions following the opening of bids.
- H. Appropriate contract price reductions may be sought if substitutions result in a lower quality equipment item than included in BID.
- I. Any revisions to contract drawings and construction made necessary by substituted equipment will be the responsibility of the Contractor.

END OF SECTION

SECTION 01 7000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Surveying for laying out the work.
- F. Cleaning and protection.
- G. Starting of systems and equipment.
- H. Demonstration and instruction of Owner personnel.
- I. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
- J. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
- B. Section 01 3000 - Administrative Requirements: Submittals procedures, Electronic document submittal service.
- C. Section 01 4000 - Quality Requirements: Testing and inspection procedures.
- D. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
 - 1. On request, submit documentation verifying accuracy of survey work.
 - 2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
 - 3. Submit surveys and survey logs for the project record.
- C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
 - 1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences. Include design drawings and calculations for bracing and shoring.
 - 2. Identify demolition firm and submit qualifications.
 - 3. Include a summary of safety procedures.
- D. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
 - 1. Structural integrity of any element of Project.
 - 2. Integrity of weather exposed or moisture resistant element.
 - 3. Efficiency, maintenance, or safety of any operational element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of Owner or separate Contractor.
 - 6. Include in request:
 - a. Identification of Project.
 - b. Location and description of affected work.
 - c. Necessity for cutting or alteration.
 - d. Description of proposed work and products to be used.
 - e. Alternatives to cutting and patching.
 - f. Effect on work of Owner or separate Contractor.
 - g. Written permission of affected separate Contractor.

- h. Date and time work will be executed.
- E. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.04 QUALIFICATIONS

- A. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Engineer/Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,
- B. For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

1.05 PROJECT CONDITIONS

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
- C. Perform dewatering activities, as required, for the duration of the project.
- D. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- E. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
- F. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
- G. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.
- H. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.06 COORDINATION

- A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Notify affected utility companies and comply with their requirements.
- C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- F. Coordinate completion and clean-up of work of separate sections.
- G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Engineer/Architect four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of examination, preparation and installation procedures.
 - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer/Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Engineer/Architect of any discrepancies discovered.
- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Promptly report to Engineer/Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer/Architect.
- F. Utilize recognized engineering survey practices.
- G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
 - 2. Grid or axis for structures.

3. Building foundation, column locations, ground floor elevations.
- H. Periodically verify layouts by same means.
- I. Maintain a complete and accurate log of control and survey work as it progresses.

3.05 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 1. Verify that construction and utility arrangements are as indicated.
 2. Report discrepancies to Engineer/Architect before disturbing existing installation.
 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Remove existing work as indicated and as required to accomplish new work.
 1. Remove items indicated on drawings.
 2. Relocate items indicated on drawings.
 3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
 4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- C. Protect existing work to remain.
 1. Prevent movement of structure; provide shoring and bracing if necessary.
 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 3. Repair adjacent construction and finishes damaged during removal work.
- D. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
- E. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- F. Refinish existing surfaces as indicated:
 1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
 2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- G. Clean existing systems and equipment.
- H. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- I. Do not begin new construction in alterations areas before demolition is complete.
- J. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
 1. Complete the work.
 2. Fit products together to integrate with other work.
 3. Provide openings for penetration of mechanical, electrical, and other services.

4. Match work that has been cut to adjacent work.
 5. Repair areas adjacent to cuts to required condition.
 6. Repair new work damaged by subsequent work.
 7. Remove samples of installed work for testing when requested.
 8. Remove and replace defective and non-complying work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
 - E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
 - F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
 - G. Restore work with new products in accordance with requirements of Contract Documents.
 - H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
 - I. Patching:
 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 2. Match color, texture, and appearance.
 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.09 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 SYSTEM STARTUP

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.

- E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 DEMONSTRATION AND INSTRUCTION

- A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.
- B. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.
- C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
- D. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- E. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.

3.12 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.13 FINAL CLEANING

- A. Execute final cleaning prior to Substantial Completion.
 - 1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.
- B. Use cleaning materials that are nonhazardous.
- C. Wipe clean wood and laminate surfaces including doors, countertops, cabinets, window sills, and all other similar items.
- D. Wipe clean all painted surfaces.
- E. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- F. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- G. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- H. Clean filters of operating equipment.
- I. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
- J. Clean site; sweep paved areas, rake clean landscaped surfaces.
- K. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.
- L. Clean Owner-occupied areas of work.

3.14 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
 - 1. Provide copies to Engineer/Architect and Owner.
- B. Notify Engineer/Architect when work is considered ready for Engineer/Architect's Substantial Completion inspection.
- C. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Engineer/Architect's Substantial Completion inspection.
- D. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

- E. Notify Engineer/Architect when work is considered finally complete and ready for Engineer/Architect's Substantial Completion final inspection.
- F. Complete items of work determined by Engineer/Architect listed in executed Certificate of Substantial Completion.

3.15 MAINTENANCE

- A. Provide service and maintenance of components indicated in specification sections.
- B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.
- C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

SECTION 01 7400

CLEANING

PART 1 GENERAL

1.01 DESCRIPTION

- A. Maintain premises and public properties free from accumulations of waste, debris and rubbish caused by operations.
- B. At completion of work remove waste materials, rubbish, tools, equipment, machinery and surplus materials and clean all sight-exposed surfaces; leave project clean and ready for occupancy or use.

1.02 SAFETY REQUIREMENTS

- A. Standards: maintain project in accordance with latest OSHA safety and insurance standards.
- B. Hazards control:
 - 1. Store volatile wastes in covered metal containers and remove from premises daily.
 - 2. Prevent accumulation of wastes which create hazardous conditions.
 - 3. Provide adequate ventilation during use of volatile or noxious substances.
- C. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
 - 1. Do not burn or bury rubbish and waste materials on project site.
 - 2. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary drains.
 - 3. Do not dispose of wastes into streams or waterways.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning materials manufacturer.

PART 3 EXECUTION

3.01 DURING CONSTRUCTION

- A. Ensure that public properties are maintained free from accumulations of waste materials rubbish.
- B. Provide on-site containers for collection of waste materials, debris and rubbish.
- C. Remove waste materials, debris and rubbish from site and legally dispose of at public or private dumping areas off Owner's property.
- D. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.

3.02 FINAL CLEANING

- A. Employ experienced workmen or professional cleaners for final cleaning.
- B. Conduct final inspection of sight-exposed interior and exterior surfaces and of concealed spaces before substantial completion.
- C. Remove grease, dust, dirt, stains, labels, fingerprints and other foreign materials from sight-exposed interior and exterior finished surfaces; polish surfaces so designated to shine finish
- D. Repair, patch and touch up marred surfaces to specified finish to match adjacent surfaces.
- E. Broom clean paved surfaces and rake clean other surfaces of grounds.
- F. Remove snow and ice from access to building.
- G. Maintain cleaning until project, or portion thereof, is occupied by Owner.

END OF SECTION

SECTION 01 7800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

- A. Section C-700 Standard General Conditions.
- B. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- C. Section 01 7000 - Execution and Closeout Requirements: Contract closeout procedures.
- D. Individual Product Sections: Specific requirements for operation and maintenance data.
- E. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

- A. Project Record Documents: Submit documents to Engineer/Architect with claim for final Application for Payment.
- B. Operation and Maintenance Data:
 - 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Engineer/Architect will review draft and return one copy with comments.
 - 2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
 - 3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Engineer/Architect comments. Revise content of all document sets as required prior to final submission.
 - 4. Submit two sets of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
 - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed shop drawings, product data, and samples.
 - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:

1. Manufacturer's name and product model and number.
 2. Product substitutions or alternates utilized.
 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
1. Measured depths of foundations in relation to finish first floor datum.
 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 4. Field changes of dimension and detail.
 5. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

- A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. For Each Product, Applied Material, and Finish:
 1. Product data, with catalog number, size, composition, and color and texture designations.
 2. Information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- D. Additional information as specified in individual product specification sections.
- E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
 1. Description of unit or system, and component parts.
 2. Identify function, normal operating characteristics, and limiting conditions.
 3. Include performance curves, with engineering data and tests.
 4. Complete nomenclature and model number of replaceable parts.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
- C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- D. Include color coded wiring diagrams as installed.
- E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

- F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- G. Provide servicing and lubrication schedule, and list of lubricants required.
- H. Include manufacturer's printed operation and maintenance instructions.
- I. Include sequence of operation by controls manufacturer.
- J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- K. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- L. Include test and balancing reports.
- M. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

- A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- D. Prepare data in the form of an instructional manual.
- E. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- F. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- G. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.
- H. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Engineer/Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
- I. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
- J. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- K. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.
- L. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- M. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
- N. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.

- d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
3. Part 3: Project documents and certificates, including the following:
- a. Shop drawings and product data.
 - b. Air and water balance reports.
 - c. Certificates.
 - d. Photocopies of warranties and bonds.

3.06 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.
- F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
- G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
- H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

SECTION 01 7839
PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings, including Shop Drawings.
 - 2. Record Specifications, including Change Orders.
 - 3. Record Product Data and Record Field Tests.
- B. See Divisions 02 through 46 for specific requirements for Project Record Documents of the Work in those Sections.

1.02 SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one (1) set of marked-up Record Prints.
- B. Record Specifications: Submit one (1) copy of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one (1) copy of each Product Data submittal.
- D. Record Field Tests: Submit one (1) copy of each test result required by the specifications.

PART 2 PRODUCTS

2.01 RECORD DRAWINGS

- A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.
 - 1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 - 2. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 - 3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 - 4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
 - 1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 - 2. Identification: As follows:
 - a. Project name and Project number.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name and Address of Contractor.

2.02 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. Note related Change Orders and Record Drawings where applicable.

2.03 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders and Record Drawings where applicable.

2.04 FIELD TESTS AND MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble field tests and miscellaneous records required by other Specification Sections for record keeping and submittal in connection with actual performance of the Work. Bind or file field tests and miscellaneous records and identify each, ready for continued use and reference.

PART 3 EXECUTION

3.01 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Engineer's reference during normal working hours.

END OF SECTION

DIVISION 03: Concrete

SECTION 03 0100
MAINTENANCE OF CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete repair products and accessories.
- B. Scope of Work: As determined by Owner for current Work to be completed. The Work may include but is not limited to:
 - 1. Crack Injection.
 - 2. Concrete Spall Repair.
 - 3. Waterproofing Coatings.
 - 4. Related repair Work necessary to complete crack injection, spall repair, waterproof coatings and similar Work. Include all related product accessories for a complete system installation.
- C. Attachments: Product information data sheets in the order listed herein below under approved product manufactureres.

1.02 SUBMITTALS

- A. Make submittals directly to Owner.
- B. Product Data: Indicate product standards, physical and chemical characteristics, technical specifications, limitations, maintenance instructions, and general recommendations regarding each material.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Each cementitious patching-mortar; crack-injection-adhesive; and insert product manufacturer shall employ factory-trained technical representatives who are available for consultation and Project-site inspection and assistance at no additional cost.
- B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer to apply packaged patching-mortar materials and epoxy crack injection materials.
- C. Product Compatibility: Verify compatibility of all materials with related work in which they come into contact, and with materials covered by this section.
- D. Provide primer coat for all systems and products where recommend by product manufacturer. No Exceptions.
- E. Maintenance Program: Prepare a written plan for maintenance of cast-in-place concrete, including each phase or process, protection of surrounding materials during operations, and control of debris and runoff during the Work. Describe in detail materials, methods, equipment, and sequence of operations to be used for each phase of the Work.

1.04 MOCK-UP(S)

- A. Build mockups to demonstrate aesthetic effects and set quality standards for materials and execution.
- B. Test each type of maintenance procedure required on each type of existing construction, to determine the most appropriate procedures to use and as a record of expected results.
- C. Crack Injection: Prepare two samples of each type of injection.
- D. Horizontal Surface Repair: Total of 10 foot square area, demonstrating each type of repair.
- E. Vertical Surface Repair: Total of 10 foot square area, demonstrating each type of repair.
- F. Locate mock-up(s) where directed.
- G. Re-work mock-up(s) until satisfactory to Owner.
- H. Satisfactory mock-up(s) may remain as part of the work.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturers' instructions for storage, shelf life limitations, and handling of products.

PART 2 PRODUCTS

2.01 APPROVED CEMENTITIOUS PATCHING AND REPAIR PRODUCTS

- A. Crack Injection:
 - 1. Dural Injection Gel and Guide by EUCLID Chemical: www.euclidchemical.com.
 - 2. Masterinject 1380 by BASF Master Builders Solutions:
www.master-builders-solutions.basf.us/en-us.
- B. Concrete Spall Repair:
 - 1. Verticoat Supreme Repair Mortar by EUCLID Chemical: www.euclidchemical.com.
 - 2. MasterEmaco S 488CI by BASF Master Builders Solutions:
www.master-builders-solutions.basf.us/en-us.
- C. Waterproofing Coatings (Mark: EF-1):
 - 1. VANDES BB 75 by EUCLID Chemical: www.euclidchemical.com.
 - 2. MasterSeal 581 by BASF Master Builders Solutions:
www.master-builders-solutions.basf.us/en-us.

2.02 ACCESSORIES

- A. Exposed Rebar Repair Primer: Zincrich Rebar Primer by BASF or Equivalent.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Beginning of installation means acceptance of substrate.

3.02 PREPARATION

- A. Prepare concrete surfaces to be repaired in accordance with product manufacturers instructions.

3.03 INSTALLATION

- A. Install approved products in accordance with manufacturers instructions.

END OF SECTION

SECTION 03 0712
STRUCTURAL CONCRETE PANEL

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Structural Concrete Panels.

1.02 RELATED REQUIREMENTS

- A. Section 05 4000 - Cold-Formed Metal Framing

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications and installation instructions with Project conditions and materials clearly identified or detailed for each required system.

1.04 QUALITY ASSURANCE

- A. Pre-Installation Conference:
 - 1. At least one week prior to starting the Structural Concrete Panel floor system work, conduct a pre-installation conference at the project site.
 - a. Parties shall include, but not be limited to, the Architect, General Contractor, Structural Engineer, Owner's Representative, Structural Concrete Panel Contractor and the Framing Contractor.
- B. Field Quality Control:
 - 1. At frequent intervals during construction, the job site will be visited by the Owner's Representative to confirm that the Structural Concrete Panel floor system is being installed per this specification.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Delivery:
 - 1. Deliver material to site promptly without undue exposure to weather.
 - 2. Deliver in manufacturer's unopened containers, bundles, or panels fully identified with name, brand, type and grade.
- B. Storage:
 - 1. Store above ground in dry, ventilated space.
 - 2. Protect materials from soiling, rusting and damage.

1.06 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. When mechanically fastened, do not install Structural Concrete Panels when ambient or conditioned temperature is below 0 Deg F.
 - 2. Temperature must be at least 40 Deg F for at least 24 hours after installation if adhesive is used, unless the adhesive manufacturer permits the use of its product at a lower temperature.
 - 3. Prior to the application of finished flooring, Structural Concrete Panels must be conditioned at the same temperature as required for the finished flooring for at least 48 hours.
 - 4. Do not apply finished flooring over Structo-Crete structural concrete panels that are wet, frozen or contain frost.

PART 2 - PRODUCTS

2.01 PRODUCTS AND MANUFACTURERS

- A. Structural Concrete Panel: Listed products establish standard of quality and are manufactured by United States Gypsum Company (USG), Chicago, IL.
- B. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

- A. Structural Concrete Panel:
 - 1. Structural Concrete Panel, 3/4 inch x 48 inches x 96 inches.
 - 2. Edges: Tongue and Groove.
- B. Structural Concrete Panel Fasteners:

1. Corrosion-resistant #8 self-drilling/tapping screws: 1 5/8 inch at 12 inches o.c. in panel field and 6 inches o.c. at panel perimeter unless otherwise specified by Structural Engineer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and adjoining construction and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.
 1. Steel framing to receive the Structural Concrete Panels shall be structurally sound, free from bows, twists or other malformations and in general compliance with local building code requirements. Damaged framing shall be replaced before installation of Structural Concrete Panel.

3.02 GENERAL INSTALLATION REQUIREMENTS

- A. Framing:
 1. The floor joists and other floor framing components must be designed to meet the strength and deflection criteria specified in the contract documents. The attachment flange or bearing edge must be a minimum 1.625 inch (41 mm) wide. Metal framing must be a minimum 18 gauge.
 2. Joist bearing shall be provided at the foundation that is uniform and level.
 3. Joists shall be located directly over bearing studs or a header installed at the top of the bearing wall to distribute the load.
 4. On steel framing, a web stiffener shall be provided at reaction points and/or concentrated loads as specified in the contract documents. End blocking shall be provided where joists ends are not otherwise restrained from rotation.
 5. Additional joists shall be provided under parallel partitions and around all floor openings that interrupt one or more spanning members. Framing must be properly fastened to the supporting walls or structure.
 6. All blocking or bridging must be installed prior to the installation of Structural Concrete Panels.
 7. Framing must be of good quality, free of bows, twists or other malformations.
- B. Structural Panel Application:
 1. The panels shall be cut to size with a circular saw equipped with carbide-tipped cutting blade and a dry dust collection device or a water-dispensing device that limits the amount of airborne dust. Wear safety glasses and a NIOSH-approved dust mask when cutting the panel. Collected dust shall be disposed in a safe manner and in compliance with local, state and federal ordinances.
 2. Structural Concrete Panels shall be installed in a horizontal (long edges perpendicular to the framing) manner. Panels may be installed with either surface against the framing. However, because the panel markings that facilitate fastening are on one side only, applying the board with the marking toward the installer is the preferred orientation.
 3. The use of adhesives in addition to the mechanical attachment of Structural Concrete Panels to the framing or to adjacent Structural Concrete Panels is optional. The fire, sound and structural ratings of the Structural Concrete Panel floor system are based on mechanical attachment only.
 4. If the specification calls for an adhesive/mechanical connection, only apply adhesive to the top of the joists that can be covered by one panel at a time.
 5. Begin panel installation by snapping a line across the joists parallel to the rim joist at a distance equal to the width of the first panel being placed. Plan the layout so the first and last panel row width is a minimum of 24 inches wide.
 6. Place the cut edge or tongue along the rim joist. Place each panel across three or more supports. Cut panels to length as needed to ensure that the butt end of the panel is centered on the framing member. Install panels in a direction that ensures that the butt end falls over the open side of the joist. This will help keep adjacent ends in the same place.
 7. Fasten each panel after it has been placed following the fastening schedule listed in the contract documents. Begin fastening at one end and fan out across the panel. Do not fasten all the corners first. After the installation of one complete row, begin the next row. Slide panels together so that the tongue of the panel being installed fits into the groove of the installed panel. No gaps are required between panels. If adhesives or sealants are specified in the joints, carefully apply a 1/4-3/8 inch diameter bead of adhesive to the

bottom of the grooves of the installed panels. Only apply enough adhesive to cover the joint that will be covered by the first panel in the second row. Install the second panel and all subsequent panels in a similar manner to complete the row. Install all rows in a running bond pattern so that end joints fall over the center of the framing members and are staggered by at least two supports from where the end joints fall in the adjacent rows.

8. Cutouts in the panels should be made before installing the panel whenever possible. If a cutout is required after the panel is installed, set the depth of the saw blade to ensure that the framing is not scored. Support the ends and edges of cutouts with framing if they are larger than 6 inches in either direction.
 9. Drive fasteners so the heads are flush with the surface of the board. See Materials 2.02 B for the correct fastener to be used.
- C. Clean Up:
1. Leftover material shall be removed from the job site.
 2. Remove all foreign material from the floor surface and vacuum all dust from the surface.

END OF SECTION

SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete formwork.
- B. Elevated concrete slabs.
- C. Floors and slabs on grade.
- D. Concrete foundation walls.
- E. Concrete reinforcement.
- F. Joint devices associated with concrete work.
- G. Concrete curing.
- H. Concrete finishing.
 - 1. Floor surfaces to be left exposed.

1.02 RELATED REQUIREMENTS

- A. Section 07 9200 - Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.
- B. Section Division 22 - Plumbing Piping Specialties: Mechanical items for casting into concrete.
- C. Section Division 26 - Grounding and Bonding for Electrical Systems: Electrical items for casting into concrete. Coordinate location with electrical contractor.
- D. Section Division 32 - Exterior Concrete Flatwork. Refer to concrete flatwork for all aspects of exterior concrete flatwork except stoops, aprons, and any other concrete element bearing on the building's foundation walls.

1.03 REFERENCE STANDARDS

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).
- B. ACI 301 - Specifications for Structural Concrete; 2016.
- C. ACI 302.1R - Guide to Concrete Floor and Slab Construction; 2015.
- D. ACI 302.2R - Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials
- E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).
- F. ACI 305R - Guide to Hot Weather Concreting; 2010.
- G. ACI 306R - Guide to Cold Weather Concreting; 2016.
- H. ACI 308R - Guide to External Curing of Concrete; 2016.
- I. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2018).
- J. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2016.
- K. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2012.
- L. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2016.
- M. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2016b.
- N. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2019a.
- O. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2016a.
- P. ASTM C150/C150M - Standard Specification for Portland Cement; 2016.
- Q. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2016.

- R. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2016.
- S. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).
- T. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2019.
- U. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2017.
- V. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 2013.
- W. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures; 2015.
- X. ASTM E1155 - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers; 2014.
- Y. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2018a.
- Z. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2017.
- AA. COE CRD-C 572 - Corps of Engineers Specifications for Polyvinylchloride Waterstop; 1974.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
- C. Mix designs: Submit mix design for each mix showing compliance with specified requirements.
- D. Test Reports: Submit report for each test or series of tests specified.
- E. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.
- F. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
- B. Follow recommendations of ACI 305R when concreting during hot weather.
- C. Follow recommendations of ACI 306R when concreting during cold weather.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
 - 1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
 - 2. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
 - 3. Form Ties: Contractor's choice of standard product type that will leave no metal within 1-1/2 inches of concrete surface.

2.02 REINFORCEMENT MATERIALS

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
 - 1. Type: Deformed billet-steel bars.
 - 2. Finish: Unfinished, unless otherwise indicated.
- B. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

3. Do not use clay bricks or similar blocks/chunks of material as rebar chairs. Concrete dobies as rebar chairs are acceptable.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
 1. Acquire cement for entire project from same source.
- B. Fine and Coarse Aggregates: ASTM C33/C33M.
 1. Acquire aggregates for entire project from same source.
 2. Provide aggregate free of shale at all slab locations exposed to freeze/thaw action.
- C. Fly Ash: ASTM C618, Class C or F.
- D. Calcined Pozzolan: ASTM C618, Class N.
- E. Silica Fume: ASTM C1240, proportioned in accordance with ACI 211.1.
- F. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.04 ADMIXTURES

- A. Chemical Admixture:
 1. Manufacturers by concrete supplier:
 - a. BASF: www.basf.com.
 - b. Grace Construction Products: www.grace.com.
 - c. Fritz-Pak: www.fritzpak.com.
 - d. Mapei GRT: www.mapei.com.
 - e. Sika Corporation U.S.: www.sika.com.
 - f. Euclid Chemical: www.euclidchemical.com.
 - g. Substitutions: See Section 01 6000 - Product Requirements.
- B. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
- C. Admixtures shall comply with ASTM C494.
- D. Air Entrainment Admixture: ASTM C260/C260M.

2.05 ACCESSORY MATERIALS

- A. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
 1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch.
 2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.
- B. Epoxy Grout: Hilti Hit-Hy 200 Epoxy System. No substitutions.

2.06 BONDING AND JOINTING PRODUCTS

- A. Latex Bonding Agent: Non-redispersible acrylic latex, complying with ASTM C1059 Type II.
 1. Manufacturers:
 - a. SpecChem, LLC; Strong Bond Acrylic Bonder: www.specchemllc.com/#sle.
 - b. W. R. Meadows, Inc; ACRY-LOK-: www.wrmeadows.com/#sle.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- B. Waterstops: Hydrophilic Butyl Rubber Waterstops.
 1. Configuration: Rectangular, continuous.
 2. Size: Approximately 1 inch by 1 inch.
 3. Acceptable Products:
 - a. JP Specialties, Inc.: www.jpsspecialties.com.
 - b. Henry: www.henry.com.
 - c. Durajoint: www.durajoint.com.
 - d. Adeka Corporation: www.adeka.com.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
- C. Waterstops: PVC, complying with COE CRD-C 572.
 1. Configuration: As indicated on drawings.
 2. Manufacturers:
 - a. JP Specialties, Inc.: www.jpsspecialties.com.

- b. Durajoint: www.durajoint.com.
 - c. Sika: www.sika.com.
 - d. WR Meadows, Inc: www.wrmeadows.com.
 - e. Grace Construction Products: www.na.graceconstruction.com.
 - f. Substitutions: See Section 01 6000 - Product Requirements.
- D. Expansion-Joint Filler: Polyethylene/polypropylene semi-rigid closed-cell backing complying with ASTM D 3575/ASTM D 8139/ASTM D 1751, 1/2 inch thick and full depth of slab less 1/2 inch with peel-off feature. Provide product by BASF Construction Chemicals-Building Systems, W.R. Meadows, Namaco, or equivalent.
- 1. Place peel-off feature at top of slab when sealants are specified. Remove peel-off portion of expansion-joint filler prior to application of sealants.
 - 2. Place peel off feature at bottom of slab when no sealants are specified.

2.07 CURING MATERIALS

- A. Liquid Membrane Curing Compound: ASTM C 309, Type 2, Class B, White Pigmented.
 - 1. Product: L&M CURE R2 by Laticrete or approved equivalent.
 - a. Other Approved Products:
 - 1) SpecRez White by SpecChem.
 - 2. Application Locations: Exterior Concrete surfaces unless indicated otherwise. Finish surfaces to a light broom finish prior to applying curing compound.
- B. Moisture-Retaining Sheet: ASTM C171.
 - 1. White-burlap-polyethylene sheet, weighing not less than 3.8 ounces per square yard.

2.08 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
 - 1. For trial mixtures method, employ independent testing agency acceptable to Engineer/Architect for preparing and reporting proposed mix designs.
- C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.
- D. Materials In General: Do not use materials or combinations thereof that will result in a reaction that is detrimental to the structural integrity or visual appearance of concrete.
- E. Normal Weight Concrete: Refer to structural notes on the drawings.

2.09 MIXING

- A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.
- B. Transit Mixers: Comply with ASTM C94/C94M.
- C. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.
 - 1. Use latex bonding agent only for non-load-bearing applications.

- E. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

3.04 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Place concrete for floor slabs in accordance with ACI 302.1R.
- C. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.05 SLAB JOINTING

- A. Locate joints as indicated on drawings.
 - 1. If no pattern is shown, contractor shall provide for 15 by 15 feet saw cut areas and shall contact Engineer for exact locations of joints.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.
 - 1. Install wherever necessary to separate slab from other building members, including columns, walls, equipment foundations, footings, stairs, manholes, sumps, and drains.
- D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 24 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.
 - 1. Do not exceed 2 inches deep when/if slab thicknesses are greater than 8 inches.

3.06 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. Refer to structural notes on the drawings.

3.07 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.
- C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide other finishes as follows:
 - 1. Grout-Cleaned Finish (Class A per ACI 347): Wet concrete surfaces and apply grout of a consistency of thick paint to coat surface and fill small holes. Mix one part portland cement to one and one-half parts fine sand with 1:1 moisture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
 - a. Locations: Provide this finish only where indicated on the drawings.
- D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
 - 1. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.
 - a. Installation of sealant is recommended prior to installation of floor sealers to prevent the need for cleaning of saw cut joints for proper sealant adhesion.
 - b. Chemical Curer/Sealer/Dustproofer/Hardener(When Applicable): Apply product per manufacturer's instructions after curing and protection procedures are complete.
 - 1) Acceptable Product:
 - (a) Laticrete: www.laticrete.com.
 - (b) Product: L&M Seal Hard; Concrete Sealer, Densifier, Chemical Hardener.
 - (1) Location: Garage/shop/warehouse type areas.
 - 2) Other Acceptable Manufacturers:
 - (a) Dayton Superior Corporation: www.daytonsuperior.com.

- (b) BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 - (c) Ashford Formula by Curecrete Distribution, Inc: www.ashfordformula.com.
 - (d) L.M. Scofield Company: www.scofield.com.
 - (e) The Euclid Chemical Company: www.euclidchemical.com.
- 3) Substitutions: See Section 01 6000 - Product Requirements.
- E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains as indicated on drawings.
- F. At exterior slabs, aprons, and other horizontal locations provide a light broom finish and liquid membrane curing compound finish unless indicated otherwise.
- G. At interior slabs do not over trowel where concrete is to be left exposed to avoid slippery surfaces when wet. Review finishing with Architect's representative prior to completing the work.

3.08 CURING AND PROTECTION

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Surfaces Not in Contact with Forms:
 - 1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than 7 days by saturated burlap unless noted otherwise.
 - a. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.
 - 2. Final Curing: Begin after initial curing but before surface is dry.

3.09 FIELD QUALITY CONTROL

- A. Provide free access to concrete operations at project site and cooperate with appointed firm.
- B. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
- C. Submit proposed mix design of each class of concrete to Engineer/Architect for review prior to commencement of concrete operations.

3.10 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Engineer/Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
 - 1. Concrete damaged by the construction activities required to complete the Work of this section shall also be considered defective concrete.
- C. Repair or replacement of defective concrete will be determined by the Engineer/Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer/Architect for each individual area.

3.11 PROTECTION

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

DIVISION 04: Masonry

SECTION 04 0100
MAINTENANCE OF MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water and Chemical cleaning (Chemical cleaning only if needed) of masonry surfaces.
- B. Replacement of masonry units (Replacement only if needed).
- C. Tuckpointing/Repointing mortar joints.
- D. Repair of damaged masonry.
- E. Cementitious repair mortar.
- F. Injection mortar and grout.
- G. Stone Repair Compound.

1.02 REFERENCE STANDARDS

- A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; 2011.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week prior to commencing work of this section.
 - 1. Require attendance of parties directly affecting work of this section.
 - 2. Review conditions of installation, installation procedures, and coordination with related work.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on cleaning compounds and cleaning solutions.
- C. Samples: Submit four samples of face brick units to illustrate matching color, texture and extremes of color range.
- D. Manufacturer's Instructions: For cleaning materials, indicate special procedures, conditions requiring special attention.

1.05 QUALITY ASSURANCE

- A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.
- B. Restorer: Company specializing in masonry restoration with minimum five years of documented experience.

1.06 FIELD CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Restoration and Cleaning Chemical: OneRestore by EaCo Chem; www.eacochem.com or approved equivalent.
- B. Heritage Lime Putty Mortar Type O: US Heritage Group; www.usheritage.com or approved equivalent.
- C. Mortar Type O: TCC Materials; www.tccmaterials.com or approved equivalent.
- D. Heritage High Lime Hydrate Mortar Type N: US Heritage Group; www.usheritage.com or approved equivalent.
- E. Mortar Type N: TCC Materials; www.tccmaterials.com or approved equivalent.
- F. Dispersed Hydrated Lime DIM - Injection Mortar: US Heritage Group; www.usheritage.com or approved equivalent.

- G. Heritage Masonry Repair Mortar IG10 - Injection Grout: US Heritage Group; www.usheritage.com or approved equivalent.
- H. Heritage Masonry Repair Mortar HS60 - Sandstone Patch: US Heritage Group; www.usheritage.com or approved equivalent.
- I. Sure Klean Cleaning and Protective Treatments: Prosoco; www.prosoco.com or approved equivalent.
- J. Substitutions: See Section 01 6000 - Product Requirements.

2.02 CLEANING MATERIALS

- A. Cleaning Agent: Detergent type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces to be cleaned and restored are ready for work of this section.

3.02 METHOD OF CLEANING

- A. Test cleaning should start with the gentlest means available (warm water and a soft bristle brush) and then, only if necessary, advance to detergents and other cleaners. Water pressures should begin with very low pressures, such as 100 psi, and only be increased if necessary. Water pressure should not exceed 400 psi. If damage to the historic masonry as part of the cleaning is observed (even if it is not getting perfectly clean) then the cleaning method should be reduced to non-damaging levels.

3.03 PREPARATION

- A. Protect surrounding elements from damage due to restoration procedures.
- B. Separate areas to be protected from restoration areas using means adequate to prevent damage.
- C. Mask immediately adjacent surfaces with material that will withstand cleaning and restoration procedures.
- D. Protect roof membrane and flashings from damage with 1/2 inch plywood laid on roof surfaces over full extent of work area and traffic route.
- E. When using cleaning methods that involve water or other liquids, install drainage devices to prevent runoff over adjacent surfaces unless those surfaces are impervious to damage from runoff.

3.04 REBUILDING

- A. Cut out damaged and deteriorated masonry with care in a manner to prevent damage to any adjacent remaining materials.
- B. Support structure as necessary in advance of cutting out units.
- C. Cut away loose or unsound adjoining masonry and mortar to provide firm and solid bearing for new work.
- D. Build in new units following procedures for new work specified in other section(s).
- E. Mortar Mix: Colored and proportioned to match existing work.
- F. Ensure that anchors are correctly located and built in.
- G. Install built in masonry work to match and align with existing, with joints and coursing true and level, faces plumb and in line. Build in all openings, accessories and fittings.

3.05 REPOINTING

- A. Perform repointing prior to cleaning masonry surfaces.
- B. Cut out loose or disintegrated mortar in joints to minimum 1 inch depth or until sound mortar is reached.
- C. Use power tools only after test cuts determine no damage to masonry units will result.
- D. Do not damage masonry units.

- E. When cutting is complete, remove dust and loose material by brushing and blowing with high pressure air.
- F. Premoisten joint and apply mortar. Pack tightly in maximum 1/4 inch layers. Form a smooth, compact concave joint to match existing.
- G. Follow manufacture's repointing guidelines and instructions.

3.06 INSTALLATION INSTRUCTIONS

- A. Install with in strict accordance with manufacture's installation instructions. See attached product cut sheets.

3.07 CLEANING EXISTING MASONRY

- A. Cleaning Detergent: Brush clean masonry surfaces at indicated locations with cleaning agent in accordance with the manufacturer's instructions. Saturate masonry with clean water and flush loose mortar and dirt.

3.08 CLEANING NEW MASONRY

- A. Verify mortar is fully set and cured.
- B. Clean surfaces and remove large particles with wood scrapers, brass or nylon wire brushes.

3.09 RESTORATION CLEANING

- A. Clean surfaces and remove large particles with wood scrapers or non-ferrous wire brush.
- B. Provide a second application if required to match mock-up area.
- C. Allow sufficient time for solution to remain on masonry and agitate with soft fiber brush or sponge.
- D. Rinse from the bottom up with potable water applied at 400 psi and at a rate of 4 gal/min.

3.10 AGING

- A. Rub in new masonry work to match, as close as possible, adjacent original work.
 - 1. Use carbon black in small amounts, rubbing in well with burlap rags.
- B. After each application, dust off surplus and wash down with low pressure hose. Allow surface to dry before proceeding with succeeding applications.
- C. Continue process until acceptance.

3.11 CLEANING

- A. Immediately remove stains, efflorescence, or other excess resulting from the work of this section.
- B. Remove excess mortar, smears, and droppings as work proceeds and upon completion.
- C. Clean surrounding surfaces.

END OF SECTION

DIVISION 05: Metals

SECTION 05 4000
COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formed steel stud interior wall framing.
- B. Formed steel joist framing and bridging.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood blocking and miscellaneous framing.

1.03 REFERENCE STANDARDS

- A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.
- B. AISI SG02-1 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- E. ASTM C955 - Standard Specification for Cold-Formed Steel Structural Framing Members; 2018, with Editorial Revision.
- F. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2011a (Reapproved 2015).
- G. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data on factory-made framing connectors, showing compliance with requirements.
- C. Shop Drawings: Indicate component details, bearing, anchorage, loading, welds, and type and location of fasteners, and accessories or items required of related work.
 - 1. Design data:
- D. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention .

1.05 PROJECT CONDITIONS

- A. Verify that field measurements are as indicated on shop drawings.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Framing:
 - 1. ClarkDietrich Building Systems: www.clarkdietrich.com.
 - 2. Marino: www.marinoware.com.
 - 3. Phillips Manufacturing Company: www.phillipsmfg.com.
 - 4. The Steel Network, Inc: www.SteelNetwork.com.
 - 5. Custom Stud, Inc: www.customstud.com.
 - 6. Telling Industries: www.tellingindustries.com.
 - 7. Super Stud Building Products, Inc: www.buysuperstud.com.
 - 8. Substitutions: See Section 01 6000 - Product Requirements.
- B. Framing Connectors and Accessories:
 - 1. Same manufacturer as metal framing.
 - 2. Simpson Strong Tie: www.strongtie.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FRAMING SYSTEM

- A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.
- B. Design Requirements: Provide completed framing system having the following characteristics:
 - 1. Design: Calculate structural characteristics of cold-formed steel framing members according to AISI S100-12.
 - 2. Structural Performance: Design, engineer, fabricate, and erect to withstand specified design loads for project conditions within required limits.
 - 3. Design Loads: In accordance with applicable codes.
 - 4. Live load deflection meeting the following, unless otherwise indicated:
 - 5. Able to tolerate movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
 - 6. Able to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

2.03 FRAMING MATERIALS

- A. Studs and Track: ASTM C955; studs formed to channel, "C", or "Sigma" shape with punched web; U-shaped track in matching nominal width and compatible height.
 - 1. Gage and Depth: As indicated on drawings.
- B. Joists and Purlins: Fabricated from ASTM A653/A653M steel sheet, with G90/Z275 hot dipped galvanized coating.
 - 1. Base Metal: Structural Steel (SS), Grade 33/230.
 - 2. Gage and Depth: As indicated on drawings.
- C. Framing Connectors: Factory-made, formed steel sheet.
 - 1. Material: ASTM A653/A653M SS Grade 33 and 40 (minimum), with G90/Z275 hot dipped galvanized coating for base metal thickness less than 10 gage, 0.1345 inch, and factory punched holes and slots.
 - 2. Structural Performance: Maintain load and movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
 - 3. Fixed Connections: Provide non-movement connections for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners.

2.04 FASTENERS

- A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M.
 - 1. Products:
- B. Anchorage Devices: Tapcon or equivalent type fasteners.

2.05 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.
- B. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION OF STUDS

- A. Install components in accordance with manufacturers' instructions and ASTM C1007 requirements.
- B. Place studs at 16 inches on center; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using fastener method.
- C. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.

- D. Install load bearing studs full length in one piece. Splicing of studs is not permitted.
- E. Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.
- F. Attach cross studs to studs for attachment of fixtures anchored to walls.
- G. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.

3.03 INSTALLATION OF JOISTS AND PURLINS

- A. Install framing components in accordance with manufacturer's instructions.
- B. Make provisions for erection stresses. Provide temporary alignment and bracing.
- C. Locate joist end bearing directly over load bearing studs or provide load distributing member to top of stud track.
- D. Provide web stiffeners at reaction points.
- E. Touch-up field welds and damaged galvanized surfaces with primer.

3.04 TOLERANCES

- A. Maximum Variation from True Position: 1/4 inch.
- B. Maximum Variation of any Member from Plane: 1/4 inch.

END OF SECTION

SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel items.

1.02 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014.
- E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2018.
- F. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- G. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on all finishing products, including VOC content.
- C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
 - 2. Indicate unit identification mark and location for each unique item.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections, Angles, and Plates: ASTM A36/A36M and Stainless Steel.
- B. Steel Tubing: ASTM A500/A500M, Grade B cold-formed structural tubing.
- C. Stainless Steel Materials: A316 or A304 Stainless Steel; #4 Brushed, ASTM A240, ASME SA240.
- D. Fasteners: Provide expansion, sleeve, and adhesive anchors by HILTI, Simpson or approved equal.
- E. Bolts, Nuts, and Washers: ASTM A307, Grade A, galvanized to ASTM A153/A153M where connecting galvanized components. Stainless Steel Where Applicable.
- F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- G. Touch-Up Primer for Galvanized Surfaces: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

2.02 MATERIALS - STAINLESS STEEL

- A. Pipe: ASTM A666, Type 304.

2.03 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Mark each item with its identification mark. Use a non-permanent method at units that will remain exposed; welding is not acceptable, it shall be ground smooth, filled, and primed by the supplier at no additional cost to the Owner.
- C. Fabricate items with joints tightly fitted and secured.

- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FABRICATED ITEMS

- A. Grating Joists and Supports: As detailed; Stainless Steel.
- B. Mechanical Equipment Stands: As detailed; Galvanized.
- C. Lintels/Support Angles: As detailed; galvanized finish, unless noted otherwise.
- D. Items indicated on the drawings.

2.05 FINISHES - STEEL

- A. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.

2.06 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

2.07 PREFABRICATED ACCESSORIES

- A. Brackets: Provide products as indicated on the drawings by UNISTRUT or equivalent.

2.08 CONCRETE ANCHORING SYSTEMS

- A. Approved Manufacturers/Products:
 - 1. HILTI: www.us.hilti.com.
 - 2. MiTek: www.mitek-us.com.
 - 3. Powers: www.powers.com.
 - 4. Red Head: www.itwredhead.com.
 - 5. Simpson Strong-Tie: www.strongtie.com.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Perform field welding in accordance with AWS D1.1/D1.1M.
- D. Obtain approval prior to site cutting or making adjustments not scheduled.
- E. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 05 5100

METAL STAIRS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Stairs with grating treads.
- B. Landings of similar construction.
- C. Structural stair framing and supports.
- D. Handrails and guards.

1.02 REFERENCE STANDARDS

- A. AISC 201 - AISC Certification Program for Structural Steel Fabricators, Standard for Steel Building Structures; 2006.
- B. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- C. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- D. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc; 2011.
- E. NAAMM AMP 510 - Metal Stairs Manual; 1992, Fifth Edition.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
 - 2. Include the design engineer's seal and signature on each sheet of shop drawings.
- C. Design Data: As required by authorities having jurisdiction.
- D. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is certified under AISC 201.
- E. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.04 QUALITY ASSURANCE

- A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer; include engineer's stamp.
- B. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.
- C. Fabricator Qualifications:
 - 1. A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 201.
- D. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

PART 2 PRODUCTS

2.01 METAL STAIRS - GENERAL

- A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
 - 1. Regulatory Requirements: Provide stairs and railings complying with the most stringent requirements of local, state, and federal regulations; where requirements of the contract documents exceed those of regulations, comply with the contract documents.
 - 2. Structural Design: Provide complete stair and railing assemblies complying with the applicable local code.

3. Dimensions: As indicated on drawings.
 4. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
 5. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
 6. Separate dissimilar metals using paint or permanent tape.
- B. Metal Jointing and Finish Quality Levels:
1. Commercial: Exposed joints as inconspicuous as possible, whether welded or mechanical; underside of stair not covered by soffit IS considered exposed to view.
 - a. Welded Joints: Intermittently welded on back side, filled with body putty, and sanded smooth and flush.
 - b. Welds Exposed to View: Ground smooth and flush.
 - c. Mechanical Joints: Butted tight, flush, and hairline.
 - d. Bolts Exposed to View: Countersunk flat or oval head bolts; no exposed nuts.
 - e. Exposed Edges and Corners: Eased to small uniform radius.
 - f. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for satin or matte finish.
 - C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
 - D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.02 METAL STAIRS WITH GRATING TREADS

- A. Jointing and Finish Quality Level: Commercial, as defined above.
- B. Risers: Open.
- C. Tread Grating: Grip Strut Grating, serrated diamond pattern; channel depth x width x height as indicated; Products by McNICHOLS or approved equivalent.
 1. Material: Aluminum.
- D. Treads: Aluminum bar grating.
 1. Grating Type: Welded.
 2. Bearing Bar Depth: 1 inch, minimum.
 3. Top Surface: Standard.
 4. Nosing: Checkered plate.
 5. Nosing Width: 1-1/4 inch, minimum.
 6. Anchorage to Stringers: End plates welded to grating, bolted to stringers.
- E. Stringers: Aluminum; designers preference.
- F. Railings: Aluminum pipe.

2.03 HANDRAILS AND GUARDS

- A. Wall-Mounted Rails: Round pipe or tube rails unless otherwise indicated.
 1. Outside Diameter: 1 1/2 inch, minimum, to 1-1/2 inches, maximum.
- B. Guards:
 1. Rails: Round pipe or tube rails unless otherwise indicated.
 - a. Outside Diameter: 1 1/2 inch, minimum, to 1-1/2 inches, maximum.
 2. End and Intermediate Posts: Same material and size as top rails.
 - a. Horizontal Spacing: As indicated on drawings.
 - b. Mounting: Welded to top surface of stringer.

2.04 ACCESSORIES

- A. Fasteners and Welding Materials: As recommended by manufacturer.

2.05 EXPANSION ANCHORS

- A. Approved Products: Red Head Concrete Anchoring Solutions: www.itwredhead.com.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. When field welding is required, clean and strip primed steel items to bare metal.

3.03 INSTALLATION

- A. Install components plumb and level, accurately fitted, free from distortion or defects.
- B. Provide anchors, plates, angles, and hangers required for connecting stairs to structure.
- C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- D. Provide welded field joints where specifically indicated on drawings. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.
- F. Obtain approval prior to site cutting or creating adjustments not scheduled.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION

DIVISION 06: Wood, Plastics, and Composites

SECTION 06 1000
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roofing nailers.
- B. Preservative treated wood materials.
- C. Miscellaneous framing and sheathing.

1.02 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- B. AWWA U1 - Use Category System: User Specification for Treated Wood; 2018.
- C. PS 1 - Structural Plywood; 2009.
- D. PS 20 - American Softwood Lumber Standard; 2020.
- E. WWPA G-5 - Western Lumber Grading Rules; 2017.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
 - 2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

2.02 DIMENSION LUMBER

- A. Grading Agency: Western Wood Products Association; WWPA G-5.
- B. Sizes: Nominal sizes as indicated on drawings, S4S.
- C. Moisture Content: S-dry or MC19.
 - 1. Plates: MC15 or KD15.
- D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

- A. Miscellaneous Applications:
 - 1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
 - 2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
 - 3. Other Locations: PS 1, C-D Plugged or better.
 - 4. Electrical Component Mounting: APA rated sheathing, fire retardant treated.

2.04 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
 - 2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.

2.05 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 - 1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.
- B. Preservative Treatment:
 - 1. Manufacturers:
 - a. Arch Wood Protection, Inc: www.wolmanizedwood.com.
 - b. Viance, LLC: www.treatedwood.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. All wood exposed to or in contact with masonry or concrete shall be Preservative Treated Wood.
- B. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.
- C. Securely install blocking, size within 1/16 of required dimension, and install plumb and level.

3.02 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- C. Provide the following specific non-structural framing and blocking:
 - 1. Items indicated on the drawings and in the specifications.

3.03 CLEANING

- A. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- B. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 7413
MOLDED FIBERGLASS GRATING

PART 1 – GENERAL

1.01 SECTION INCLUDES:

- A. Moulded Fiberglass Grating and Accessories; fiberglass reinforced polymer (FRP).

1.02 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specification Sections, apply to work of this section.
- B. ANSI/ACMA/FGMC FRP Composites Grating Manual for Pultruded and Molded Grating and Stair Treads.

1.03 SCOPE OF WORK:

- A. Furnish all labor, materials, equipment and incidentals governed by this section necessary to install the fiberglass reinforced polymer (FRP) products as specified herein.

1.04 QUALITY ASSURANCE:

- A. The material covered by these specifications shall be furnished by an ISO-9001:2008 certified manufacturer of proven ability who is regularly engaged in the manufacture, fabrication and installation of FRP systems.
- B. Substitution of any component or modification of system shall be made only when approved by the Architect or Design Engineer.
- C. Fabricator Qualifications: Firm experienced in successfully producing FRP fabrications similar to that indicated for this project, with sufficient production capacity to produce required units without causing delay in the work.
- D. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for work.

1.05 DESIGN CRITERIA:

- A. The design of FRP Molded Grating, including connections, shall be in accordance with governing building codes and standards as applicable.
- B. Design live loads of FRP molded grating shall be in accordance with the following design loads based on the latest adopted International Building Code:
 - 1. 60 psf live load (non-emergency exit walkways)
 - 2. 300 lb concentrated load
- C. Molded grating shall not deflect more than 1/4 inch and structural support members shall not deflect more than L/180 of span for structural members unless specifically stated otherwise in drawings and/or supplementary conditions. Connections shall be designed to transfer the design loads.

1.06 SUBMITTALS:

- A. Shop drawings of all fabricated components shall be submitted to the Design Engineer for approval in accordance with the requirements of Section 01 6000. Fabrication shall not start until receipt of Design Engineer's approval marked "Approved", "Approved As Submitted" or "Approved As Noted".
- B. Manufacturer's catalog data showing:
 - 1. Materials of construction
 - 2. Dimensions, spacings, and construction of grating, handrails and building panels.
- C. Detail shop drawings showing:
 - 1. Dimensions
 - 2. Sectional assembly
 - 3. Location and identification mark
 - 4. Size and type of supporting frames required
- D. Samples of each type of product shall be submitted for approval in accordance with the requirements of Section 01 6000.

1.07 SHIPPING AND STORAGE INSTRUCTIONS:

- A. All gratings and components shall be shop fabricated and assembled into the largest practical size suitable for transporting.
- B. All materials and equipment necessary for the fabrication and installation of all component shall be stored before, during, and after shipment in a manner to prevent cracking, twisting, bending, breaking, chipping or damage of any kind to the materials or equipment, including damage due to over exposure to the sun. Any material which, in the opinion of the Design Engineer, has become damaged as to be unfit for use, shall be promptly removed from the site of work, and the Contractor shall receive no compensation for the damaged material or its removal.
- C. Identify and match-mark all components and fabrications for installation and field assembly.

PART 2 – PRODUCTS

2.01 GENERAL:

- A. Materials used in the manufacture of the FRP products shall be raw materials in conformance with the specification and certified as meeting the manufacturer's approved list of raw materials.
- B. All raw materials shall be as specified by the contract.
- C. The visual quality of the pultruded shapes shall conform to ASTM D4385.
- D. Molded components shall be manufactured to achieve the following performance requirements (Refer to "Design" below for resin system and color):
 - 1. All mechanical performance standards set forth by the Fiberglass Grating Manufacturers Council (FGMC) in the FRP Composites Grating Manual for Pultruded and Molded Grating and Stair Treads.
 - 2. A flame spread rating of 25 or less in accordance with ASTM test method E-84, and flammability characteristics of UL 94 V0 and the self-extinguishing requirements of ASTM D635.
 - 3. NSF Standard 61 Certified with flammability characteristics of UL 94 V0 and the self-extinguishing requirements of ASTM D635.
 - 4. Food-grade with flammability characteristics of UL 94 V0 and the self-extinguishing requirements of ASTM D635.
- E. Where applicable, after fabrication, all cut ends, holes and abrasions of FRP shapes shall be sealed with a compatible resin coating.
- F. Where applicable FRP products exposed to weather shall contain an ultraviolet inhibitor.
- G. Where applicable all glass fibers shall be covered with resin to protect against their exposure due to wear or weathering.
- H. All grating shall have non-skid grit finish; medium grit.
- I. Basis of Design: 2" FRP Panel/Grating - GatorPlate 2020 or Pre-Approved Equal Systems that provide a monolithic surface that meets the loading requirements.
- J. Basis of Design: 2" FRP Grating - GatorGrate 2020 or Pre-Approved Equal Systems that meets the loading requirements.
- K. Manufacturers:
 - 1. Strongwell: www.strongwell.com.
 - 2. Fibergrate: www.fibergrate.com.
 - 3. National Grating: www.nationalgrating.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- L. The materials covered by these specifications shall be furnished by an ISO-9001 certified manufacturer.

2.02 PULTRUDED GRATINGS:

- A. General
 - 1. Grating shall be shipped from the manufacturer, palletized and banded with exposed edges protected to prevent damage in shipment.
 - 2. Each piece shall be clearly marked showing manufacturer's applicable drawing number.
- B. Design

1. The grating shall be one piece construction with the tops of the bearing bars and cross bars in the same plane.
 2. The mesh pattern and thickness shall be:
 - a. 2 inch square mesh, 2 inch thick.
 3. Resin systems and colors are:
 - a. The resin used in the manufacture of the grating shall be standard vinyl ester.
 - b. Color shall be high visibility yellow or gray as selected by the Architect.
 4. Grating (exclusive of food grade) shall be fire retardant with a flame spread rating of 25 or less when tested in accordance with ASTM E-84. Food grade grating shall be fire retardant with a flame spread rating of 30 or less when tested in accordance with ASTM E-84.
 5. Grating shall meet all mechanical performance standards set forth by the Fiberglass Grating Manufacturers Council (FGMC) in the FRP Composites Grating Manual for Pultruded and Molded Grating.
 6. For slip resistance, the top of each bar shall:
 - a. have sand or quartz grit applied; medium grit
- C. Products
1. The FRP molded grating shall be manufactured by the open mold process.
 2. Standard FRP Curb Angles of gray fire retardant vinyl ester resin system.
 3. Hold down clamps shall be of type 316 stainless steel:
 - a. Type M clips for attaching grating to supports.
 - b. Type J clips for attaching grating to supports for moderate loads.
 - c. Type C clips for joining two unsupported edges.
 4. Grating with cover plate
 - a. Grating shall be the same as described above in this section.
 - b. The cover plate for molded grating shall be an integrally molded plate as manufactured by Strongwell.
 - c. The integrally molded plate may use the same resin as the grating.
 - d. The integrally molded plate shall be bonded to the grating, and a non-skid grit shall be affixed to the top surface of the assembly.
 5. If required, all cut and machined edges, holes and abrasions shall be sealed with a compatible resin.
 6. All panels shall be fabricated to the sizes shown on the approved shop drawing.

PART 3 – EXECUTION

3.01 PREPARATION:

- A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction.
- B. Coordinate delivery of such items to project site.

3.02 INSPECTION AND TESTING:

- A. The Design Engineer shall have the right to inspect and test all materials to be furnished under these specifications prior to their shipment from the point of manufacture.
- B. All labor, power, materials, equipment and appurtenances required for testing shall be furnished by the Contractor at no cost to the Owner.

3.03 INSTALLATION, GENERAL:

- A. Fastening to in-place construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous FRP fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts and other connectors as determined by the Design Engineer.
- B. Cutting, fitting and placement: Perform cutting, drilling and fitting required for installation of miscellaneous FRP fabrications. Set FRP fabrication accurately in location, alignment and elevation; with edges and surfaces level, plumb, true and free of rack; measured from established lines and levels.

- C. Provide temporary bracing or anchors in form work for items that are to be built into concrete masonry or similar construction.

3.04 ALL FRP INSTALLATION:

- A. If required, all field cut and drilled edges, holes and abrasions shall be sealed with a catalyzed resin compatible with the original resin as recommended by the manufacturer.
- B. Install items specified as indicated and in accordance with manufacturer's instructions.

END OF SECTION

DIVISION 07: Thermal and Moisture Protection

SECTION 07 2130

SPRAY APPLIED THERMAL AND ACOUSTIC INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Spray applied thermal and acoustic insulation.

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Installation Instructions: Indicate preparation required, installation techniques, jointing requirements, and installation details.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: TC-417 by ThermaCoustic Industries International Limited.
 - 1. Materials: Spray-applied material shall be TC-417 white glass fiber together with TC-417 synthetic emulsion adhesive conforming to CAN/ULC S-114 and ASTM E-136.
 - 2. Adhesive shall be mixed with fresh, clean, potable water in the exact proportion as recommended by the manufacturer.
 - 3. R-Value: 20 minimum; 5 inch thick.
 - 4. Color: Standard.
 - 5. Application Locations: Where indicated on the drawings.
- B. Other Acceptable Manufacturers:
 - 1. K-13 Spray-On Systems; International Cellulose Corporation.
 - 2. Monoglass Spray Thermal / Acoustic Insulation: Monoglass Spray-On Insulation.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ACCESSORIES

- A. Accessories: Provide all accessories for a complete system.

PART 3 EXECUTION

3.01 PREPARATION

- A. Prepare surfaces in accordance with manufacturer's instructions.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Use a 'one-pass' application procedure.
- C. Trowel in accordance with manufacturer's instructions for a smoother finish.

3.03 CLEAN-UP

- A. Remove overspray from equipment and surfaces not intended to be covered. Perform all removal work while installed products is still wet.

END OF SECTION

SECTION 07 3113
ASPHALT SHINGLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Asphalt shingle roofing.
- B. Flexible sheet membranes for eave protection and underlayment.
- C. Associated metal flashings and accessories.

1.02 REFERENCE STANDARDS

- A. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2019.
- B. ASTM D3462/D3462M - Standard Specification for Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules; 2019.
- C. ICC-ES AC188 - Acceptance Criteria for Roof Underlayments; 2012, with Editorial Revision (2015).
- D. NRCA MS104 - The NRCA Roofing Manual: Steep-slope Roof Systems; 2013.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating material characteristics.
- C. Samples: Submit two samples of each shingle color indicating color range and finish texture/pattern; for color selection.
- D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Perform Work in accordance with the recommendations of NRCA Steep Roofing Manual.

1.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a ten year period after Date of Substantial Completion.
- C. Provide lifetime manufacturer's warranty for coverage against black streaks caused by algae.
- D. Provide ten year manufacturer's warranty for wind damage.

PART 2 PRODUCTS

2.01 SHINGLES

- A. Base Manufacturer: Certainteed Corporation; Product Landmark - Pro Designer Shingles with SureStart 4-STAR Coverage: www.certainteed.com.
 - 1. NRCA (RM) - The NRCA Roofing Manual; 2019.
 - 2. GAF: www.gaf.com.
 - 3. Owens Corning Corp: www.owenscorning.com.
 - 4. Tamko: www.tamko.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ASPHALT SHINGLES

- A. Asphalt Shingles: Asphalt-coated glass felt, mineral granule surfaced, complying with ASTM D3462/D3462M; Class A fire resistance.
 - 1. Weight: 250 lb/100 sq ft.
 - 2. Self-sealing type.
 - 3. Style: Laminated overlay.
 - 4. Color: As selected by the Architect/Owner.

2.03 SHEET MATERIALS

- A. Underlayment: Synthetic non-asphaltic sheet, intended by manufacturer for mechanically fastened roofing underlayment without sealed seams.

1. Minimum Requirements: Comply with requirements of ICC-ES AC188 for non-self-adhesive sheet.
 2. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
 3. Ultraviolet (UV) Resistance and Weatherability: Approved in writing by manufacturer for exposure to weather for minimum of six months.
 4. Low Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.
 5. Fasteners: As recommended by manufacturer or building code qualification report or approval.
 6. Manufacturers:
 - a. Certaineed Corporation; Product DiamondDeck Underlayment.
 - b. Other approved shingle manufacturers products.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- B. Eave Protection Membrane (Ice and Water Shield): Self-adhering polymer-modified asphalt sheet complying with ASTM D 1970; 60 mil total thickness; with strippable treated release paper and polyethylene sheet top surface.
1. Manufacturers:
 - a. Certaineed Corporation; Product Winterguard.
 - b. Other approved shingle manufacturers products.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- C. Flexible Flashing: Self-adhering polymer-modified asphalt sheet complying with ASTM D1970/D1970M; 60 mil total thickness; with strippable treated release paper and polyethylene sheet top surface.
1. Manufacturers:
 - a. Certaineed Corporation; Product Winterguard.
 - b. Other approved shingle manufacturers products.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.04 ACCESSORIES

- A. Nails: Standard round wire shingle type, of hot-dipped zinc coated steel, 10 wire gage, 0.1019 inch shank diameter, 3/8 inch head diameter, of sufficient length to penetrate through roof sheathing or 3/4 inch into roof sheathing or decking.
- B. Lap Cement: Fibrated cutback asphalt type, recommended for use in application of underlayment, free of toxic solvents .
- C. Ridge Vents: Cor-A-Vent V-600E Ridge Ventilation System; Lomanco OmniRoll; or approved equivalent.
- D. Other Accessories: Provide all other accessories including but not limited to pipe boots, vent caps, and storm collars for a complete installation.
- E. Verify that sheathing panel edges perpendicular to roof framing members have sheathing clips installed or are supported by continuous blocking. Immediately notify Architect if they are not.

2.05 METAL FLASHINGS

- A. Metal Flashings: Provide sheet metal eave edge, gable edge, and fascia covers and other flashing to provide a complete roofing system.
 1. Form flashings to protect roofing materials from physical damage and shed water.
 2. Form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance.
 3. Hem exposed edges of flashings minimum 1/4 inch on underside.
- B. Sheet Metal: Prefinished galvanized steel, as specified in Section 07 6200.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions prior to beginning work.
- B. Verify that deck is of sufficient thickness to accept fasteners.
- C. Verify that roof penetrations and plumbing stacks are in place and flashed to deck surface.
- D. Verify roof openings are correctly framed.

- E. Verify deck surfaces are dry, free of ridges, warps, or voids.

3.02 PREPARATION

- A. At areas where eave protection membrane is to be adhered to substrate, fill knot holes and surface cracks with latex filler.
- B. Broom clean deck surfaces before installing underlayment or eave protection.
- C. Install eave edge and gable edge flashings tight with fascia boards. Weather lap joints 2 inches and seal with plastic cement. Secure flange with nails spaced 8 inches on center.

3.03 INSTALLATION - EAVE PROTECTION MEMBRANE

- A. Install eave protection membrane from eave edge to minimum 4 ft up-slope beyond interior face of exterior wall.
- B. Install eave protection membrane in accordance with manufacturer's instructions.

3.04 INSTALLATION - UNDERLAYMENT

- A. Underlayment: Install underlayment perpendicular to slope of roof, with ends and edges weather lapped minimum 4 inches. Stagger end laps of each consecutive layer. Nail in place. Weather lap minimum 4 inches over eave protection.
- B. Items projecting through or mounted on roof: Weather lap and seal watertight with plastic cement.

3.05 INSTALLATION - METAL FLASHING AND ACCESSORIES

- A. Weather lap joints minimum 2 inches and seal weather tight with plastic cement.
- B. Secure in place with nails at 8 inches on center. Conceal fastenings.
- C. Items Projecting Through or Mounted on Roofing: Flash and seal weather tight with plastic cement.

3.06 INSTALLATION - SHINGLES

- A. Install shingles in accordance with manufacturer's instructions.
 - 1. Fasten individual shingles using 2 nails per shingle, or as required by code, whichever is greater.
 - 2. Fasten strip shingles using 4 nails per strip, or as required by code, whichever is greater.
- B. Place shingles in straight coursing pattern with 5 inch weather exposure to produce double thickness over full roof area. Provide double course of shingles at eaves.
- C. Project first course of shingles 3/4 inch beyond fascia boards.
- D. Extend shingles 1/4 inch beyond face of gable edge fascia boards.
- E. Extend shingles on both slopes across valley in a weave pattern and fasten. Extend shingles a minimum of 12 inches beyond valley center line to achieve woven valley, concealing the valley protection.
- F. Cap hips with individual shingles, maintaining 5 inch weather exposure. Place to avoid exposed nails.
- G. Coordinate installation of roof mounted components or work projecting through roof with weather tight placement of counterflashings.
- H. Complete installation to provide weather tight service.

3.07 PROTECTION

- A. Do not permit traffic over finished roof surface.

END OF SECTION

SECTION 07 6200
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings, counterflashings, and other items indicated on the drawings.
- B. Sealants for joints within sheet metal fabrications.
- C. Manufactured metal gutters and downspouts.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood nailers for sheet metal work.
- B. Section 07 9200 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

1.03 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- C. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2018).
- D. CDA A4050 - Copper in Architecture - Handbook; current edition.
- E. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.
- F. NRCA's ANSI/SPRI ES-1 - American National Standard for Edge Systems Used with Low Slope Roof Systems - Certification Listing for Shop-fabricated Edge Metal Flashings; 2003.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- C. Samples: Submit two samples 8 by 8 inch in size illustrating metal finish color.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 5 years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

- A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, (0.0239 inch) thick base metal.
 - 1. Do not use unfinished galvanized steel flashings in finished locations, interior or exterior, unless specifically indicated.
- B. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, (0.0239) inch thick base metal, shop pre-coated with PVDF coating.
 - 1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.

2. Color: As selected by Engineer/Architect from manufacturer's full colors.
3. Face Heights: Flashings 8 inch or less shall be a minimum of 24 gauge, over 8 inch shall be 22 gauge, or as indicated on the drawings. Continuously supported flashing over 8 inches may be 24 gauge unless noted otherwise.

2.02 MANUFACTURED PRODUCTS

- A. Metal gutters and downspouts.
 1. Product: Rollex Rainware Gutters and Downspouts: www.rollex.com.
 - a. Other acceptable Manufacturers:
 - 1) EDCO: www.edcoproducts.com.
 - 2) ATAS International, Inc: www.atas.com.
 - 3) ABC Seamless: www.abcseamless.com.
 - 4) Substitutions: See Section 01 6000 - Product Requirements.
 2. Profile: 5 inch K style.
 - a. Provide as few joints as possible base on Rollex's 10', 16', and 22' lengths.
 3. Down Spout: Corrugated rectangular profile.
 4. Accessories: Fasteners, trim, and related flashings.
 5. Color: As selected.
 6. Warranty: Correct defective Work within a two year period after Substantial Completion, including defects in water tightness and integrity of seals.

2.03 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

2.04 ACCESSORIES

- A. Fasteners: Galvanized steel, with soft neoprene washers.
- B. Primer: Zinc chromate type.
- C. Sealant: Type specified in Section 07 9200.
- D. Plastic Cement: ASTM D4586/D4586M, Type I.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 INSTALLATION

- A. Install manufactured products according to manufacturers instructions including all accessory components to create a complete system.
- B. Secure flashings in place using concealed fasteners.
- C. Apply sealant between metal flashings and felt flashings.
- D. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- E. Seal metal joints watertight.

END OF SECTION

SECTION 07 7200
ROOF ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Equipment rails.
- B. Roof hatches.

1.02 REFERENCE STANDARDS

- A. 29 CFR 1910.23 - Ladders; current edition.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- C. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2010 (Reapproved 2015).

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used.
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Maintenance requirements.
- C. Shop Drawings: Submit detailed layout developed for this project and provide dimensioned location and number for each type of roof accessory.
- D. Warranty Documentation:
 - 1. Submit manufacturer warranty.
 - 2. Ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products under cover and elevated above grade.

1.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 ROOF HATCHES AND VENTS

- A. Basis of Design: (These are default Bilco models/series; Refer to schedule on drawings for sizes and locations.)
 - 1. Type D is a "Roof Scuttle" Roof Hatch type.
- B. Roof Hatch Manufacturers:
 - 1. Acudor Products Inc: www.acudor.com/#sle.
 - 2. Babcock-Davis: www.babcockdavis.com/#sle.
 - 3. Bilco Company: www.bilco.com/#sle.
 - 4. Dur-Red Products: www.dur-red.com.
 - 5. Milcor, Inc: www.milcorinc.com.
 - 6. Nystrom, Inc: www.nystrom.com/#sle.
 - 7. Karp Associates, Inc: www.karpinc.com.
 - 8. Elmdor Access Doors: www.elmdorstoneman.com.
 - 9. Precision Ladders: www.precisionladders.com.
 - 10. Substitutions: See Section 01 6000 - Product Requirements.
- C. Frames and Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.
 - 1. Insulation: Manufacturer's standard; 1 inch rigid glass fiber, located on outside face of curb.

- D. Safety Railing System: Manufacturer's standard accessory safety rail system mounted directly to curb.
 - 1. Comply with 29 CFR 1910.23, with a safety factor of two.
 - 2. Posts and Rails: Aluminum tube.
 - 3. Gate: Same material as railing; automatic closing with latch.
 - a. Allow for gate option, however verify if it is to be included during the shop drawing process.
 - 4. Finish: Manufacturer's standard, factory applied finish.
- E. Hardware: Type 316 stainless steel, unless otherwise indicated or required by manufacturer.
 - 1. Lifting Mechanisms: Compression or torsion spring operator with shock absorbers that automatically opens upon release of latch; capable of lifting covers despite 10 psf load.
 - 2. Hinges: Heavy duty pintle type.
 - 3. Hold open arm with vinyl-coated handle for manual release.
 - 4. Latch: Upon closing, engage latch automatically and reset manual release.
 - 5. Manual Release: Pull handle on interior.
 - 6. Locking: Padlock hasp on interior.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Engineer/Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

3.04 CLEANING

- A. Clean installed work to like-new condition.

3.05 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 07 8400

FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping systems.
- B. Firestopping of all joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on drawings or not.
- C. Marking and identification of fire walls, fire barriers, fire partitions, smoke barriers, and smoke partitions, or any other wall required to have protected openings or penetrations.

1.02 REFERENCE STANDARDS

- A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2019.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).
- C. ITS (DIR) - Directory of Listed Products; current edition.
- D. FM (AG) - FM Approval Guide; current edition.
- E. UL (FRD) - Fire Resistance Directory; Current Edition.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Each respective trade shall provide submittals as it relates to their Scope of Work.
- C. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
- D. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- E. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- F. Installer Qualification: Submit qualification statements for installing mechanics.

1.04 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the specified fire ratings when tested in accordance with methods indicated.
 - 1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
 - 2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
 - 3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.
- B. Installer Qualifications: Personnel specializing and trained in performing the work of this section and:
 - 1. Trained by manufacturer.
- C. Each respective trade shall perform the Work of this section as it relates to their Scope of Work. Coordinate the Work between all trades so that firestopping locations and adjacent Work are within the limitations of firestopping products to be used at each location.
- D. Prior to installation of any of the fire-resistive "through" or "membrane" penetration fire block systems and any fire-resistive "joint" systems, detailed testing, and installation information on each of the specific listed assemblies intended for use must be submitted to Building Official for code review. The specific assemblies must also be listed for each intended use (i.e. proper penetration size and rating condition and for the type of construction material that it is being used in/on). Each trade person responsible for sealing said conditions must provide this information to the building inspector for review prior to installation of any assembly.

1.05 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

2.02 FIRESTOPPING SYSTEMS

- A. Firestopping: Any material meeting requirements.
 - 1. Fire Ratings: Use any system that is listed by UL (FRD) and tested in accordance with ASTM E814 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.

2.03 MATERIALS

- A. Firestopping Sealants: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.
- B. Intumescent Firestop Sealants
 - 1. FlameSafe FS 1900 Intumescent Elastomeric Sealant.
 - 2. 3M Fire Barrier Caulk CP25WB+
 - 3. A/D Firebarrier Intumescent Caulk.
 - 4. Hilti USA
 - 5. Specified Technologies, Inc: www.stifirestop.com.
- C. Endothermic Water-Based Sealants
 - 1. FlameSafe FS 900 Endothermic Sealant
 - 2. 3M Interam FireDam 150 Caulk
 - 3. A/D Firebarrier Seal & Seal NS
 - 4. Hilti USA
 - 5. Specified Technologies, Inc: www.stifirestop.com.
- D. Elastomeric Firestop Coating
 - 1. FlameSafe FS2900 Intumescent Elastomeric Firestop Coating
 - 2. 3M FireDam Spray
 - 3. A/D Firebarrier Spraymastic
 - 4. Hilti USA
 - 5. Specified Technologies, Inc: www.stifirestop.com.
- E. Intumescent Firestop Putty
 - 1. FlameSafe FSP 1000 Intumescent Putty
 - 2. 3M Fire Barrier Moldable Putty+
 - 3. A/D Firebarrier Putty
 - 4. Hilti USA
 - 5. Specified Technologies, Inc: www.stifirestop.com.
- F. Firestop Mortar
 - 1. FlameSafe Mortar Seal
 - 2. 3M Fire Barrier Mortar
 - 3. A/D Firebarrier Mortar
 - 4. Hilti USA
 - 5. Specified Technologies, Inc: www.stifirestop.com.
- G. Firestop Bags
 - 1. FlameSafe Intumescent Firestop Bags
 - 2. A/D Firebarrier Pillows
 - 3. Hilti USA
 - 4. Specified Technologies, Inc: www.stifirestop.com.

- H. Firestop Sleeves
 - 1. FlameSafe Intumescent Sleeve
 - 2. Hilti USA
 - 3. Specified Technologies, Inc: www.stifirestop.com.
- I. Wrap Strips
 - 1. FlameSafe Intumescent Wrap Strip
 - 2. 3M Fire Barrier FS-195+ Wrap/Strip
 - 3. A/D Firebarrier Wrap Strip
 - 4. Hilti USA
 - 5. Specified Technologies, Inc: www.stifirestop.com.
- J. Restraining Collars
 - 1. FlameSafe FSRC 100/FSRC 150 Restraining Collars
 - 2. 3M Fire Barrier RC-1 Restraining collar
 - 3. A/D Firebarrier Collars & Collar Strips
 - 4. Hilti USA
 - 5. Specified Technologies, Inc: www.stifirestop.com.
- K. Composite Sheet
 - 1. 3M Fire Barrier CS-195+ Composite Sheet
 - 2. Hilti USA
 - 3. Specified Technologies, Inc: www.stifirestop.com.
- L. Accessories
 - 1. Forming or Damming Materials as specified by the manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.
- C. Install backing materials to arrest liquid material leakage.

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by authorities having jurisdiction.
- C. Install labeling required by code.
 - 1. Marking and Identification: Fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling. Such identification shall:
 - a. Be located in accessible concealed floor, floor-ceiling or attic spaces;
 - b. Be located within 15 feet of the end of each wall and at intervals not exceeding 30 feet measured horizontally along the wall or partition; and
 - c. Include lettering not less than 3 inches in height with a minimum 3/8 inch stroke in a contrasting color incorporating the suggested wording. "FIRE AND/OR SMOKE BARRIER-PROTECT ALL OPENINGS" or other wording.

3.04 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

3.05 PROTECTION

- A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 9200

JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

1.02 REFERENCE STANDARDS

- A. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- B. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- C. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2002 (Reapproved 2013).

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
- C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- E. Samples for Verification: Where custom sealant color is specified, obtain directions from Engineer/Architect and submit at least two physical samples for verification of color of each required sealant.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and with at least five years of documented experience.

1.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Base Manufacturer: Tremco Global Sealants: www.tremcosealants.com.
- B. Other Acceptable Manufacturers:
 - 1. Master Builders Solutions by BASF: www.master-builders-solutions.basf.us/en-us.
 - 2. Bostik Inc: www.bostik-us.com.
 - 3. Manus Products, Inc.: www.manus.net.
 - 4. Pecora Corporation: www.pecora.com.
 - 5. PSI, Polymeric Systems, Inc.: www.polymericsystems.com.
 - 6. Red Devil: www.reddevil.com.

7. Sherwin-Williams Company: www.sherwin-williams.com.
8. Sika Corporation US: usa.sika.com.
9. W.R.Meadows: www.wrmeadows.com.
10. Substitutions: See Section 01 6000 - Product Requirements.

2.02 JOINT SEALANT APPLICATIONS

- A. Scope:
 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
 - a. Wall expansion and control joints.
 - b. Joints between door, window, and other frames and adjacent construction.
 - c. Joints between different exposed materials.
 - d. Openings below ledge angles in masonry.
 - e. Other joints indicated below.
 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. Other joints indicated below.
 - c. Other joints where indicated on the drawings.
 3. Do not seal the following types of joints.
 - a. Intentional weepholes in masonry.
 - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - d. Joints where installation of sealant is specified in another section.
 - e. Joints between suspended panel ceilings/grid and walls.
- B. Exterior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.
 1. Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane "traffic-grade" sealant.
- C. Interior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.

2.03 JOINT SEALANTS - GENERAL

- A. Colors: Color shall be selected by the Engineer/Architect from manufacturer's full range unless specifically indicated to be a specific color.

2.04 NONSAG JOINT SEALANTS

- A. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multicomponent; not expected to withstand continuous water immersion or traffic.
 1. Movement Capability: Plus and minus 25 percent, minimum.
 2. Manufacturers:
 - a. Dymonic FC or Dymeric 240 FC manufactured by Tremco Commercial Sealants.
 - b. Sonolastic NP1 or NP2 manufactured by Master Builders Solutions by BASF.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.05 SELF-LEVELING SEALANTS

- A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multicomponent; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion.
 1. Movement Capability: Plus and minus 25 percent, minimum.
 2. Manufacturers:
 - a. THC-901, Vulkem 445SSL (also Dymonic FC, or Dymeric 240 FC) manufactured by Tremco Commercial Sealants.
 - b. MasterSeal SL 1, SL 2 (also NP 1, or NP 2 manufactured by Master Builders Solutions by BASF.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.06 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
 - 1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
 - 2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type C - Closed Cell Polyethylene.
 - 3. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- D. Install bond breaker backing tape where backer rod cannot be used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- H. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04 CLEANING

- A. Clean adjacent soiled surfaces.

3.05 PROTECTION

- A. Protect sealants until cured.

END OF SECTION

DIVISION 08: Openings

SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire-rated hollow metal doors and frames.

1.02 RELATED REQUIREMENTS

- A. Section 08 7100 - Door Hardware.
- B. Section 09 9123 - Interior Painting: Field painting.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2016.
- G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.
- H. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.
- I. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- J. ITS (DIR) - Directory of Listed Products; current edition.
- K. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
- L. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.
- M. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.
- N. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
- O. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.
- P. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
- Q. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.
- B. Maintain at project site copies of reference standards relating to installation of products specified.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
 - 1. Ceco Door; Curries or Fleming, an Assa Abloy Group company: www.assaabloydss.com.
 - 2. De La Fontaine Inc: www.delafontaine.com/#sle.
 - 3. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
 - 4. Steelcraft, an Allegion brand: www.allegion.com/sle.
 - 5. Technical Glass Products: www.tgpamerica.com.
 - 6. Mesker: www.meskerdoor.com.
 - 7. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DESIGN CRITERIA

- A. Requirements for Hollow Metal Doors and Frames:
 - 1. Steel used for fabrication of doors and frames shall comply with one or more of the following requirements; Galvannealed steel conforming to ASTM A653/A653M, cold-rolled steel conforming to ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel conforming to ASTM A1011/A1011M, Commercial Steel (CS) Type B for each.
 - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 - 3. Door Top Closures: Flush end closure channel, with top and door faces aligned.
 - 4. Door Edge Profile: Beveled, both sides.
 - 5. Typical Door Face Sheets: Flush.
 - 6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Flush.
 - 7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
 - 8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

- A. Door Finish: Factory primed and field finished.
- B. Fire-Rated Doors:
 - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 2 - Heavy-duty.
 - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 18 gage, 0.042 inch, minimum.
 - 2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
 - 3. Provide units listed and labeled by UL (DIR) or ITS (DIR).
 - a. Attach fire rating label to each fire rated unit.
 - 4. Door Core Material: Manufacturers standard core material/construction in compliance with requirements.
 - 5. Door Thickness: 1-3/4 inch, nominal.

2.04 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Frame Finish: Factory primed and field finished.
- C. Door Frames, Fire-Rated: Face welded type.
 - 1. Fire Rating: Same as door, labeled.
 - 2. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
- D. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
- E. Frames Depth: Size frame depth to accommodate wall assembly thickness and to allow proper attachment to assembly components.

2.05 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Finish: Paint in field. Color as selected/indicated by the Architect.

2.06 ACCESSORIES

- A. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- B. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Install door hardware as specified in Section 08 7100.

3.03 TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.04 ADJUSTING

- A. Adjust for smooth and balanced door movement.

3.05 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 08 3100
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Floor access door and frame units, interior and exterior.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000: Openings in concrete; materials for cast-in-place.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Manufacturer's Installation Instructions: Indicate installation requirements and rough-in dimensions.

PART 2 PRODUCTS

2.01 ACCESS DOOR AND PANEL APPLICATIONS

2.02 FLOOR ACCESS UNITS

- A. Floor Access Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
 - 1. Size: As indicated on the drawings.
 - 2. Hardware: Stainless steel, Type 316.
 - a. Hinges: Removable pin.
- B. Floor Access Units: Aluminum, minimum 1/4 inch thick.
 - 1. Design Load: Design to support live load of 300 lb/sq ft with deflection not to exceed 1/180 of span.
 - 2. Operation: Manual opening, and manual closing.
 - 3. Cover Pattern: Diamond tread plate.
 - 4. Lift Handle: Recessed, non-removable.
 - 5. Finish: Mill finish.
 - 6. Locking: Padlock Bar.
 - 7. Fall Protection: Grating or posts and chains where indicated on the drawings.
 - 8. Manufacturers:
 - a. Basis of Design: Bilco models/series; Refer to schedule on drawings for sizes and locations..
 - b. Other acceptable Manufacturers:
 - 1) Halliday Products: www.hallidayproducts.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings are correctly sized and located.

3.02 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings. Secure rigidly in place.
- C. Position units to provide convenient access to the concealed work requiring access.

END OF SECTION

SECTION 08 7100
DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hardware for hollow metal doors.
- B. Hardware for fire-rated doors.
- C. Weatherstripping and gasketing.

1.02 RELATED REQUIREMENTS

- A. Section 08 1113 - Hollow Metal Doors and Frames.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. BHMA A156.1 - American National Standard for Butts and Hinges; 2013.
- C. BHMA A156.3 - American National Standard for Exit Devices; 2014.
- D. BHMA A156.4 - American National Standard for Door Controls - Closers; 2013.
- E. BHMA A156.5 - American National Standard for Cylinders and Input Devices for Locks; 2014.
- F. BHMA A156.13 - American National Standard for Mortise Locks & Latches Series 1000; 2012.
- G. BHMA A156.16 - American National Standard for Auxiliary Hardware; 2013.
- H. BHMA A156.18 - American National Standard for Materials and Finishes; 2012.
- I. BHMA A156.21 - American National Standard for Thresholds; 2014.
- J. BHMA A156.22 - American National Standard for Door Gasketing and Edge Seal Systems, Builders Hardware Manufacturers Association; 2012.
- K. BHMA A156.28 - American National Standard for Recommended Practices for Mechanical Keying Systems; 2013.
- L. DHI (KSN) - Keying Systems and Nomenclature; 1989.
- M. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames; 2004.
- N. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- O. ITS (DIR) - Directory of Listed Products; current edition.
- P. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
- Q. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- R. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2016.
- S. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.
- T. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
- U. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- V. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.
- B. Keying Requirements Meeting:
 - 1. Schedule meeting at project site prior to Contractor occupancy.
 - 2. Attendance Required:
 - a. Contractor.
 - b. Owner.
 - c. Engineer/Architect.

- d. Installer's Architectural Hardware Consultant (AHC).
3. Agenda:
 - a. Establish keying requirements.
4. Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following:
5. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer/Architect, Owner, participants, and those affected by decisions made.
6. Deliver established keying requirements to manufacturers.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.
- C. Shop Drawings - Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.
 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
 2. Provide complete description for each door listed.
- D. Shop Drawings - Electrified Door Hardware: Submit diagrams for power, signal, and control wiring for electrified door hardware that include details of interface with building safety and security systems. Provide elevations and diagrams for each electrified door opening as follows:
 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC).
 2. Elevations: Submit front and back elevations of each door opening showing electrified devices with connections installed and an operations narrative describing how opening operates from either side at any given time.
 3. Diagrams: Submit point-to-point wiring diagram that shows each device in door opening system with related colored wire connections to each device.
- E. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- F. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- G. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
 1. See Section 01 6000 - Product Requirements, for additional provisions.
 2. Tools: One set of each special wrench or tool applicable for each different or special hardware component, whether supplied by hardware component manufacturer or not.

1.06 QUALITY ASSURANCE

- A. Standards for Fire-Rated Doors: Maintain one copy of each referenced standard on site, for use by Engineer/Architect and Contractor.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least three years of documented experience.
- D. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) to assist in work of this section.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

- B. Warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion.
 - 1. Closers: Five years, minimum.
 - 2. Exit Devices: Three years, minimum.
 - 3. Locksets and Cylinders: Three years, minimum.
 - 4. Other Hardware: Two years, minimum.

PART 2 PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

- A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.
- B. Provide individual items of single type, of same model, and by same manufacturer.
- C. Provide door hardware products that comply with the following requirements:
 - 1. Applicable provisions of federal, state, and local codes.
 - 2. Accessibility: ADA Standards and ICC A117.1.
 - 3. Applicable provisions of NFPA 101.
 - 4. Fire-Rated Doors: NFPA 80, listed and labeled by qualified testing agency for fire protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
 - 5. Hardware on Fire-Rated Doors: Listed and classified by UL (DIR), ITS (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for application indicated.
 - 6. Hardware for Smoke and Draft Control Doors: Provide door hardware that complies with local codes, and requirements of assemblies tested in accordance with UL 1784.
 - a. Air Leakage Rate: Tested in accordance with UL 1784, with air leakage rate not to exceed 3.0 cfm/sf of door opening at 0.10 inch of water for both ambient and elevated temperature tests.
- D. Fasteners:
 - 1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
 - a. Aluminum fasteners are not permitted.
 - b. Provide phillips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.
 - 2. Fire-Rated Applications: Comply with NFPA 80.
 - a. Provide wood or machine screws for hinges mortised to doors or frames, strike plates to frames, and closers to doors and frames.
 - b. Provide steel through bolts for attachment of surface mounted closers, hinges, or exit devices to door panels unless proper door blocking is provided.

2.02 HINGES

- A. Manufacturers:
 - 1. McKinney; an Assa Abloy Group company: www.assaabloydss.com.
 - 2. Bommer Industries, Inc: www.bommer.com.
 - 3. Hager Companies: www.hagerco.com/#sle.
 - 4. Stanley, dormakaba Group: www.stanleyhardwarefordoors.com/#sle.
 - 5. Ives, an Allegion brand: www.allegion.com/us.
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Hinges: Complying with BHMA A156.1, Grade 1.
 - 1. Provide hinges on every swinging door.
 - 2. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
 - 3. Provide ball-bearing hinges at each door.
 - 4. Provide stainless steel hinges on exterior doors and interior doors in wet locations.
 - 5. Provide following quantity of butt hinges for each door:
 - a. Doors From 60 inches High up to 90 inches High: Three hinges.

2.03 FLUSH BOLTS

- A. Flush Bolts: Comply with BHMA A156.16, Grade 1.
 - 1. Flush Bolt Throw: 3/4 inch, minimum.

2. Provide dustproof floor strike for bolt into floor, except at metal thresholds.
3. Self-Latching Flush Bolts: Automatically latch upon closing of door; manually retracted; located on inactive leaf of pair of doors.

2.04 EXIT DEVICES

- A. Manufacturers:
 1. Basis of Design: Grade 1 - Lever Handle as Selected - Mortise Cylinders Lever Lock - Smooth Mechanism Case.
 2. Corbin Russwin, Sargent, or Yale; an Assa Abloy Group company: www.assaabloydss.com.
 3. Precision, dormakaba Group: www.precisionhardware.com/#sle.
 4. Von Duprin, an Allegion brand: www.allegion.com/us.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Exit Devices: Complying with BHMA A156.3, Grade 1.
 1. Lever design to match lockset trim.
 2. Provide cylinder with cylinder dogging or locking trim.
 3. Provide exit devices properly sized for door width and height.
 4. Provide strike as recommended by manufacturer for application indicated.
 5. Provide UL (DIR) listed exit device assemblies for fire-rated doors and panic device assemblies for non-fire-rated doors.

2.05 LOCK CYLINDERS

- A. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.
 1. Provide standard type cylinders, Grade 1, with six-pin core in compliance with BHMA A156.5 at locations indicated.
 2. Provide cylinders from same manufacturer as locking device.
 3. Provide cams and/or tailpieces as required for locking devices.

2.06 MORTISE LOCKS

- A. Manufacturers:
 1. Basis of Design: Grade 1 - Lever Handle as Selected.
 2. Corbin Russwin, Sargent, or Yale; an Assa Abloy Group company: www.assaabloydss.com.
 3. Best, dormakaba Group: www.bestaccess.com/#sle.
 4. Hager Companies: www.hagerco.com/#sle.
 5. Schlage, an Allegion brand: www.allegion.com/us.
 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Mortise Locks: Comply with BHMA A156.13, Grade 1, Security, 1000 Series.
 1. Latchbolt Throw: 3/4 inch, minimum.
 2. Deadbolt Throw: 1 inch, minimum.
 3. Backset: 2-3/4 inch unless otherwise indicated.
 4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
 - a. Finish: To match lock or latch.

2.07 COORDINATORS

- A. Coordinators: Provide on doors having closers and self-latching or automatic flush bolts to ensure that inactive door leaf closes before active door leaf.
 1. Type: Bar, unless otherwise indicated.
 2. Material: Aluminum, unless otherwise indicated.
 3. Ensure that coordination of other door hardware affected by placement of coordinators and carry bar is applied properly for completely operable installation.

2.08 CLOSERS

- A. Manufacturers; Surface Mounted:
 1. Basis of Design: Grade 1 - Parallel Arm Push Side Mount - Metal Cover Plate - Sprayed to match.
 2. Corbin Russwin, Norton, Rixson, Sargent, or Yale; an Assa Abloy Group company: www.assaabloydss.com.

3. Hager Companies: www.hagerco.com/#sle.
 4. LCN, an Allegion brand: www.allegion.com/us.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Closers: Complying with BHMA A156.4, Grade 1.
1. Provide door closer on each fire-rated and smoke-rated door.

2.09 KICK PLATES

- A. Manufacturers:
1. Basis of Design: 10 inch high x .05 inch thick, stainless steel.
 2. Hiawatha, Inc, an Activar Construction Products Group company: www.activarcpg.com/hiawatha/#sle.
 3. Ives, an Allegion brand: www.allegion.com/us/#sle.
 4. Trimco: www.trimcohardware.com/#sle.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Kick Plates: Provide along bottom edge of push side of every door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.
1. Size: 8 inch high by 2 inch less door width (LDW) on push side of door.

2.10 ASTRAGALS

- A. Manufacturers:
1. Basis of Design: Pemko 355CS.
 2. Pemko; an Assa Abloy Group company: www.assaabloydss.com.
 3. Hager Companies: www.hagerco.com/#sle.
 4. National Guard Products, Inc: www.ngpinc.com.
 5. Zero International, Inc: www.zerointernational.com.
 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Astragals: Comply with BHMA A156.22.
1. Type: Split, two parts, and with sealing gasket.
 2. Material: Aluminum, with neoprene weatherstripping.
 3. Provide non-corroding fasteners at exterior locations.

2.11 THRESHOLDS

- A. Manufacturers:
1. Basis of Design: Reese S205A.
 2. Pemko; an Assa Abloy Group company: www.assaabloydss.com.
 3. Hager Companies: www.hagerco.com/#sle.
 4. National Guard Products, Inc: www.ngpinc.com.
 5. Zero International, Inc: www.zerointernational.com.
 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Thresholds: Comply with BHMA A156.21.
1. Provide threshold at each exterior door, unless otherwise indicated.
 2. Type: Flat surface.
 3. Material: Aluminum.
 4. Threshold Surface: Fluted horizontal grooves across full width.
 5. Field cut threshold to profile of frame and width of door sill for tight fit.
 6. Provide non-corroding fasteners at exterior locations.

2.12 WEATHERSTRIPPING AND GASKETING

- A. Manufacturers:
1. Pemko; an Assa Abloy Group company: www.assaabloydss.com.
 2. Hager Companies: www.hagerco.com/#sle.
 3. National Guard Products, Inc: www.ngpinc.com.
 4. Zero International, Inc: www.zerointernational.com.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Weatherstripping and Gasketing: Complying with BHMA A156.22.
1. Head and Jamb Type: Adjustable.
 2. Door Sweep Type: Encased in retainer.

3. Material: Aluminum, with brush weatherstripping.

2.13 LATCH PROTECTOR

- A. Latch Protector: Provide on door to protect latch from being tampered with while in locked position.
 1. Type: Standard latch protector.
 2. Material: Stainless steel.

2.14 KEY CONTROL SYSTEMS

- A. Key Control Systems: Complying with guidelines of BHMA A156.28.
 1. Provide keying information in compliance with DHI (KSN) standards.
 2. Keying: Grand master keyed.
 3. Supply keys in following quantities:
 - a. 1 each Grand Master keys.

2.15 FINISHES

- A. Finishes: Provide door hardware of same finish, unless otherwise indicated.
 1. Primary Finish: 626; satin chromium plated over nickel, with brass or bronze base material (former US equivalent US26D); BHMA A156.18.
 2. Exceptions:
 - a. Where base material metal is specified to be different, provide finish that is an equivalent appearance in accordance with BHMA A156.18.
 - b. Hinges for Fire-Rated Doors: Steel base material with painted finish, in compliance with NFPA 80.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.
- C. Install hardware for smoke and draft control doors in accordance with NFPA 105.
- D. Use templates provided by hardware item manufacturer.
- E. Do not install surface mounted items until application of finishes to substrate are fully completed.
- F. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.
 1. For Steel Doors and Frames: Install in compliance with DHI (LOCS) recommendations.

3.03 ADJUSTING

- A. Adjust work under provisions of Section 01 7000 - Execution and Closeout Requirements.
- B. Adjust hardware for smooth operation.
- C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.04 CLEANING

- A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

3.05 PROTECTION

- A. Protect finished Work under provisions of Section 01 7000 - Execution and Closeout Requirements.
- B. Do not permit adjacent work to damage hardware or finish.

PART 4 SCHEDULE

4.01 BASIC DOOR HARDWARE AND DOOR OPERATION INTENT HAS BEEN LISTED BELOW. PROVIDE ANY ADDITIONAL HARDWARE TO MEET APPLICABLE CODES AND TO ACHIEVE OPERATION, FUNCTION, AND INTENT. IF INTENT IS UNCLEAR TO BIDDER, CONTACT THE ARCHITECT REPRESENTATIVE FOR CLARIFICATION. PLEASE NOTE THAT SOME REQUIRED DOOR HARDWARE ITEMS ARE ONLY LISTED ABOVE AND NOT WITHIN THE HARDWARE GROUP.

5.01 HARDWARE GROUP 1 (DOUBLE DOOR - INTERIOR)

- A. Hinges
- B. Rim Exit Device - Active Leaf - Classroom Function
- C. Automatic Flush Bolts - Inactive Leaf
- D. Closers, Overhead Holders with fuse link, and Stops
- E. Coordinator
- F. Gasketing
- G. Intumescent Seals
- H. Fire Rating labels

5.02 HARDWARE GROUP 2 (DOUBLE DOOR - EXTERIOR)

- A. Hinges
- B. Mortise Lockset - Active Leaf - Entrance Function
- C. Latch Protector Plate
- D. Automatic Flush Bolts - Inactive Leaf
- E. Closers, Overhead Holders, and Stops
- F. Coordinator
- G. Weatherstripping
- H. Between Door Seal
- I. Drip
- J. Threshold
- K. Sweeps

END OF SECTION

DIVISION 09: Finishes

SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Acoustic insulation.
- D. Gypsum wallboard.
- E. Joint treatment and accessories.
- F. Prefabricated Wood Blocking System.

1.02 RELATED REQUIREMENTS

- A. Section 05 4000 - Cold-Formed Metal Framing: Structural steel stud framing.

1.03 REFERENCE STANDARDS

- A. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- B. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- C. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
- D. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- E. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.
- F. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
 - 1. GA-214 - Recommended Levels of Gypsum Board Finish; Gypsum Association; 2007.
- G. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.
- H. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2016.
- I. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- J. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.
- K. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2015.
- L. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- M. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
- N. ASTM E413 - Classification for Rating Sound Insulation; 2016.
- O. GA-216 - Application and Finishing of Gypsum Board; 2013.
- P. GA-600 - Fire Resistance Design Manual; 2015.
- Q. UL (FRD) - Fire Resistance Directory; Current Edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate the location of all expansion joints in plan and elevation view. Include details at intersections of walls, floors, ceilings, and other construction.
- C. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum five years of documented experience.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
- B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
 - 1. Acoustic Attenuation: STC as indicated calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
 - 2. Walls indicated to receive sound insulation that are not indicated to meet an STC rating are not intended to be constructed as an acoustic assembly.
- C. Fire Rated Assemblies: Provide completed assemblies complying with applicable code.
 - 1. Gypsum Association File Numbers: Comply with requirements of GA-600 for the particular assembly.
 - 2. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

2.02 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
 - 2. Marino: www.marinoware.com.
 - 3. Phillips Manufacturing Co: www.phillipsmfg.com/#sle.
 - 4. The Steel Network, Inc: www.steelnetwork.com.
 - 5. Custom Stud, Inc: www.customstud.com.
 - 6. Telling Industries: www.buildstrong.com.
 - 7. Super Stud Building Products, Inc: www.buysuperstud.com.
 - 8. Substitutions: See Section 01 6000 - Product Requirements.
- B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
 - 1. Shapes and Sizes: As indicated on the drawings.
- C. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and fastened as indicated on drawings.

2.03 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
 - 1. American Gypsum Company: www.americangypsum.com.
 - 2. CertainTeed Corporation: www.certainteed.com.
 - 3. Georgia-Pacific Gypsum: www.gpgypsum.com.
 - 4. Lafarge North America Inc: www.lafargenorthamerica.com.
 - 5. National Gypsum Company: www.nationalgypsum.com.
 - 6. PABCO Gypsum: www.pabco gypsum.com.
 - 7. USG Corporation: www.usg.com.
 - 8. Substitutions: See Section 01 6000 - Product Requirements.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 - 2. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 - 3. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
 - b. Ceilings: 5/8 inch.

2.04 ACCESSORIES

- A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness: 3 or more inches as required to fill wall depth.
 - 1. ASTM E84 surface burning characteristics: Flame Spread Index 25 or less; Smoke Developed Index 450 or less.
- B. Finishing Accessories: ASTM C1047, galvanized steel, rolled zinc, rigid plastic, or aluminum, unless noted otherwise.
 - 1. Types: As detailed or required for finished appearance.
 - a. Products for specific applications:
 - 1) Expansion Joints (V-Groove Joint): Trim-Tex #093V Expansion joint or approved equal shall be used at expansion joints in flat wall or ceiling applications.
 - 2) Angled Joints: Trim-Tex Magic Corner or approved equal shall be used at angular walls and ceilings.
 - 3) Wall Termination: Trim-Tex Tear Away XT Extra Tall Masking or approved equal shall be used at all location where new construction terminates into existing construction or non-gypsum construction.
 - 2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead at exposed panel edges.
 - 3. Products:
 - a. Same manufacturer as framing materials.
 - b. Phillips Manufacturing Co: www.phillipsmfg.com/#sle.
 - c. Trim-Tex, Inc.: www.trim-tex.com.
 - d. Fry Reglet: www.fryreglet.com.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
- C. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
 - 1. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
 - 2. Ready-mixed vinyl-based joint compound.
 - 3. Powder-type vinyl-based joint compound.
- D. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.
- E. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion resistant.
- F. Prefabricated Blocking Systems: DANBACK 3/4 inch standard/treated plywood or approved equal: www.danback.com.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Studs: Space studs as permitted by standard.
 - 1. Extend partition framing to structure where indicated and to ceiling in other locations.
 - 2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
 - 3. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.
- C. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- D. Blocking: Install blocking for support of:

1. Wall mounted door hardware.
2. All other items indicated on the drawings and in the specifications.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

3.04 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Provide solid continuous shims under first layer of gypsum board as necessary to minimize variations in plane. Tolerance of surface shall be as indicated.
- C. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
 1. Exception: Tapered edges to receive joint treatment at right angles to framing.
- D. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- E. Installation on framing: Use screws for attachment of gypsum board.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as follows:
 1. Not more than 30 feet apart on walls, soffits, and ceilings in any direction.
 2. At intersections of soffits and intersecting walls.
 3. At intersection of half height wall and intersecting walls.
 4. At locations indicated on the drawings.
 5. Other locations where cracking may occur due to changes in height and structure.
 6. All jointing locations shall be indicated on shop drawings.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.06 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C 840 (additional reference guideline; GA-214 - Recommended Levels of Gypsum Board Finish), as follows:
 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - a. No visible defects should be apparent under normal lighting conditions. Provide Level 5 finish where defects become apparent at no additional cost to the Owner.
 - b. Contractors that cannot guarantee their Level 4 finish will be free of visible defects under normal lighting conditions should provide a Level 5 finish.
 - c. If the Architect or Owner is unsatisfied with a Level 4 finish due to visible defects under normal lighting conditions then a Level 5 finish shall be installed at no additional cost to the Owner. No exceptions.
 2. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
 3. Level 1: Wall areas above finished ceilings, whether or not accessible in the completed construction.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
 2. Tapered edges of gypsum board that are not located at taped and filled joints shall also be filled and sanded smooth to match the plane of the wall.

3.07 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 6500
RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Installation accessories.

1.02 REFERENCE STANDARDS

- A. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2014).

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Selection Samples: Submit manufacturer's complete set of color samples for Engineer/Architect's initial selection.
- D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Wall Base: 20 linear feet of each type and color.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.
- B. Installer Qualifications: Company specializing in performing resilient flooring installation, with minimum of five years of documented experience.

1.05 FIELD CONDITIONS

- A. Maintain temperature in storage area between 55 degrees F and 90 degrees F.
- B. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.01 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
 - 1. Fill all voids with approved products to create a solid and continuous surface at all resilient base locations.

3.02 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

3.03 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

SECTION 09 9123
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
 - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
 - 2. Exposed surfaces of primed and unprimed metal items in finished areas unless specifically indicated to not be painted.
 - 3. Mechanical and Electrical:
 - a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, electrical equipment, and pipes, unless otherwise indicated.
 - b. In finished areas, paint shop-primed items.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
 - 5. Floors, unless specifically indicated.
 - 6. Glass.
 - 7. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 09 2116 - Gypsum Board Assemblies: Joint and surface treatment prior to painting.

1.03 DEFINITIONS

- A. Comply with ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.
- D. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
- E. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
 - 4. Manufacturer's installation instructions.

5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
1. Where sheen is specified, submit samples in only that sheen.
 2. Where sheen is not specified, discuss sheen options with Engineer/Architect before preparing samples, to eliminate sheens definitely not required.
 3. Allow 15 days for approval process, after receipt of complete samples by Engineer/Architect.
 4. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as factory finished items, have been approved.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 6000 - Product Requirements, for additional provisions.
 2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
 3. Label each container with color in addition to the manufacturer's label.
 4. Do not provide or leave extra paint materials for the Owner.
 5. Do provide product info, color names, and installation locations for all products and colors. Information shall be included in the Operation and Maintenance Manual.

1.06 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Engineer/Architect is obtained using the specified procedures for substitutions.
- B. Paints:
1. Base Manufacturer: Sherwin Williams: www.sherwin-williams.com.
 2. Other Manufacturers: Approved products shall meet performance and physical characteristics of base manufacturer (basis of design) product including published ratio of solids by volume, plus or minus two percent.
- C. Other Acceptable Manufacturers: Submit product information for each line of paint for Architect's approval. Substitutions of Base Manufacturer's products may not be accepted during the shop drawing process.
1. Behr Process Corporation: www.behr.com/#sle.
 2. Benjamin Moore & Co: www.benjaminmoore.com.
 3. Diamond Vogel Paints: www.diamondvogel.com/#sle.
 4. PPG Paints: www.ppgpaints.com/#sle.

5. Pratt & Lambert Paints: www.prattandlambert.com/#sle.
6. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
7. Tnemec: www.tnemec.com.
8. Valspar Corporation: www.valsparpaint.com/#sle.

D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - a. Spayed finish; is preferred on all metal surfaces; is required on the following surfaces:
 - 1) Metal doors and frames; prior to hardware installation.
 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 3. Provide commercial grade paint systems by approved paint manufacturer for substrates not specifically covered under paint systems.
 - a. Consult with Architect/Engineer/Designer for approval of additional products and systems. Provide quantifiable product information.
 4. Supply each paint material in quantity required to complete entire project's work from a single production run.
 5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- C. Volatile Organic Compound (VOC) Content:
 1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Engineer/Architect from the manufacturer's full line.
- E. Colors: As indicated on drawings.
 1. Where indicated or scheduled colors do not match the paint product lines indicated below it is anticipated that colors will be color matched; product lines below are intended to set a level of standard for the product lines used for each application.
 2. Locations Not Indicated: Selection to be made by Engineer/Architect after award of contract.
 3. Extend colors to surface edges; colors may change at any edge as directed by Engineer/Architect.
 4. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.
- F. Coats: The number of coats specified, are based on manufacturer's recommendations. Provide for additional coats, as necessary, for complete coverage and true color. Additional coats due to a lack of coverage shall be provided at no additional cost to the Owner. No exceptions.
- G. Coverage: Do not stretch products beyond their recommended coverage rate nor install fewer coats than specified regardless of appearance after previous coats are applied. Thin product application may show surface imperfections or inconsistencies that would otherwise not be visible. Additional coats due to a lack of proper coverage shall be provided at no additional cost to the Owner. No exceptions.

2.03 PAINT SYSTEMS - INTERIOR

- A. Paint Product: **Pro Industrial Pre-Catalyzed Waterbased Epoxy (Single-Component)**
 - 1. Primer: Prime and/or touch up as per Manufacturers recommended Specifications in accordance with specified Product.
 - 2. Number of Paint Coats Over Primer: Two.
 - 3. Types of Substrates:
 - a. Steel.
 - b. Drywall.
 - 4. Sheen: As scheduled on the drawings.
 - 5. Location Types:
 - a. Hollow metal doors and frames.
 - b. Other metals unless noted otherwise.

2.04 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Engineer/Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Gypsum Wallboard: 12 percent.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask and/or protect all surfaces, appurtenances not affiliated with coating process, including but not limited to electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- F. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP 1.
 - 2. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

- D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- E. Painting shall be free from paint runs; no exceptions.
- F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

SECTION 09 9600

COATING SYSTEMS FOR WASTEWATER TREATMENT FACILITY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Coating systems for wastewater processing facilities.

1.02 RELATED SECTIONS

- A. Section 01 3000 - Submittal Procedures.

1.03 REFERENCES

- A. ASTM D 16 - Terminology Relating to Paint, Varnish, Lacquer, and Related Products.
- B. ASTM D 4263 - Indicating Moisture in Concrete by the Plastic Sheet Method.
- C. ASTM F 1869 - Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- D. AWWA D 102- Painting Steel Water Storage Tanks
- E. International Concrete Repair Institute (ICRI) Guideline No. 310.2-1997 (formerly 03732) - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.
- F. NACE SP0188 - Standard Recommended Practice, Discontinuity (Holiday) Testing of Protective Coatings.
- G. NAPF 500-03-04 Abrasive Blast Cleaning.
- H. SSPC-SP 1 - Solvent Cleaning.
- I. SSPC-SP 5/NACE 1 - White Metal Blast Cleaning.
- J. SSPC-SP 6/NACE 3 - Commercial Blast Cleaning.
- K. SSPC-SP 10/NACE 2 - Near-White Metal Blast Cleaning.
- L. SSPC-SP 16 Brush-Off Blast Cleaning of Non-Ferrous Metals
- M. SSPC-SP 13/NACE 6 - Surface Preparation of Concrete.
- N. SSPC-TU 11 - Inspection of Fluorescent Coating Systems

1.04 DEFINITIONS

- A. Definitions of Painting Terms: ASTM D 16, unless otherwise specified.
- B. Dry Film Thickness (DFT): Thickness of a coat of cured paint measured in mils (1/1000 inch).

1.05 SUBMITTALS

- A. Comply with Section 01 3000 - Submittal Procedures.
- B. Product Data: Submit manufacturer's product data for each coating, including generic description, complete technical data, surface preparation, and application instructions.
- C. Color Samples: Submit manufacturer's color samples showing full range of standard colors.
- D. Manufacturer's Quality Assurance: Submit manufacturer's certification that coatings comply with specified requirements and are suitable for intended application.
- E. Applicator's Quality Assurance: Submit list of a minimum of 5 completed projects of similar size and complexity to this Work. Include for each project:
 - 1. Project name and location.
 - 2. Name of owner.
 - 3. Name of contractor.
 - 4. Name of engineer.
 - 5. Name of coating manufacturer.
 - 6. Approximate area of coatings applied.
 - 7. Date of completion.
- F. Warranty: Submit manufacturer's standard warranty.

1.06 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
 - 1. Specialize in manufacture of coatings with a proven successful experience.
 - 2. Able to demonstrate successful performance on comparable projects.
 - 3. Single Source Responsibility: Coatings and coating application reducers and additives shall be products of a single manufacturer.
- B. Applicator's Qualifications:
 - 1. Experienced in application of specified coatings on projects of similar size and complexity to this Work.
 - 2. Applicator's Personnel: Employ persons trained for application of specified coatings.
- C. Preapplication Meeting: Convene a preapplication meeting two 2 weeks before start of application of coating systems. Require attendance of parties directly affecting work of this section, including Contractor, Engineer, applicator, and manufacturer's representative. Review the following:
 - 1. Environmental requirements.
 - 2. Protection of surfaces not scheduled to be coated.
 - 3. Surface preparation.
 - 4. Application.
 - 5. Repair.
 - 6. Field quality control.
 - 7. Cleaning.
 - 8. Protection of coating systems.
 - 9. One-year inspection.
 - 10. Coordination with other work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying:
 - 1. Coating or material name.
 - 2. Manufacturer.
 - 3. Color name and number.
 - 4. Batch or lot number.
 - 5. Date of manufacture.
 - 6. Mixing and thinning instructions.
- B. Storage:
 - 1. Store materials in a clean dry area and within temperature range in accordance with manufacturer's instructions.
 - 2. Keep containers sealed until ready for use.
 - 3. Do not use materials beyond manufacturer's shelf life limits.
- C. Handling: Protect materials during handling and application to prevent damage or contamination.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Weather:
 - 1. Air and Surface Temperatures: Prepare surfaces and apply and cure coatings within air and surface temperature range in accordance with manufacturer's instructions.
 - 2. Surface Temperature: Minimum of 5 degrees F (3 degrees C) above dew point.
 - 3. Relative Humidity: Prepare surfaces and apply and cure coatings within relative humidity range in accordance with manufacturer's instructions.
 - 4. Precipitation: Do not prepare surfaces or apply coatings in rain, snow, fog, or mist.
 - 5. Wind: Do not spray coatings if wind velocity is above manufacturer's limit.
- B. Ventilation: Provide ventilation during coating evaporation stage in confined or enclosed areas in accordance with AWWA D 102.
- C. Dust and Contaminants:
 - 1. Schedule coating work to avoid excessive dust and airborne contaminants.

2. Protect work areas from excessive dust and airborne contaminants during coating application and curing.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. The Sherwin-Williams Company (www.sherwin.com/protective).
- B. For immersion surfaces, Opt-Check optically activated pigment (OAP) technology is strongly recommended for rapid holiday detection in accordance with SSPC-TU 11
- C. Other Acceptable Manufacturers: Submit product information for each line of paint for Architect's approval. Substitutions of Base Manufacturer's products may not be accepted during the shop drawing process.
 1. Diamond Vogel Paints: www.diamondvogel.com.
 2. PPG Paints: www.ppgpaints.com.
 3. Sherwin-Williams Company: www.sherwin-williams.com.
 4. Tnemec: www.tnemec.com.
- D. Substitutions: Not permitted.
- E. Note: Not all systems are used. Refer to drawings for finished items. Provide systems specified herein where not specifically indicated.

2.02 COATING SYSTEMS FOR STEEL - STRUCTURAL, TANKS, PIPE, EQUIPMENT, AND MISCELLANEOUS

- A. Type CS-__ - Exterior Exposed:
 1. System Type: Epoxy/epoxy/urethane.
 2. Surface Preparation: SSPC-SP 6 with a surface profile of 2.0 to 3.0 mils.
 3. Primer: Macropoxy 646. DFT 3.0 to 5.0 mils.
 4. Intermediate Coat: Macropoxy 646. DFT 3.0 to 5.0 mils.
 5. Finish Coat: Acrolon Ultra or Hi-Solids Polyurethane. DFT 2.0 to 4.0 mils.
 6. Total DFT: 8.0 to 14.0 mils.
 7. Finish Color: As indicated on the drawings or Color Schedule.
- B. Type CS-__ - Interior Exposed:
 1. System Type: Epoxy/epoxy.
 2. Surface Preparation: SSPC-SP 6 with a surface profile of 2.0 to 3.0 mils.
 3. Primer: Dura-plate 235 MPE. DFT 7.0 to 9.0 mils.
 4. Finish: Dura-plate 235 MPE. DFT 7.0 to 9.0 mils.
 5. Total DFT: 14.0 to 18.0 mils. Finish Color: As indicated on the drawings or Color Schedule.

2.03 COATING SYSTEMS FOR GALVANIZED STEEL AND NONFERROUS METAL - PIPE AND MISCELLANEOUS FABRICATIONS

- A. Type CS-__ - Exterior Exposed:
 1. System Type: Epoxy/urethane.
 2. Surface Preparation: SSPC SP 16.
 3. Primer: Macropoxy 646. DFT 3.0 to 5.0 mils.
 4. Finish Coat: Acrolon Ultra or Hi-Solids Polyurethane. DFT 2.0 to 4.0 mils.
 5. Total DFT: 5.0 to 9.0 mils.
 6. Finish Color: As indicated on the drawings, or color schedule.
- B. Type CS-__ - Interior Exposed:
 1. System Type: Epoxy.
 2. Surface Preparation: SSPC SP 16.
 3. Primer: Macropoxy 646. DFT 3.0 to 5.0 mils.
 4. Finish Coat: Macropoxy 646. DFT 3.0 to 5.0 mils.
 5. Total DFT: 6.0 to 10.0 mils.
 6. Finish Color: As indicated on the drawings, or color schedule.
- C. Type CS-__ - Immersion (Wastewater)*:
 1. System Type: Epoxy/epoxy.
 2. Surface Preparation: SSPC-SP 16.

3. Primer Coat: Sher-Glass FF: DFT 8.0 to 12.0 mils
4. Finish Coat: Sher-Glass FF: DFT 8.0 to 12.0 mils
5. Total DFT: 16.0 to 24.0 mils.
6. *Zinc-rich coatings including galvanizing are readily consumed in acidic conditions, so complete coverage is essential. Spray apply Dura-Plate UHS for one or two coat application. OAP technology strongly recommended.

2.04 COATING SYSTEMS FOR DUCTILE OR CAST IRON - PIPE, PUMPS, AND VALVES

- A. Type CS-__ - Exterior Exposed:
 1. System Type: Epoxy/epoxy/urethane.
 2. Surface Preparation: NAPF 500-03-04 with the exception that ALL rust and mold coating be removed. Only tightly adherent annealing oxide may remain..
 3. Primer: Macropoxy 646. DFT 3.0 to 5.0 mils.
 4. Intermediate Coat: Macropoxy 646. DFT 3.0 to 5.0 mils.
 5. Finish Coat: Ultra or Hi-Solids Polyurethane. DFT 2.0 to 4.0 mils.
 6. Total DFT: 8.0 to 14.0 mils.
 7. Finish Color: As indicated on the drawings, or color schedule.
 8. Copoxy Shop Primer and Corothane I Galvapac Zinc Primer are also acceptable.
- B. Type CS-__ - Below Ground (Buried):
 1. System Type: Coal tar epoxy.
 2. Surface Preparation: NAPF 500-03-04 with the exception that ALL rust and mold coating be removed. Only tightly adherent annealing oxide may remain..
 3. Primer: None.
 4. Finish Coat: Hi-Mil Sher-Tar Epoxy. DFT 14.0 to 20.0 mils.
 5. Total DFT: 14.0 to 20.0 mils.
 6. Finish Color: Black.
- C. Type CS-__ - Interior Exposed:
 1. System Type: Epoxy/epoxy.
 2. Surface Preparation: SSPC-SP 6 with a surface profile of 2.0 to 3.0 mils.
 3. Primer: Dura-plate 235 MPE. DTF 7.0 to 9.0 mils.
 4. Finish Coat: Dura-plate 235 MPE. DTF 7.0 to 9.0 mils.
 5. Total DFT: 9.0 to 15.0 mils.
 6. Finish Color: As indicated on the drawings, or color schedule.
 7. Total DFT: 14.0 to 18.0 mils. Finish Color: As indicated on the drawings or Color Schedule.
- D. Type CS-__ - Immersion (Wastewater):
 1. System Type: Epoxy/epoxy/epoxy.
 2. Surface Preparation: NAPF 500-03-04 with the exception that ALL rust and mold coating be removed. Only tightly adherent annealing oxide may remain.
 3. Primer: Dura-plate UHS DFT 8.0 to 10 mils.
 4. Finish Coat: Dura-plate UHS DFT 10.0 to 14 mils.
 5. Total DFT: 18.0 to 24.0 mils. Finish Color: As indicated on the drawings, or color schedule.
 6. Spray apply Dura-Plate UHS for one or two coat application. OAP technology strongly recommended.
 7. Finish Color: As indicated on the drawings, or color schedule.

2.05 COATING SYSTEMS FOR PVC

- A. Type CS-__ - Interior or Exterior Exposed:
 1. System Type: Acrylic.
 2. Surface Preparation: Scarify.
 3. Primer: Pro Industrial Pro-Cryl Universal Primer. DFT 2.0 to 4.0 mils.
 4. Finish Coat: Pro-Industrial Acrylic. DFT 2.5 to 4.0 mils.
 5. Total DFT: 4.5 to 8.0 mils.
 6. Finish Color: As indicated on the drawings, or color schedule.

2.06 COATING SYSTEMS FOR INSULATED PIPE

- A. Type CS-__ - Interior or Exterior Exposed:

1. System Type: Acrylic.
2. Surface Preparation: Clean and dry.
3. Primer: Pro Industrial Pro-Cryl Universal Primer. DFT 2.0 to 4.0 mils.
4. Finish Coat: Pro-Industrial Acrylic. DFT 2.5 to 4.0 mils.
5. Total DFT: 4.5 to 8.0 mils.
6. Finish Color: As indicated on the drawings, or color schedule.

2.07 COATING SYSTEMS FOR PRECAST CONCRETE, CAST-IN-PLACE CONCRETE, AND DENSE CONCRETE MASONRY UNITS

- A. Type CS-12 - Immersion (Wastewater): (Mark: IF-1)
 1. Scope: Coat entire wet well with immersion recommendation.
 2. System Type: Epoxy/epoxy.
 3. Surface Preparation: SSPC-SP 13/NACE 6 with a surface profile of ICRI CSP 2 or 3.
 4. Filler: Fill bug holes, air pockets and other voids with Steel-Seam FT910.
 5. Primer: Dura-Plate 235 UHS. DFT 8.0 to 12.0 mils.
 6. Finish: Dura-Plate 235 UHS. DFT 22.0 to 28.0 mils.
 7. Total DFT: 30.0 to 40.0 mils.
 8. Finish Color: White.
 9. Where flexibility is required, use SherFlex Elastomeric Polyurethane at 60.0 to 100.0 mils total DFT over an epoxy primer.
- B. Type CS-13 - Interior Exposed: (Mark: IF-2)
 1. System Type: Epoxy.
 2. Surface Preparation: SSPC-SP 13/NACE 6 to achieve a surface profile of ICRI CSP 2 or 3.
 3. Primer: Pro-Industrial Waterborne Catalyzed Epoxy. DFT 2.0 to 4.0 mils. Roll or backroll.
 4. Finish Coat: Pro-Industrial Waterborne Catalyzed Epoxy. DFT 3.0 to 4.0 mils.
 5. Total DFT: 5.0 to 8.0 mils.
 6. Finish Color: White.

2.08 COATING SYSTEMS FOR SECONDARY CONTAINMENT

- A. Type CS-___ - Chemical Storage Containment Area:*
 1. System Type: High-solids epoxy.
 2. Surface Preparation: SSPC-SP 13/NACE 6 with a surface profile of ICRI CSP 4 or 5.
 3. Primer: Corobond 100. DFT 4.0 to 6.0 mils.
 4. Intermediate Coat: Cor-Cote HCR FF. DFT 15.0 to 20.0 mils.
 5. Finish Coat: Cor-Cote HCR FF. DFT 15.0 to 20.0 mils.
 6. Total DFT: 34.0 to 46 mils.
 7. Finish Color: As indicated on the drawings. *Limited Color Selection*
 8. Verify resistance to stored commodities and anticipated traffic load PRIOR to installation.
- B. Type CS-___ - Floors, Severe Chemical, Abrasion, and Traffic Exposure:*
 1. System Type: Aggregate-filled epoxy novalac.
 2. Surface Preparation: SSPC-SP 13/NACE 6 with a surface profile of ICRI CSP 5 or 6.
 3. Primer: Corobond 100. DFT 4.0 to 6.0 mils.
 4. First Coats: Cor-Cote HCR Mortar, double broadcast. DFT 1/8 inch.
 5. Finish Coat: Cor-Cote HCR FF. DFT 15.0 to 20.0 mils.
 6. Total DFT: Greater than 1/8 inch (125 mils).
 7. Finish Color: As indicated on the drawings. *Limited Color Selection*
 8. Verify resistance to stored commodities and anticipated traffic load PRIOR to installation.

2.09 COATING SYSTEMS FOR POROUS CONCRETE MASONRY UNITS

- A. Type CS-___ - Interior Exposed:
 1. System Type: Cementitious Acrylic/epoxy
 2. Surface Preparation: SSPC-SP 13/NACE 6. Clean and dry.
 3. Primer: Cement Plex 875. Spreading rate 80 to 100 sq. ft/gal.
 4. Intermediate Coat: Pro-Industrial Waterborne Catalyzed Epoxy. DFT 2.0 to 4.0 mils.
 5. Finish Coat: Pro-Industrial Waterborne Catalyzed Epoxy. DFT 3.0 to 4.0 mils.
 6. Total DFT: 5.0 to 8.0 mils plus filler.
 7. Finish Color: As selected by Architect from manufacturer's standard colors.

2.10 ACCESSORIES

- A. Coating Application Accessories:
 - 1. Accessories required for application of specified coatings in accordance with manufacturer's instructions, including thinners.
 - 2. Products of coating manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions under which coating systems are to be applied. Notify Engineer of areas or conditions not acceptable. Do not begin surface preparation or application until unacceptable areas or conditions have been corrected.

3.02 PROTECTION OF SURFACES NOT SCHEDULED TO BE COATED

- A. Protect surrounding areas and surfaces not scheduled to be coated from damage during surface preparation and application of coatings.
- B. Immediately remove coatings that fall on surrounding areas and surfaces not scheduled to be coated.

3.03 SURFACE PREPARATION OF STEEL

- A. Prepare steel surfaces in accordance with manufacturer's instructions.
- B. Fabrication Defects:
 - 1. Correct steel and fabrication defects revealed by surface preparation.
 - 2. Remove weld spatter and slag.
 - 3. Round sharp edges and corners of welds to a smooth contour.
 - 4. Smooth weld undercuts and recesses.
 - 5. Grind down porous welds to pinhole-free metal.
 - 6. Remove weld flux from surface.
- C. Ensure surfaces are dry.
- D. Immersion or Below Grade Surfaces: Remove visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter in accordance with SSPC-SP 10/NACE 2. Create a surface profile as specified in Part 2 or as required by the coating manufacturer..
- E. Exterior Exposed or Interior Exposed Surfaces: Remove visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter in accordance with SSPC-SP 6/NACE 3. Create a surface profile as specified in Part 2 or as required by the coating manufacturer..
- F. Abrasive Blast-Cleaned Surfaces: Coat abrasive blast-cleaned surfaces with primer before visible rust forms on surface. Do not leave blast-cleaned surfaces uncoated for more than 8 hours.
- G. Shop Primer: Shop primed steel shall receive a field sweep blast prior to the application of subsequent coats. Prepare shop primer to receive field coat in accordance with manufacturer's instructions. Removal all unknown shop primers and re-prime in accordance with this specification.

3.04 SURFACE PREPARATION OF GALVANIZED STEEL AND NONFERROUS METAL

- A. Prepare galvanized steel and nonferrous metal surfaces in accordance with SSPC-SP16 and the coating manufacturer's instructions.
- B. Test galvanized surfaces for chromate treatments and remove as required by SSPC-SP 16, or other Engineer approved method.
- C. Ensure surfaces are dry.

3.05 SURFACE PREPARATION OF DUCTILE OR CAST IRON

- A. Prepare ductile or cast iron surfaces in accordance with NAPF 500-03-04 Abrasive Blast Cleaning with the exception that ALL rust and mold coating be removed. Only tightly adherent annealing oxide may remain. Bituminous coated pipe shall NOT be allow if field painting is required..

- B. Bituminous coated pipe shall NOT be allow if field painting is required.
- C. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.

3.06 SURFACE PREPARATION OF PVC

- A. Prepare PVC surfaces in accordance with manufacturer's instructions.
- B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.
- C. Scarify PVC surfaces.

3.07 SURFACE PREPARATION OF INSULATED PIPE

- A. Prepare insulated pipe surfaces in accordance with manufacturer's instructions.
- B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.

3.08 SURFACE PREPARATION OF CONCRETE

- A. Interior, Wet Substrate:
 - 1. Prepare concrete surfaces in accordance with manufacturer's instructions, SSPC-SP 13/NACE 6, and ICRI 310.2.
 - 2. Allow concrete to cure for a minimum of 28 days.
 - 3. Test concrete for moisture in accordance with ASTM D 4263 and, if necessary, F 1869.
 - 4. Abrasive blast surface to remove laitance and solid contaminants and to provide clean, sound substrate with uniform anchor profile.
 - 5. Verify that the pH of the cleaned concrete surfaces to be coated is within the range of to 8 to 11. Application of coating materials outside this range will not be permitted without written approval from the Engineer.
 - 6. Fill holes, pits, voids, and cracks with manufacturer approved surfer.
 - 7. Ensure surfaces are clean, dry, and free of oil, grease, chalk, form release agents, and other contaminants.
- B. Exterior and Interior Dry:
 - 1. Prepare concrete surfaces in accordance with manufacturer's instructions, SSPC-SP 13/NACE 6, and ICRI 310.2.
 - 2. Allow concrete to cure for a minimum of 28 days.
 - 3. Test concrete for moisture in accordance with ASTM D 4263 and, if necessary, F 1869.
 - 4. Level concrete protrusions and mortar spatter.
 - 5. Verify that the pH of the cleaned concrete surfaces to be coated is within the range of to 8 to 11. Application of coating materials outside this range will not be permitted without written approval from the Engineer.
 - 6. Fill hairline cracks less than 1/64 inch (0.4 mm) in accordance with manufacturer's instructions.
 - 7. Prepare cracks wider than 1/64 inch (0.4 mm), moving cracks, gaps, and expansion joints in accordance with manufacturer's instructions.
 - 8. Ensure surfaces are clean, dry, and free of oil, grease, chalk, form release agents, and other contaminants.

3.09 SURFACE PREPARATION OF CONCRETE FLOORS

- A. Prepare concrete surfaces in accordance with manufacturer's instructions, SSPC-SP 13/NACE 6, and ICRI 310.2.
- B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.
- C. Allow concrete to cure for a minimum of 28 days before coating.
- D. Test concrete for moisture in accordance with ASTM D 4263 and, if necessary, F 1869.
- E. Verify that the pH of the cleaned concrete surfaces to be coated is within the range of to 8 to 11. Application of coating materials outside this range will not be permitted without written approval from the Engineer.

3.10 SURFACE PREPARATION OF POROUS CONCRETE MASONRY UNITS

- A. Prepare porous concrete masonry unit surfaces in accordance with manufacturer's instructions and SSPC-SP 13/NACE 6.
- B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.

- C. Allow mortar to cure for a minimum of 28 days before coating.
- D. Level protrusions and mortar spatter.

3.11 APPLICATION

- A. Apply coatings in accordance with manufacturer's instructions.
- B. Mix and thin coatings, including multi-component materials, in accordance with manufacturer's instructions.
- C. Keep containers closed when not in use to avoid contamination.
- D. Do not use mixed coatings beyond pot life limits.
- E. Use application equipment, tools, pressure settings, and techniques in accordance with manufacturer's instructions.
- F. Uniformly apply coatings at spreading rate required to achieve specified DFT.
- G. Apply coatings to be free of film characteristics or defects that would adversely affect performance or appearance of coating systems.
- H. Stripe paint with brush critical locations on steel such as welds, corners, and edges using specified primer. Apply and additional strip coat of the intermediate coating material in immersion areas.
- I. Roll or backroll the first coat of epoxy or block filler applied to concrete or interior block substrates to work the material into the substrate.

3.12 REPAIR

- A. Materials and Surfaces Not Scheduled To Be Coated: Repair or replace damaged materials and surfaces not scheduled to be coated.
- B. Damaged Coatings: Touch-up or repair damaged coatings. Touch-up of minor damage shall be acceptable where result is not visibly different from adjacent surfaces. Recoat entire surface where touch-up result is visibly different, either in sheen, texture, or color.
- C. Coating Defects: Repair in accordance with manufacturer's instructions coatings that exhibit film characteristics or defects that would adversely affect performance or appearance of coating systems.

3.13 FIELD QUALITY CONTROL

- A. Required Inspections and Documentation:
 - 1. Verify coatings and other materials are as specified.
 - 2. Verify environmental conditions are as specified.
 - 3. Verify surface preparation and application are as specified.
 - 4. Verify DFT of each coat and total DFT of each coating system are as specified using wet film and dry film gauges. DFT's shall be measured in accordance with SSPC-PA2.
 - 5. Coating Defects: Check coatings for film characteristics or defects that would adversely affect performance or appearance of coating systems.
 - a. Check for holidays on interior steel immersion surfaces using holiday detector in accordance with NACE SP0188 or SSPC TU-11 using a safe blue light inspection lamps if OAP technology is used.
 - 6. Report:
 - a. Prepare inspection reports daily.
 - b. Submit written reports describing inspections made and actions taken to correct nonconforming work.
 - c. Report nonconforming work not corrected.
 - d. Submit copies of report to Engineer and Contractor.
- B. Manufacturer's Field Services: Manufacturer's representative shall provide technical assistance and guidance for surface preparation and application of coating systems.

3.14 CLEANING

- A. Remove temporary coverings and protection of surrounding areas and surfaces.

3.15 PROTECTION OF COATING SYSTEMS

- A. Protect surfaces of coating systems from damage during construction.

3.16 ONE-YEAR INSPECTION

- A. Owner will set date for one-year inspection of coating systems.
- B. Inspection shall be attended by Owner, Contractor, Engineer, and manufacturer's representative.
- C. Repair deficiencies in coating systems as determined by Engineer in accordance with manufacturer's instructions.

3.17 COLOR SCHEDULE:

- A. To facilitate identification of piping in plants and pumping stations follow the TenStates Identification with Sherwin-Williams Colors system (See attachment to this Section):

END OF SECTION

TenStates Identification with Sherwin-Williams Colors

SERVICE	SCHEDULE	SYSTEM 4000 COLOR	BANDS
<u>WATER LINES</u>			
Raw Water	Olive Green	4070 Generator Green	
Settled or Clarified Water	Aqua	4068 Alloy Aqua	
Finished or Potable Water	Dark Blue	4086 Safety Blue	
Sprinklers	Dark Red	4081 Safety Red	
Suction Line (Pump Stations)	Mid Blue	4063 Robotic Blue	
Pressure Line (Pump Stations)	Safety Blue	4086 Safety Blue	
<u>WASTE LINES</u>			
Backwash Waste	Light Brown	4003 Pallet Tan	
Sludge	Dark Brown	4009 Walnut Brown	
Sanitary Sewer or Other	Dark Gray	4025 Anchor Gray	
Sewage Effluent	Clay	4048 Mason Brick	
Raw Sludge	Brown/Black	4001 Bolt Brn	4032 Black
Sludge Recirc	Brown / Yellow	4001 Bolt Brn	4084 Safety Yellow
Sludge Draw Off	Brown/Orange	4001 Bolt Brn	4083 Safety Orange
Sludge Recirc Dischg	Brown	4001 Bolt Brown	
Sludge Gas	Orange-Red	4084 International Orange	
Natural Gas	OrangeRed/Black	4084 Intl Orange	4032 Black
NonPotable Water	Blue / Black	4086 Safety Blue	4032 Black
Potable Water	Blue	4086 Safety Blue	
Chlorine	Yellow	4084 Safety Yellow	
Sulfur Dioxide	Yellow / Red	4084 Safety Yellow	4081 Safety Red
Sewage	Gray	4026 Slate Gray	
Compressed Air	Green	4071 Rain Forest	
<u>CHEMICAL LINES</u>			
Alum or Primary Coagulant	Orange	4083 Safety Orange	
Ammonia	White	White	
Carbon Slurry	Black	Black	
Caustic	Yellow with Green	4084 Safety Yellow	4085 Safety Green
Chlorine	Yellow	4084 Safety Yellow	
Fluoride	Light Blue with Red	4061 Hydro Blue	4081 Safety Red
Lime Slurry	Light Green	4069 Emerald Ice	
Ozone	Yellow with Orange	4084 Safety Yellow	4083 Safety Orange
Phosphate Compounds	Light Green with Red	4069 Emerald Ice	4081 Safety Red
Polymers or Coagulant Aids	Orange with Green	4083 Safety Orange	4085 Safety Green
Potassium Permanganate	Violet	4080 Plumb	
Soda Ash	Light Green with Orange	4069 Emerald Ice	4083 Safety Orange
Sulfuric Acid	Yellow with Red	4084 Safety Yellow	4081 Safety Red
Sulfur Dioxide	Light Green with Yellow	4069 Emerald Ice	4084 Safety Yellow
<u>OTHER LINES</u>			
Compressed Air	Dark Green	4071 Rain Forest	
Gas	Red	4040 Deck Red	
Other Lines	Light Gray	4019 Flint Gray	
Hoists, Trolleys	Yellow	4084 Safety Yellow	
Fire Protection	Red	4081 Safety Red	
Steam	Orange	4083 Safety Orange	
Oil	Ivory	4036 Mill Ivory	

DIVISION 22: Plumbing

SECTION 22 0010

BASIC MECHANICAL PLUMBING REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Basic Mechanical Plumbing Requirements specifically applicable to Division 22 in addition to Division 1 - General Requirements.

1.02 SCOPE OF WORK

- A. The Mechanical Plumbing Contract shall also include furnishing and installing a complete plumbing system for the new building and all other related work as called for under the specifications and shown on plans.

1.03 WORK INCLUDED

- A. The Mechanical Plumbing Contract shall include all work under the listed Division 22 of the Specifications Index and all related Mechanical work as shown on the Drawings for the project.
- B. A Complete table of Mechanical Reference Symbols is shown on the plans.
- C. Under this Contract the Mechanical Contractor shall furnish the Owner with two 3-ring binders of all pertinent systems related documents. Submit manuals to the Engineer for his review. The Engineer will then turn books over to the Owner. The books shall contain the following items:
 - 1. Shop drawings on all major equipment.
 - 2. Operating Instructions for all major equipment.
 - 3. Maintenance Instructions for all major equipment.
 - 4. Wiring diagrams for all equipment.
 - 5. Test and Balance Reports.
- D. The Mechanical Contractor is responsible for contacting the utility companies and coordinating the water, sewer and natural gas connections for the building service. Include all costs in bid.
- E. The Mechanical installation to be made under Divisions 22 is set up for contract bidding as follows:
 - 1. Mechanical Plumbing Contractor is a sub-contractor to the General Contractor.
 - a. The Mechanical contractor is responsible for own equipment, such as cranes, lifts, etc. in order to provide a complete installation of mechanical systems.
 - b. The Mechanical contractor shall be a sub-contractor to the General Contractor and shall include in his bid, prices from sub-contractors for control wiring, and other trades necessary to complete the entire job.

1.04 SPECIFICATIONS COMPLIANCE

- A. The requirements of these specifications shall be complied with in every respect. Therefore, it shall be absolutely mandatory that the job foreman, all lead mechanics, subcontractors and their foreman have completely studied these specifications, be completely knowledgeable as to their entire contents, and maintain a copy at the job-site. Failure to comply with this requirement will be reason to presume the mechanic or subcontractor is not in responsible charge of his work due to ignorance of job requirements, and will be reason for the owner to require dismissal and replacement with approved personnel. Every foreman and lead mechanic shall be provided with a complete copy of this specification.

1.05 INCONSISTENCIES

- A. If there is an inconsistency in the quality and/or quantity of Work required by the Contract Documents, either the greater quality and/or quantity of Work indicated shall be provided in accordance with the Engineer/Architect's interpretation without change in the contract sum.

1.06 WORK NOT INCLUDED

- A. The following work is not included as part of the Contract.
 - 1. The removal and storage of any equipment in the building required to be moved or relocated during the construction process.

1.07 CODES, FEES AND LATERAL COSTS

- A. The Plumbing Installation shall meet all applicable local, state and federal codes and standards.

- B. All permits necessary for a complete plumbing installation shall be paid for by this Contractor.
- C. This contractor shall contact the local utilities for gas, water, sanitary and storm sewers, and include in their bid the any costs associated with service installation charges of the utility(s).
- D. Except in those municipalities which provide state- approved electrical inspection, all installation of electrical equipment wiring shall be inspected by the State Board of Electricity. Allowance shall be made in the bid and contract for the cost of such inspection.
 - 1. Fees for such inspection will be charged in accordance with the rules and regulations of the State Board of Electricity. Evidence of payment of fees shall be provided by the Contractor with his Request for Payment.

1.08 REFERENCES

- A. All equipment, piping, etc., shall be new and shall be installed to meet the approval of the following additional ordinances: ASME Rules for Pressure Tanks, National Board of Fire Underwriter's Rules, American Waterworks and the American Gas Association.

1.09 SUBMITTALS

- A. Submit under provisions of Division 01 3000.
- B. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.
- C. All documents shall be submitted in .pdf format unless pre-approved by Engineer.
- D. The contractor shall not use any equipment or materials that does not have the engineer's stamped approval.
- E. Mark dimensions and values in units to match those specified.

1.10 PROJECT/SITE CONDITIONS

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions.

1.11 SEQUENCING AND SCHEDULING

- A. Construct Work in sequence under provisions of Division 1.

1.12 PRE-CONSTRUCTION COORDINATION AND VERIFICATION

- A. This Contractor shall coordinate his work with other Contractors on this job. Any conflict which cannot be resolved shall be settled by the Architect/Engineer.
- B. Field verification of scale dimensions on plans is directed since actual locations, distances and levels will be governed by actual field conditions.
- C. The Contractors shall check architectural, structural, plumbing, heating, ventilating and electrical plans to avert possible installation conflicts. Should drastic changes from original plans be necessary to resolve such conflicts this Contractor shall notify the Architect/Engineer and secure written approval and agreement on necessary adjustments before the installation is started.
- D. Discrepancies shown on different plans or between plans and actual field conditions or between plans and specifications shall promptly be brought to the attention of the Architect/Engineer for a decision.
- E. The Contractor shall consider and review the complete set of documents, etc., Architectural, Structural, Mechanical, Electrical, etc., (Drawings and Specifications) as his complete set. He will be responsible for any and all mechanical work shown or stated (to be by him), to include this work in his bid and install such items even though they are not specifically shown or stated on the Mechanical section of the plans and specifications.

1.13 COORDINATION

- A. Contractor shall be responsible for continual coordination of the mechanical work with other trades so as to avoid conflicts in installation. Contractor shall cooperate with other trades to assure that construction proceeds in an orderly and timely manner.
- B. Study the civil, structural, electrical, shop and any specialty drawings and specifications to determine required coordination.
 - 1. Anchor bolts, sleeves, inserts and supports that may be required for the mechanical work shall be furnished and installed under the same division of the specifications as the

respective items to be supported. Excluded from this requirement are cast in place anchor bolts.

2. Slots, chases, openings and recesses through floors and walls as specified will be provided by the various trades in their respective materials, but the trade requiring them shall see that they are properly located in zones provided or otherwise approved by the Engineer or Architect and/or Owner.
 3. Locations of pipes, panels, equipment, fixtures, etc., shall be adjusted to accommodate interferences encountered. The Project Coordinator shall determine the exact rerouting and location of each pipe and/or duct encountered prior to fabrication.
 - a. Right-of-Way: Lines which pitch shall have the right of way over those which do not pitch. Lines whose elevations cannot be changed shall have the right of way over lines whose elevations can be changed.
 - b. Offsets, transitions and changes in direction in pipes shall be made as required to maintain proper head room and pitch of sloping lines whether or not indicated on the drawings.
 4. Installation of Arrangement: The contractor shall install all mechanical work to permit removal of, and access to, (without damage to other parts) all parts requiring periodic replacement or maintenance.
- C. Layout Priority:
1. All trades shall understand that other trades will need to work in the same areas during the project. All final decisions as to the right-of-way and runs of utility lines (pipes, ducts, etc.) shall be made by Owner and/or Architect. In general, priority shall be given as follows:
 - a. Process piping which must be drainable
 - b. Sheet metal ductwork
 - c. Light Fixtures
 - d. Plumbing waste lines, downspouts, and vents
 - e. Sprinkler piping
 - f. Gravity water lines
 - g. Ice water or steam lines
 - h. Refrigerant lines
 - i. Gas and air lines
 - j. Plumbing water
 - k. Electrical conduit
 - l. Control air lines
- D. PREPARE DETAILED SHOP DRAWINGS WHERE NECESSARY TO ASSURE PROPER FIT AND NECESSARY CLEARANCE.

1.14 CUTTING, PATCHING AND FIRESTOPPING

- A. The Plumbing Contractor shall set all sleeves in construction for their Work.
- B. Where cutting is required, it shall be done by the Plumbing Contractor.
- C. All patching shall be done by Plumbing Contractor.
- D. All cutting of any kind must be done with great care so as not to leave unsightly surfaces which may not be entirely concealed by plates, escutcheons, or their normal concealing construction, if such unsightly conditions occur, Plumbing Contractor will be required, at their own expense, to replace the damaged construction.
- E. This Plumbing Contractor shall provide and install firestopping materials per Section 07 8400 - Firestopping.

1.15 ACCESS PANELS REQUIRED BY TRADE

- A. Trade requiring access shall provide and install access panels where not shown or specified.
- B. The finished appearance and function will be subject to approval by the Architect/Owner.
- C. Provide panels that accommodate adjacent finishes in finished spaces.
- D. Access panels shall meet all code requirements for each location they are installed and shall be sized appropriately.

1.16 ELECTRICAL

- A. Electrical Contractor shall furnish all motor starters and motor controls and provide all wiring for motor control operation, except if specified otherwise.

1.17 ADDITIONAL ELECTRICAL COSTS

- A. If the Mechanical Contractor substitutes equipment for specified units, the mechanical contractor shall be responsible for any additional electrical installation costs for this substitution whether the other equipment was listed as equal in the specification or was approved equal after the project was in the bidding process.

1.18 GUARANTEE

- A. This Contractor shall be responsible for the proper installation and working of everything in this contract and shall guarantee to remedy free of charge any defects in workmanship and materials that may appear to give or gives rise to trouble of any kind for a period of one year from date of final substantial completion.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

3.01 NOT USED

END OF SECTION

SECTION 22 0513

COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General construction and requirements.
- B. Applications.

1.02 RELATED REQUIREMENTS

- A. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.
- B. Section 26 2913 - Enclosed Controllers.

1.03 REFERENCE STANDARDS

- A. NEMA MG 1 - Motors and Generators; 2016.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.

1.05 QUALITY ASSURANCE

- A. Conform to NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

PART 2 PRODUCTS

2.01 GENERAL CONSTRUCTION AND REQUIREMENTS

- A. Electrical Service: Refer to Section 26 0583 for required electrical characteristics.
- B. Construction:
 - 1. Open drip-proof type except where specifically noted otherwise.
 - 2. Design for continuous operation in 104 degrees F environment.
 - 3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
- C. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
- D. Wiring Terminations:
 - 1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
 - 2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

2.02 APPLICATIONS

END OF SECTION

SECTION 22 0517

SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe sleeves.
- B. Manufactured sleeve-seal systems.

1.02 REFERENCE STANDARDS

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

PART 2 PRODUCTS

2.01 PIPE SLEEVES

- A. Vertical Piping:
 - 1. Sleeve Length: 2 inch above finished floor.
 - 2. Provide sealant for watertight joint.
 - 3. Blocked Out Floor Openings: Provide 1-1/2 inch angle set in silicon adhesive around opening.
 - 4. Drilled Penetrations: Provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.
- B. Clearances:
 - 1. Provide allowance for insulated piping.
 - 2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch greater than external; pipe diameter.
 - 3. All Rated Openings: Caulked tight with fire stopping material complying with ASTM E814 in accordance with Section 07 8400 to prevent the spread of fire, smoke, and gases.

2.02 MANUFACTURED SLEEVE-SEAL SYSTEMS

- A. Modular/Mechanical Seal:
 - 1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.
 - 2. Provide watertight seal between pipe and wall/casing opening.
 - 3. Elastomer element size and material in accordance with manufacturer's recommendations.
 - 4. Glass reinforced plastic pressure end plates.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- B. Install piping to conserve building space, to not interfere with use of space and other work.
- C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- D. Provide sleeves when penetrating floors. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
- E. Manufactured Sleeve-Seal Systems:
 - 1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
 - 2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.

3. Locate piping in center of sleeve or penetration.
 4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
 5. Tighten bolting for a water-tight seal.
 6. Install in accordance with manufacturer's recommendations.
- F. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

END OF SECTION

SECTION 22 0519
METERS AND GAGES FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pressure gages and pressure gage taps.
- B. Thermometers and thermometer wells.

1.02 REFERENCE STANDARDS

- A. ASME B40.100 - Pressure Gauges and Gauge Attachments; 2013.
- B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers; 2014.
- C. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers; 2014.
- D. UL 393 - Indicating Pressure Gauges for Fire-Protection Service; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.
- C. Operation and Maintenance Data: _____.

PART 2 PRODUCTS

2.01 PRESSURE GAGES

- A. Manufacturers:
 - 1. Dwyer Instruments, Inc; _____: www.dwyer-inst.com/#sle.
 - 2. Moeller Instrument Company, Inc; _____: www.moellerinstrument.com/#sle.
 - 3. Omega Engineering, Inc; _____: www.omega.com/#sle.
 - 4. H.O. Trerice
- B. Pressure Gages: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
 - 1. Case: Steel with brass bourdon tube.
 - 2. Size: 4-1/2 inch diameter.
 - 3. Mid-Scale Accuracy: One percent.
 - 4. Scale: Psi and kPa.

2.02 PRESSURE GAGE TAPPINGS

- A. Gage Cock: Tee or lever handle, brass for maximum 150 psi.

2.03 DIAL THERMOMETERS

- A. Manufacturers:
 - 1. Dwyer Instruments, Inc; _____: www.dwyer-inst.com/#sle.
 - 2. Omega Engineering, Inc; _____: www.omega.com/#sle.
 - 3. H.O. Trerice
- B. Thermometers - Adjustable Angle: Dial type bimetallic actuated; ASTM E1; stainless steel case, adjustable angle with front recalibration, silicone fluid damping, white with black markings and black pointer, hermetically sealed lens, stainless steel stem.
 - 1. Size: 5 inch diameter dial.
 - 2. Accuracy: 1 percent.
 - 3. Calibration: Degrees F.

2.04 THERMOMETER SUPPORTS

- A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

END OF SECTION

SECTION 22 0553

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Pipe markers.

1.02 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2015.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Piping: Pipe markers.
- B. Pumps: Nameplates.
- C. Small-sized Equipment: Tags.
- D. Valves: Tags.

2.02 NAMEPLATES

- A. Manufacturers:
 - 1. Brimar Industries, Inc.: www.pipemarker.com/#sle.
 - 2. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.
 - 3. Seton Identification Products: www.seton.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: Laminated three-layer plastic with engraved letters.

2.03 TAGS

- A. Manufacturers:
 - 1. Advanced Graphic Engraving: www.advancedgraphicengraving.com.
 - 2. Brady Corporation: www.bradycorp.com.
 - 3. Brimar Industries, Inc.: www.pipemarker.com.
 - 4. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.
 - 5. Seton Identification Products: www.seton.com.
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 PIPE MARKERS

- A. Manufacturers:
 - 1. Brady Corporation: www.bradycorp.com.
 - 2. Brimar Industries, Inc: www.pipemarker.com.
 - 3. Kolbi Pipe Marker Co: www.kolbipipemarkers.com.
 - 4. MIFAB, Inc: www.mifab.com.

- 5. Seton Identification Products: www.seton.com.
- 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Comply with ASME A13.1.
- C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.
- F. Color code as follows:
 - 1. Potable, Cooling, Boiler, Feed, Other Water: Green with white letters.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- E. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 22 0719
PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 22 1005 - Plumbing Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

- A. Applicable State Plumbing Code with Amendments
- B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- C. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- D. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- E. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.
- F. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2013).
- G. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2013).
- H. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2017.
- I. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation; 2013.
- J. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2014.
- K. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2015.
- L. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2015.
- M. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.
- N. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.
- O. ASTM C585 - Standard Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing; 2010.
- P. ASTM C591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation; 2015.
- Q. ASTM C610 - Standard Specification for Molded Expanded Perlite Block and Pipe Thermal Insulation; 2011.
- R. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).
- S. ASTM C1410 - Standard Specification for Cellular Melamine Thermal and Sound-Absorbing Insulation; 2014.
- T. ASTM C1695 - Standard Specification for Fabrication of Flexible Removable and Reusable Blanket Insulation for Hot Service; 2010 (Reapproved 2015).
- U. ASTM D1056 - Standard Specification for Flexible Cellular Materials--Sponge or Expanded Rubber; 2014.
- V. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2012.

- W. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- X. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- Y. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 3 years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.
- B. Protect insulation from weather and sunlight, construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.07 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER

- A. Manufacturers:
 - 1. Johns Manville Corporation; _____: www.jm.com/#sle.
 - 2. Knauf Insulation: www.knaufinsulation.com/#sle.
 - 3. Owens Corning Corp: www.owenscorning.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
 - 1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 850 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- C. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
 - 1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 650 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- D. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- E. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- F. Vapor Barrier Lap Adhesive: Compatible with insulation.
- G. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.

- H. Fibrous Glass Fabric:
 - 1. Cloth: Untreated; 9 oz/sq yd weight.
 - 2. Blanket: 1.0 lb/cu ft density.
 - 3. Weave: 5 by 5.

2.03 CELLULAR GLASS

- A. Manufacturers:
 - 1. Pittsburgh Corning Corporation: www.foamglasinsulation.com.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- B. Insulation: ASTM C552, Type II.
 - 1. Apparent Thermal Conductivity; 'K' Value: Grade 6, 0.35 at 100 degrees F.
 - 2. Service Temperature: Up to 800 degrees F.
 - 3. Water Vapor Permeability: 0.005 perm inch.
 - 4. Water Absorption: 0.5 percent by volume, maximum.

2.04 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturer:
 - 1. Aeroflex USA, Inc: www.aeroflexusa.com.
 - 2. Armacell LLC; AP Armaflex: www.armacell.us/#sle.
 - 3. K-Flex USA LLC; Insul-Tube: www.kflexusa.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
 - 1. Minimum Service Temperature: Minus 40 degrees F.
 - 2. Maximum Service Temperature:
 - a. 1 inch and below = 220F
 - b. 1.5 and 2" = 300F
 - 3. Connection: Waterproof vapor barrier adhesive.

2.05 JACKETS

- A. PVC Plastic.
 - 1. Manufacturers:
 - a. Johns Manville Corporation: www.jm.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F.
 - b. Maximum Service Temperature: 150 degrees F.
 - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 10 mil.
 - e. Connections: Brush on welding adhesive.
 - 3. Covering Adhesive Mastic: Compatible with insulation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with North American Insulation Manufacturers Association (NAIMA) National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

1. Armaflex Fabricated Fittings: Pre-fabricated insulation elbows, tees, and fabricated covers for grooved fittings and couplings to reduce complex cutting and assembly of insulation in the field. Provides complete system integrity for thermal performance and controlling condensation drip from below-ambient systems when used as part of an Armaflex pipe insulation system. UL GREENGUARD Gold Certified for low VOC's and includes Microban® antimicrobial protection from the growth of mold and mildew in the system.
- E. Glass fiber insulated pipes conveying fluids below ambient temperature:
 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- F. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- G. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- H. Glass fiber insulated pipes conveying fluids above ambient temperature:
 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- I. Inserts and Shields:
 1. Application: Piping 1-1/2 inches diameter or larger.
 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 3. Insert Location: Between support shield and piping and under the finish jacket.
 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
 6. ArmaFix EcoLight Pipe Supports: Pipe supports with a load-bearing PET core to support and protect the insulation from crushing or damage, maintaining the thermal integrity of the system and preventing thermal bridging. Armacell insulation is located on the outer part for connection to Armacell's Armaflex insulations. Matches all wall thickness and ID dimensions of Armacell's tube insulation offerings.
- J. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 8400.
- K. Pipe exposed below 10 feet and below: Finish with PVC jacket and fitting covers.

3.03 SCHEDULES

- A. Plumbing Systems:
 1. Domestic Hot Water Supply (140°F or less):
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: 0-1.25 inch.
(a) Thickness: 1 inch.
 - 2) Pipe Size Range: 1.5 inch & UP.
(a) Thickness: 2 inch.
 - b. Cellular Glass Insulation:
 - 1) Pipe Size Range: 0-1.25 inch.
(a) Thickness: 1 inch.
 - 2) Pipe Size Range: 1.5 inch & UP.
(a) Thickness: 2 inch.
 2. Domestic Cold Water:
 - a. Flexible Elastomeric Insulation:
 - 1) Pipe Size Range: all inch.
 - 2) Thickness: 1 inch.
 3. Plumbing Vents Within 10 Feet of the Exterior:

- a. Glass Fiber Insulation:
 - 1) Pipe Size Range: 0-2.5 inch.
 - (a) Thickness: 1 inch.
 - 2) Pipe Size Range: 3 inch & UP.
 - (a) Thickness: 2 inch.
- b. Cellular Glass Insulation:
 - 1) Pipe Size Range: 0-2.5 inch.
 - (a) Thickness: 1 inch.
 - 2) Pipe Size Range: 3 inch & UP.
 - (a) Thickness: 2 inch.

END OF SECTION

SECTION 22 1005
PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe, pipe fittings, specialties, and connections for piping systems.
 - 1. Sanitary sewer.
 - 2. Domestic water.
 - 3. Natural gas
 - 4. Flanges, unions, and couplings.
 - 5. Pipe hangers and supports.
 - 6. Valves.
 - 7. Water pressure reducing valves.

1.02 RELATED REQUIREMENTS

- A. Section - Excavation.
- B. Section - Fill.
- C. Section - Trenching.
- D. Section - Disinfecting of Water Utility Distribution.
- E. Section 07 8400 - Firestopping.
- F. Section 08 3100 - Access Doors and Panels.
- G. Section 09 9113 - Exterior Painting.
- H. Section 09 9123 - Interior Painting.
- I. Section 22 0516 - Expansion Fittings and Loops for Plumbing Piping.
- J. Section 22 0719 - Plumbing Piping Insulation.
- K. Section - Expansion Fittings and Loops for Plumbing Piping.
- L. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. Applicable State Plumbing Code with Amendments
- B. ANSI Z21.22 - American National Standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems; 1999, and addenda A&B (R2004).
- C. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2016.
- D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
- E. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2013.
- F. ASME B31.1 - Power Piping; 2018.
- G. ASME B31.9 - Building Services Piping; 2014.
- H. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; 2015.
- I. ASME BPVC-IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators - Welding Brazing and Fusing Qualifications; 2019.
- J. ASSE 1003 - Performance Requirements for Water Pressure Reducing Valves for Domestic Water Distribution Systems; 2009.
- K. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- L. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2016.
- M. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- N. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2016.

- O. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2018.
- P. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2016.
- Q. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2002 (Reapproved 2010).
- R. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2014.
- S. ASTM D2846/D2846M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems; 2014.
- T. ASTM D2855 - Standard Practice for the Two-Step (Primer & Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2015.
- U. ASTM F437 - Standard Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80; 2015.
- V. ASTM F438 - Standard Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40; 2015.
- W. ASTM F439 - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80; 2013.
- X. ASTM F441/F441M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80; 2013.
- Y. ASTM F442/F442M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR); 2013.
- Z. ASTM F493 - Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings; 2014.
- AA. AWWA C550 - Protective Interior Coatings for Valves and Hydrants; 2013.
- AB. AWWA C651 - Disinfecting Water Mains; 2014.
- AC. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.
- AD. MSS SP-78 - Cast Iron Plug Valves, Flanged and Threaded Ends; 2011.
- AE. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.
- AF. NSF 61 - Drinking Water System Components - Health Effects; 2019.
- AG. NSF 372 - Drinking Water System Components - Lead Content; 2016.
- AH. ASTM F 2389-06 - Standard Specification for Pressure-rated Polypropylene (PP) Piping Systems
- AI. CSA B137.11 - Polypropylene (PP-R) Pipe and Fittings for Pressure Applications
- AJ. NSF/ANSI 14 - Plastic Piping System Components and Related Materials

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Project Record Documents: Record actual locations of valves.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Welding Materials and Procedures: Conform to ASME BPVC-IX and applicable state labor regulations.

- D. Welder Qualifications: Certified in accordance with ASME BPVC-IX.
- E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.07 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.

1.08 EXTRA MATERIALS

- A. See Section 01 6000 - Project Requirements, for additional provisions.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 SANITARY SEWER PIPING, ABOVE GRADE

- A. CPVC Pipe: ASTM D2846/D2846M, ASTM F441/F441M, or ASTM F442/F442M.
 - 1. Fittings: CPVC; ASTM D2846/D2846M, ASTM F437, ASTM F438, or ASTM F439.
 - 2. Joints: ASTM D2846/D2846M, solvent weld with ASTM F493 solvent cement.

2.03 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder.

2.04 NATURAL GAS PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
 - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
 - 2. Joints: Threaded or welded to ASME B31.1.
- B. Copper Tube: ASTM B88 (ASTM B88M), Type K (A) or L (B) annealed.
 - 1. Fittings: ASME B16.26, cast bronze.
 - 2. Joints: Flared.

2.05 FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 Inches and Under:
 - 1. Ferrous pipe: Class 150 malleable iron threaded unions.
 - 2. Copper tube and pipe: Class 150 bronze unions with soldered joints.
- B. Flanges for Pipe Size Over 1 Inch:
 - 1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
 - 2. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.06 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 - 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.

3. Trapeze Hangers: Welded steel channel frames attached to structure.
 4. Vertical Pipe Support: Steel riser clamp.
- B. Plumbing Piping - Drain, Waste, and Vent:
1. Conform to ASME B31.9.
 2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
 3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
 7. Vertical Support: Steel riser clamp.
 8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- C. Plumbing Piping - Water:
1. Conform to ASME B31.9.
 2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
 3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 4. Hangers for Hot Pipe Sizes 2 Inches to 4 Inches: Carbon steel, adjustable, clevis.
 5. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron pipe roll, double hanger.
 6. Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.
 7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded supports or spacers and hanger rods, cast iron roll.
 8. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 9. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
 10. Wall Support for Hot Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron pipe roll.
 11. Vertical Support: Steel riser clamp.
 12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 13. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
 14. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron pipe roll and stand, steel screws, and concrete pier or steel support.
 15. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.07 BALL VALVES

- A. Manufacturers:
1. Apollo Valves: www.apollovalves.com/#sle.
 2. Grinnell Products, a Tyco Business: www.grinnell.com.
 3. Conbraco Industries: www.apollovalves.com.
 4. Milwaukee Valve Company: www.milwaukeevalve.com.
 5. Nibco, Inc: www.nibco.com.
 6. Uponor, Inc: www.uponorengineering.com/sle.
 7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded or grooved ends with union.

2.08 PLUG VALVES

- A. Construction 2-1/2 Inches and Larger: MSS SP-78, 175 psi CWP, cast iron body and plug, pressure lubricated, Teflon or Buna N packing, flanged or grooved ends. Provide lever operator with set screw.
- B. Construction 2-1/2 Inches and Larger: MSS SP-78, 175 psi CWP, cast iron body and plug, pressure lubricated, Teflon or Buna N packing, flanged or grooved ends. Provide lever operator with set screw.

2.09 SPRING CHECK VALVES

- A. Manufacturers:
 - 1. Grinnell Products, a Tyco Business: www.grinnell.com.
 - 2. Conbraco Industries: www.apollovalves.com.
 - 3. Milwaukee Valve Company: www.milwaukeevalve.com.
 - 4. Nibco, Inc: www.nibco.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Construction, 2 inches and smaller: MSS SP-80, ANSI 372 certified, 300 psig WOG, bronze body and disc, stainless steel lever and pin with threaded connections.
- C. Construction, 2.5 inches and greater: MSS SP-71, contains less than 0.25% of lead by weight, 125 psi SWP, 3% nickel/iron body, stainless steel trim and flanged connections.

2.10 WATER PRESSURE REDUCING VALVES

- A. Manufacturers:
 - 1. Amtrol Inc: www.amtrol.com/#sle.
 - 2. Watts Regulator Company: www.wattsregulator.com/#sle.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.
- B. Up to 2 Inches:
 - 1. ASSE 1003, bronze body, stainless steel, and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded single union ends.
- C. Over 2 Inches:
 - 1. ASSE 1003, cast iron body with interior lining complying with AWWA C550, bronze fitted, elastomeric diaphragm and seat disc, flanged.

2.11 RELIEF VALVES

- A. Temperature and Pressure Relief:
 - 1. Manufacturers:
 - a. Cla-Val Co: www.cla-val.com.
 - b. Henry Technologies: www.henrytech.com.
 - c. Watts Regulator Company: www.wattsregulator.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME BPVC-IV certified and labeled.
- B. Temperature and Pressure:
 - 1. ANSI Z21.22, AGA certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME BPVC-IV certified and labelled.

2.12 STRAINERS

- A. Manufacturers:
 - 1. Armstrong International, Inc: www.armstronginternational.com.
 - 2. Green Country Filter Manufacturing: www.greencountryfilter.com.
 - 3. WEAMCO: www.weamco.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Size 2 inch and Under:
 - 1. Threaded brass body for 175 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.

2. Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
- C. Size 1-1/2 inch to 4 inch:
 1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 22 0516.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- H. Provide access where valves and fittings are not exposed.
 1. Coordinate size and location of access doors with Section 08 3100.
- I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- J. Provide support for utility meters in accordance with requirements of utility companies.
- K. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.
 1. Painting of interior plumbing systems and components is specified in Section 09 9123.
 2. Painting of exterior plumbing systems and components is specified in Section 09 9113.
 3. All metals that are not resistant to corrosion shall be painted per section 9000.
- L. Pipe vents from gas pressure reducing valves to outdoors.
- M. Install water piping to ASME B31.9.
- N. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- O. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- P. Inserts:
 1. Provide inserts for placement in concrete formwork.
 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- Q. Pipe Hangers and Supports:
 1. Install in accordance with ASME B31.9.
 2. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

3. Place hangers within 12 inches of each horizontal elbow.
4. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
5. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
7. Provide copper plated hangers and supports for copper piping.
8. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

3.04 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- C. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Provide spring loaded check valves on discharge of water pumps.
- E. Provide plug valves in natural gas systems for shut-off service.

3.05 TOLERANCES

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.
- B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Disinfect water distribution system in accordance with Section 33 0110.58.
- B. Prior to starting work, verify system is complete, flushed and clean.
- C. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- D. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- F. Maintain disinfectant in system for 24 hours.
- G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- I. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.07 SCHEDULES

- A. Pipe Hanger Spacing:

**TABLE 313.1
HANGERS AND SUPPORTS**

MATERIALS	TYPES OF JOINTS	HORIZONTAL	VERTICAL
Cast	Lead and Oakum	5 feet, except 10 feet where 10 foot lengths are installed ^{1, 2, 3}	Base and each floor, not to exceed 15 feet
	Compression Gasket	Every other joint, unless over 4 feet then support each joint ^{1, 2, 3}	Base and each floor, not to exceed 15 feet
Cast-Iron Hubless	Shielded Coupling	Every other joint, unless over 4 feet then support each joint ^{1, 2, 3, 4}	Base and each floor, not to exceed 15 feet
Copper Tube and Pipe	Soldered or Brazed	1½ inches and smaller, 6 feet; 2 inches and larger, 10 feet	Each floor, not to exceed 10 feet ⁵
Steel and Brass Pipe for Water or DWV	Threaded or Welded	¾ inch and smaller, 10 feet; 1 inch and larger, 12 feet	Every other floor, not to exceed 25 feet ⁵
Steel, Brass, and Tinned Copper Pipe for Gas	Threaded or Welded	½ inch, 6 feet; ¾ inch and 1 inch, 8 feet; 1¼ inches and larger, 10 feet	½ inch, 6 feet; ¾ inch and 1 inch, 8 feet; 1¼ inches every floor level
Schedule 40 PVC and ABS DWV	Solvent Cemented	All sizes, 4 feet; allow for expansion every 30 feet ^{3, 6}	Base and each floor; provide mid-story guides; provide for expansion every 30 feet ⁶
CPVC	Solvent Cemented	1 inch and smaller, 3 feet; 1¼ inches and larger, 4 feet	Base and each floor; provide mid-story guides ⁶
Lead	Wiped or Burned	Continuous Support	Not to exceed 4 feet
Copper	Mechanical	In accordance with standards acceptable to the Authority Having Jurisdiction	
Steel and Brass	Mechanical	In accordance with standards acceptable to the Authority Having Jurisdiction	
PEX	Cold Expansion, Insert and Compression	1 inch and smaller, 32 inches; 1¼ inches and larger, 4 feet	Base and each floor; provide mid-story guides
PEX-AL-PEX	Metal Insert and Metal Compression	½ inch } ¾ inch } All sizes 98 inches 1 inch }	Base and each floor; provide mid-story guides
PE-AL-PE	Metal Insert and Metal Compression	½ inch } ¾ inch } All sizes 98 inches 1 inch }	Base and each floor; provide mid-story guides
Polypropylene (PP)	Fusion weld (socket, butt, saddle, electrofusion), threaded (metal threads only), or mechanical	1 inch and smaller, 32 inches; 1¼ inches and larger, 4 feet	Base and each floor; provide mid-story guides

For SI units: 1 inch = 25.4 mm, 1 foot = 304.8 mm

Notes:

¹ Support adjacent to joint, not to exceed 18 inches (457 mm).

² Brace not to exceed 40 foot (12 192 mm) intervals to prevent horizontal movement.

³ Support at each horizontal branch connection.

⁴ Hangers shall not be placed on the coupling.

⁵ Vertical water lines shall be permitted to be supported in accordance with recognized engineering principles with regard to expansion and contraction, where first approved by the Authority Having Jurisdiction.

⁶ See the appropriate IAPMO Installation Standard for expansion and other special requirements.

END OF SECTION

SECTION 22 1006
PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Drains.
- B. Back water valves.

1.02 RELATED REQUIREMENTS

- A. Section 22 1005 - Plumbing Piping.
- B. Section 22 3000 - Plumbing Equipment.
- C. Section 22 4000 - Plumbing Fixtures.
- D. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. Applicable State Plumbing Code with Amendments
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. ASME A112.6.3 - Floor and Trench Drains; 2001 (R2007).
- D. ASME A112.6.4 - Roof, Deck, and Balcony Drains; 2008 (Reaffirmed 2012).
- E. ASSE 1011 - Hose Connection Vacuum Breakers; 2004.
- F. ASSE 1012 - Backflow Preventer with Intermediate Atmospheric Vent; 2009.
- G. ASSE 1013 - Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers; 2011.
- H. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance; 2011.
- I. NSF 61 - Drinking Water System Components - Health Effects; 2019.
- J. NSF 372 - Drinking Water System Components - Lead Content; 2016.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.
- D. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.
- E. Operation Data: Indicate frequency of treatment required for interceptors.
- F. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.02 DRAINS

- A. Manufacturers:
 - 1. Jay R. Smith Manufacturing Company: www.jayrsmith.com.
 - 2. Josam Company: www.josam.com.
 - 3. Zurn Industries, LLC: www.zurn.com.

4. Watts Regulator Company: www.watts.com
 5. Wade.
- B. Floor Drain:
1. ASME A112.6.3; _____ stainless steel grate, two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer.

2.03 BACK WATER VALVES

- A. Manufacturers:
1. Jay R. Smith Manufacturing Company; _____: www.jayrsmith.com/#sle.
 2. Zurn Industries, LLC; _____: www.zurn.com/#sle.
- B. Cast Iron Back Water Valves: ASME A112.6.4; lacquered cast iron body and cover, brass valve, .

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.
- C. Pipe relief from backflow preventer to nearest drain.

END OF SECTION

SECTION 22 3000
PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sewage ejectors.
- B. Submersible sump pumps.
- C. Sanitary Sewage Pumps:
 - 1. Centrifugal solids handling.

1.02 RELATED REQUIREMENTS

- A. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. Applicable State Plumbing Code with Amendments
- B. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings; 2015.
- C. ABMA STD 11 - Load Ratings and Fatigue Life for Roller Bearings; 2014.
- D. ANSI Z21.10.1 - Gas Water Heaters - Volume I - Storage Water Heaters with Input Ratings of 75,000 Btu per Hour or Less; 2014.
- E. ANSI Z21.10.3 - Gas-Fired Water Heaters - Volume III - Storage Water Heaters with Input Ratings Above 75,000 Btu per Hour, Circulating and Instantaneous; 2016.
- F. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; 2015.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittals procedures.
- B. Product Data:
 - 1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
 - 2. Indicate pump type, capacity, power requirements.
 - 3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
- C. Shop Drawings:
- D. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.
- E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.
- C. Performance: Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for sump pumps.

PART 2 PRODUCTS

2.01 SEWAGE EJECTORS

- A. Manufacturers:
 - 1. Armstrong Fluid Technology: www.armstrongfluidtechnology.com.
 - 2. Weil.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.
- B. Type: Vertical centrifugal, direct connected, duplex arrangement.
- C. Casing: Cast iron volute with radial clearance around impeller, inlet strainer, slide away couplings.
- D. Impeller: stainless steel; open non-clog, keyed to stainless steel shaft.
- E. Support: Cast iron pedestal motor support on steel floor plate with gas tight gaskets.
- F. Bearings: Forced grease lubricated bronze sleeve spaced maximum 48 inches and grease lubricated ball thrust at floor plate.
- G. Drive: Flexible coupling to vertical, solid shaft ball bearing electric motor.
- H. Sump: Steel cover plate with steel curb frame for grouting into concrete sump with inspection opening and cover, and alarm fittings.
- I. Controls (Duplex): Float operated mechanical alternator with float rod, stops, and corrosion resistant float to alternate operation of pumps, cut-in second pump on rising level or lead pump failure, separate pressure switch high level alarm with transformer, alarm bell, and standpipe and emergency float switch with float rod, stops, and corrosion resistant float to operate both pumps on failure of alternator.
- J. Sump and pump packaged unit shall include:
 - 1. Single submersible grinder pump: Flygt model MP3068HT with 42 gpm, 59 head, 218 impeller. Motor shall be 2.3 HP, 460 V, 3PH. Duosolid Epoxy coating both internal and external.
 - 2. Control Panel shall be Flygt custom panel, NEMA 4X, 304SS, with off level, med level, and high alarm light, Hand-Off-Auto control.

2.02 SUBMERSIBLE SUMP PUMPS

- A. Manufacturers:
 - 1. Armstrong Fluid Technology; _____: www.armstrongfluidtechnology.com/#sle.
 - 2. Weil.
- B. Type: Completely submersible, vertical, centrifugal.
- C. Casing: Cast iron pump body and oil filled motor chamber.
- D. Impeller: Cast iron; open non-clog, stainless steel shaft.
- E. Bearings: Ball bearings.
- F. Sump: Fiberglass basin with steel cover plate; _____ inches diameter, _____ inches deep.
- G. Accessories: Oil resistant 6 foot cord and plug with three-prong connector for connection to electric wiring system including grounding connector.
- H. Servicing: Slide-away coupling consisting of discharge elbow secure to sump floor, movable bracket, guide pipe system, lifting chain and chain hooks.
- I. Controls: Integral diaphragm type level controls with separate liquid level control high level alarm.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.
- B. Pumps:
 - 1. Ensure shaft length allows sump pumps to be located minimum 24 inches below lowest invert into sump pit and minimum 6 inches clearance from bottom of sump pit.

2. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.
3. Align and verify alignment of base mounted pumps prior to start-up

3.02 SCHEDULES: SEE PLANS.

END OF SECTION

DIVISION 23: Heating, Ventilation, and Air-Conditioning (HVAC)

SECTION 23 0010
BASIC MECHANICAL HVAC REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Basic Mechanical HVAC Requirements specifically applicable to Division 23 in addition to Division 1 - General Requirements.

1.02 SCOPE OF WORK

- A. The Mechanical HVAC Contract shall also include furnishing and installing a complete heating, ventilating and air conditioning system for the new building and all other related work as called for under the specifications and shown on plans.

1.03 WORK INCLUDED

- A. The Mechanical HVAC Contract shall include all work under the listed Division 23 of the Specifications Index and all related Mechanical work as shown on the Drawings for the project.
- B. A Complete table of Mechanical Reference Symbols is shown on the plans.
- C. Under this Contract the Mechanical Contractor shall furnish the Owner with two 3-ring binders of all pertinent systems related documents. Submit manuals to the Engineer for his review. The Engineer will then turn books over to the Owner. The books shall contain the following items:
 - 1. Shop drawings on all major equipment.
 - 2. Operating Instructions for all major equipment.
 - 3. Maintenance Instructions for all major equipment.
 - 4. Wiring diagrams for all equipment.
 - 5. Test and Balance Reports.
 - 6. The Mechanical installation to be made under Division 23 is set up for contract bidding as follows:
 - a. Mechanical HVAC Contractor is a sub-contractor to the General Contractor.
 - 1) The Mechanical contractor is responsible for own equipment, such as cranes, lifts, etc. in order to provide a complete installation of mechanical systems.
 - 2) The Mechanical contractor shall be a sub-contractor to the General Contractor and shall include in his bid, prices from sub-contractors for control wiring, and other trades necessary to complete the entire job.

1.04 SPECIFICATIONS COMPLIANCE

- A. The requirements of these specifications shall be complied with in every respect. Therefore, it shall be absolutely mandatory that the job foreman, all lead mechanics, subcontractors and their foreman have completely studied these specifications, be completely knowledgeable as to their entire contents, and maintain a copy at the job-site. Failure to comply with this requirement will be reason to presume the mechanic or subcontractor is not in responsible charge of his work due to ignorance of job requirements, and will be reason for the owner to require dismissal and replacement with approved personnel. Every foreman and lead mechanic shall be provided with a complete copy of this specification.

1.05 INCONSISTENCIES

- A. If there is an inconsistency in the quality and/or quantity of Work required by the Contract Documents, either the greater quality and/or quantity of Work indicated shall be provided in accordance with the Engineer/Architect's interpretation without change in the contract sum.

1.06 WORK NOT INCLUDED

- A. The following work is not included as part of the Contract.
 - 1. The removal and storage of any equipment in the building required to be moved or relocated during the construction process.

1.07 CODES, FEES AND LATERAL COSTS

- A. The Heating, Ventilation and Air Conditioning Installation shall meet all applicable local, state and federal codes and standards.
- B. All permits necessary for a complete heating and ventilation installation shall be paid for by this Contractor.

- C. Except in those municipalities which provide state- approved electrical inspection, all installation of electrical equipment wiring shall be inspected by the State Board of Electricity. Allowance shall be made in the bid and contract for the cost of such inspection.
 - 1. Fees for such inspection will be charged in accordance with the rules and regulations of the State Board of Electricity. Evidence of payment of fees shall be provided by the Contractor with his Request for Payment.

1.08 REFERENCES

- A. All equipment, piping, etc., shall be new and shall be installed to meet the approval of the following additional ordinances: ASME Rules for Pressure Tanks, National Board of Fire Underwriter's Rules, American Waterworks and the American Gas Association.

1.09 SUBMITTALS

- A. Submit under provisions of Division 01 3000.
- B. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.
- C. All documents shall be submitted in .pdf format unless pre-approved by Engineer. The contractor shall not use any equipment or materials that does not have the engineer's stamped approval.
- D. Mark dimensions and values in units to match those specified.

1.10 PROJECT/SITE CONDITIONS

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions.

1.11 SEQUENCING AND SCHEDULING

- A. Construct Work in sequence under provisions of Division 1.

1.12 PRE-CONSTRUCTION COORDINATION AND VERIFICATION

- A. This Contractor shall coordinate his work with other Contractors on this job. Any conflict which cannot be resolved shall be settled by the Architect/Engineer.
- B. Field verification of scale dimensions on plans is directed since actual locations, distances and levels will be governed by actual field conditions.
- C. The Contractors shall check architectural, structural, plumbing, heating, ventilating and electrical plans to avert possible installation conflicts. Should drastic changes from original plans be necessary to resolve such conflicts this Contractor shall notify the Architect/Engineer and secure written approval and agreement on necessary adjustments before the installation is started.
- D. Discrepancies shown on different plans or between plans and actual field conditions or between plans and specifications shall promptly be brought to the attention of the Architect/Engineer for a decision.
- E. The Contractor shall consider and review the complete set of documents, etc., Architectural, Structural, Mechanical, Electrical, etc., (Drawings and Specifications) as his complete set. He will be responsible for any and all mechanical work shown or stated (to be by him), to include this work in his bid and install such items even though they are not specifically shown or stated on the Mechanical section of the plans and specifications.

1.13 COORDINATION

- A. Contractor shall be responsible for continual coordination of the mechanical work with other trades so as to avoid conflicts in installation. Contractor shall cooperate with other trades to assure that construction proceeds in an orderly and timely manner.
- B. Study the civil, structural, electrical, shop and any specialty drawings and specifications to determine required coordination.
 - 1. Anchor bolts, sleeves, inserts and supports that may be required for the mechanical work shall be furnished and installed under the same division of the specifications as the respective items to be supported. Excluded from this requirement are cast in place anchor bolts.
 - 2. Slots, chases, openings and recesses through floors and walls as specified will be provided by the various trades in their respective materials, but the trade requiring them

- shall see that they are properly located in zones provided or otherwise approved by the Engineer or Architect and/or Owner.
3. Locations of pipes, panels, equipment, fixtures, etc., shall be adjusted to accommodate interferences encountered. The Project Coordinator shall determine the exact rerouting and location of each pipe and/or duct encountered prior to fabrication.
 - a. Right-of-Way: Lines which pitch shall have the right of way over those which do not pitch. Lines whose elevations cannot be changed shall have the right of way over lines whose elevations can be changed.
 - b. Offsets, transitions and changes in direction in pipes shall be made as required to maintain proper head room and pitch of sloping lines whether or not indicated on the drawings.
 4. Installation of Arrangement: The contractor shall install all mechanical work to permit removal of, and access to, (without damage to other parts) all parts requiring periodic replacement or maintenance.
- C. Layout Priority:
1. All trades shall understand that other trades will need to work in the same areas during the project. All final decisions as to the right-of-way and runs of utility lines (pipes, ducts, etc.) shall be made by Owner and/or Architect. In general, priority shall be given as follows:
 - a. Process piping which must be drainable
 - b. Sheet metal ductwork
 - c. Light Fixtures
 - d. Plumbing waste lines, downspouts, and vents
 - e. Sprinkler piping
 - f. Gravity water lines
 - g. Ice water or steam lines
 - h. Refrigerant lines
 - i. Gas and air lines
 - j. Plumbing water
 - k. Electrical conduit
 - l. Control air lines
- D. PREPARE DETAILED SHOP DRAWINGS WHERE NECESSARY TO ASSURE PROPER FIT AND NECESSARY CLEARANCE.

1.14 CUTTING, PATCHING, AND FIRESTOPPING

- A. The Mechanical Contractor shall set all sleeves in construction for their Work.
- B. Where cutting is required, it shall be done by the Mechanical Contractor.
- C. All patching shall be done by Mechanical Contractor.
- D. All cutting of any kind must be done with great care so as not to leave unsightly surfaces which may not be entirely concealed by plates, escutcheons, or their normal concealing construction, if such unsightly conditions occur, Mechanical Contractor will be required, at their own expense, to replace the damaged construction.
- E. This Mechanical Contractor shall provide and install firestopping materials per Section 07 8400 - Firestopping.

1.15 ACCESS PANELS REQUIRED BY TRADE

- A. Trade requiring access shall provide and install access panels where not shown or specified.
- B. The finished appearance and function will be subject to approval by the Architect/Owner.
- C. Provide panels that accommodate adjacent finishes in finished spaces.
- D. Access panels shall meet all code requirements for each location they are installed and shall be sized appropriately.

1.16 ELECTRICAL

- A. Electrical Contractor shall furnish all motor starters and motor controls and provide all wiring for motor control operation, except if specified otherwise.

1.17 ADDITIONAL ELECTRICAL COSTS

- A. If the Mechanical Contractor substitutes equipment for specified units, the mechanical contractor shall be responsible for any additional electrical installation costs for this substitution whether the other equipment was listed as equal in the specification or was approved equal after the project was in the bidding process.

1.18 GUARANTEE

- A. This Contractor shall be responsible for the proper installation and working of everything in this contract and shall guarantee to remedy free of charge any defects in workmanship and materials that may appear to give or gives rise to trouble of any kind for a period of one year from date of final substantial completion.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

3.01 NOT USED

END OF SECTION

SECTION 23 0513

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General construction and requirements.
- B. Applications.
- C. Single phase electric motors.
- D. Three phase electric motors.

1.02 RELATED REQUIREMENTS

- A. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.
- B. Section 26 2913 - Enclosed Controllers.

1.03 REFERENCE STANDARDS

- A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings; 2015.
- B. IEEE 112 - IEEE Standard Test Procedure for Polyphase Induction Motors and Generators; 2004.
- C. NEMA MG 1 - Motors and Generators; 2016.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.
- C. Test Reports: Indicate test results verifying nominal efficiency and power factor for three phase motors larger than 1/2 horsepower.
- D. Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.
- E. Operation Data: Include instructions for safe operating procedures.
- F. Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.05 QUALITY ASSURANCE

- A. Conform to NFPA 70.
- B. Provide certificate of compliance from Authority Having Jurisdiction indicating approval of high efficiency motors.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Regal-Beloit Corporation (Century): www.centuryelectricmotor.com.
- B. Substitutions: See Section 01 6000 - Product Requirements.

2.02 GENERAL CONSTRUCTION AND REQUIREMENTS

- A. Electrical Service: Refer to Section 26 0583 for required electrical characteristics.
- B. Construction:
 - 1. Open drip-proof type except where specifically noted otherwise.

2. Design for continuous operation in 104 degrees F environment.
 3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
- C. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
- D. Wiring Terminations:
1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
 2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

2.03 APPLICATIONS

- A. Exception: Motors less than 250 watts, for intermittent service may be the equipment manufacturer's standard and need not conform to these specifications.
- B. Single phase motors for shaft mounted fans, oil burners, and centrifugal pumps: Split phase type.
- C. Single phase motors for shaft mounted fans or blowers: Permanent split capacitor type.
- D. Single phase motors for fans, pumps, blowers, and air compressors: Capacitor start type.
- E. Single phase motors for fans, blowers, and pumps: Capacitor start, capacitor run type.
- F. Motors located in exterior locations, wet air streams downstream of sprayed coil dehumidifiers, draw through cooling towers, air cooled condensers, humidifiers, direct drive axial fans, roll filters, explosion proof environments, and dust collection systems: Totally enclosed type.
- G. Motors located in outdoors, in wet air streams downstream of sprayed coil dehumidifiers, in draw through cooling towers, and in humidifiers: Totally enclosed weatherproof epoxy-treated type.
- H. Motors located outdoors and in draw through cooling towers: Totally enclosed weatherproof epoxy-sealed type.

2.04 SINGLE PHASE POWER - SPLIT PHASE MOTORS

- A. Starting Torque: Less than 150 percent of full load torque.
- B. Starting Current: Up to seven times full load current.
- C. Breakdown Torque: Approximately 200 percent of full load torque.

2.05 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

- A. Starting Torque: Exceeding one fourth of full load torque.
- B. Starting Current: Up to six times full load current.
- C. Multiple Speed: Through tapped windings.
- D. Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.

2.06 SINGLE PHASE POWER - CAPACITOR START MOTORS

- A. Starting Torque: Three times full load torque.
- B. Starting Current: Less than five times full load current.
- C. Pull-up Torque: Up to 350 percent of full load torque.
- D. Breakdown Torque: Approximately 250 percent of full load torque.

2.07 THREE PHASE POWER - SQUIRREL CAGE MOTORS

- A. Starting Torque: Between 1 and 1-1/2 times full load torque.
- B. Starting Current: Six times full load current.
- C. Power Output, Locked Rotor Torque, Breakdown or Pull Out Torque: NEMA Design B characteristics.

- D. Design, Construction, Testing, and Performance: Conform to NEMA MG 1 for Design B motors.
- E. Insulation System: NEMA Class B or better.
- F. Testing Procedure: In accordance with IEEE 112. Load test motors to determine free from electrical or mechanical defects in compliance with performance data.
- G. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.
- H. Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors embedded in motor windings and epoxy encapsulated solid state control relay for wiring into motor starter; refer to Section 26 2913.
- I. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA STD 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
- J. Sound Power Levels: To NEMA MG 1.
- K. Part Winding Start Where Indicated: Use part of winding to reduce locked rotor starting current to approximately 60 percent of full winding locked rotor current while providing approximately 50 percent of full winding locked rotor torque.
- L. Weatherproof Epoxy Sealed Motors: Epoxy seal windings using vacuum and pressure with rotor and starter surfaces protected with epoxy enamel; bearings double shielded with waterproof non-washing grease.
- M. Nominal Efficiency: As indicated at full load and rated voltage when tested in accordance with IEEE 112.
- N. Nominal Power Factor: As indicated at full load and rated voltage when tested in accordance with IEEE 112.

END OF SECTION

SECTION 23 0516

EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flexible pipe connectors.
- B. Expansion joints and compensators.
- C. Pipe loops, offsets, and swing joints.

1.02 RELATED REQUIREMENTS

- A. Section 23 2113 - Hydronic Piping.
- B. Section 23 2300 - Refrigerant Piping.

1.03 REFERENCE STANDARDS

- A. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015a (Reapproved 2019).
- B. EJMA (STDS) - EJMA Standards; Tenth Edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data:
 - 1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
 - 2. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.
- C. Design Data: Indicate selection calculations.
- D. Manufacturer's Instructions: Indicate manufacturer's installation instructions, special procedures, and external controls.
- E. Project Record Documents: Record installed locations of flexible pipe connectors, expansion joints, anchors, and guides.
- F. Maintenance Data: Include adjustment instructions.

PART 2 PRODUCTS

2.01 FLEXIBLE PIPE CONNECTORS - STEEL PIPING

- A. Manufacturers:
 - 1. Mercer Rubber Company: www.mercer-rubber.com.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- B. Inner Hose: Stainless Steel.
- C. Exterior Sleeve: Single braided, stainless steel.
- D. Pressure Rating: 200 psi and 250 degrees F.
- E. Joint: Flanged.
- F. Size: Use pipe sized units.
- G. Maximum offset: 3/4 inch on each side of installed center line.

2.02 FLEXIBLE PIPE CONNECTORS - COPPER PIPING

- A. Manufacturer:
 - 1. Mercer Rubber Company: www.mercer-rubber.com.
 - 2. The Metraflex Company: www.metraflex.com/#sle.
 - 3. Minnesota Flexible
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Inner Hose: Bronze.
- C. Exterior Sleeve: Braided bronze.

- D. Pressure Rating: 125 psi and 450 degrees F.
- E. Joint: Flanged.
- F. Size: Use pipe sized units.
- G. Maximum offset: 3/4 inch on each side of installed center line.
- H. Application: Copper piping.

2.03 EXPANSION JOINTS - STAINLESS STEEL BELLOWS TYPE

- A. Pressure Rating: 125 psi and 400 degrees F.
- B. Maximum Compression: 1-3/4 inches.
- C. Size: Use pipe sized units.
- D. Application: Steel piping 3 inches and under.

2.04 EXPANSION JOINTS - EXTERNAL RING CONTROLLED STAINLESS STEEL BELLOWS TYPE

- A. Pressure Rating: 125 psi and 400 degrees F.
- B. Maximum Compression: 15/16 inch.
- C. Maximum Extension: 5/16 inch.
- D. Maximum Offset: 1/8 inch.
- E. Size: Use pipe sized units.
- F. Accessories: Internal flow liner.
- G. Application: Steel piping over 2 inches.

2.05 EXPANSION JOINTS - SINGLE SPHERE, FLEXIBLE COMPENSATOR

- A. Pressure Rating, Sizes 3/4 Inch to 2 Inch: 150 psi and 210 degrees F.
- B. Pressure Rating, Sizes 1-1/2 Inch to 12 Inch: 150 psi and 250 degrees F.
- C. Pressure Rating, Sizes 14 Inch to 24 Inch: 105 psi and 250 degrees F.
- D. Maximum Compression: 1/2 inch.
- E. Maximum Elongation: 3/8 inch.
- F. Maximum Offset: 3/8 inch.
- G. Maximum Angular Movement: 15 degrees.
- H. Joint: Tapped steel flanges.
- I. Size: Use pipe sized units.
- J. Accessories: Control cables.

2.06 EXPANSION JOINTS - TWO-PLY BRONZE BELLOWS TYPE

- A. Construction: Bronze with anti-torque device, limit stops, internal guides.
- B. Pressure Rating: 125 psi and 400 degrees F.
- C. Maximum Compression: 1-3/4 inches.
- D. Maximum Extension: 1/4 inch.
- E. Size: Use pipe sized units.
- F. Application: Copper piping.

2.07 EXPANSION JOINTS - LOW PRESSURE COMPENSATOR WITH TWO-PLY BRONZE BELLOWS

- A. Working Pressure: 75 psi.
- B. Maximum Temperatures: 250 degrees F.
- C. Maximum Extension: 5/32 inch.
- D. Size: Use pipe sized units.
- E. Application: Copper or steel piping 3 inches and under.

2.08 EXPANSION JOINTS - STEEL WITH PACKED SLIDING SLEEVE

- A. Working Pressure and Temperature: Class 150.
- B. Size: Use pipe sized units.
- C. Application: Steel piping 2 inches and over.

2.09 EXPANSION JOINTS - COPPER WITH PACKED SLIDING SLEEVE

- A. Working Pressure: 125 psi.
- B. Maximum Temperature: 250 degrees F.
- C. Size: Use pipe sized units.
- D. Application: Copper or steel piping 2 inches and over.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with EJMA (Expansion Joint Manufacturers Association) Standards.
- C. Install flexible pipe connectors on pipes connected to vibration isolated equipment. Provide line size flexible connectors.
- D. Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end. Install in horizontal plane unless indicated otherwise.
- E. Anchor pipe to building structure where indicated. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.
- F. Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required.
- G. Substitute grooved piping for vibration isolated equipment instead of flexible connectors. Grooved piping need not be anchored.

END OF SECTION

SECTION 23 0519
METERS AND GAGES FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pressure gages and pressure gage taps.
- B. Thermometers and thermometer wells.
- C. Static pressure gages.
- D. Filter gages.

1.02 RELATED REQUIREMENTS

- A. Section 23 0923 - Direct-Digital Control System for HVAC.
- B. Section 23 0993 - Sequence of Operations for HVAC Controls.
- C. Section 23 2113 - Hydronic Piping.

1.03 REFERENCE STANDARDS

- A. ASME B40.100 - Pressure Gauges and Gauge Attachments; 2013.
- B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers; 2014.
- C. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers; 2014.
- D. UL 393 - Indicating Pressure Gauges for Fire-Protection Service; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.
- C. Project Record Documents: Record actual locations of components and instrumentation.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.

1.05 FIELD CONDITIONS

- A. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports and test plugs.

PART 2 PRODUCTS

2.01 PRESSURE GAGES

- A. Manufacturers:
 - 1. Dwyer Instruments, Inc: www.dwyer-inst.com.
 - 2. Moeller Instrument Company, Inc: www.moellerinstrument.com.
 - 3. Omega Engineering, Inc: www.omega.com.
 - 4. Weiss
 - 5. H.O. Trerice
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Pressure Gages: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
 - 1. Case: Steel with brass bourdon tube.
 - 2. Size: 4-1/2 inch diameter.
 - 3. Mid-Scale Accuracy: One percent.
 - 4. Scale: Psi and KPa.

2.02 PRESSURE GAGE TAPPINGS

- A. Gage Cock: Tee or lever handle, brass for maximum 150 psi.
- B. Needle Valve: Brass, 1/4 inch NPT for minimum 150 psi.
- C. Pulsation Damper: Pressure snubber, brass with 1/4 inch connections.

- D. Syphon: Steel, Schedule 40, 1/4 inch angle or straight pattern.

2.03 STEM TYPE THERMOMETERS

- A. Manufacturers:
 - 1. Dwyer Instruments, Inc: www.dwyer-inst.com.
 - 2. Omega Engineering, Inc: www.omega.com.
 - 3. Weksler Glass Thermometer Corp: www.wekslerglass.com.
 - 4. Weiss
 - 5. H.O. Trerice
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Thermometers - Fixed Mounting: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish.
 - 1. Size: 9 inch scale.
 - 2. Window: Clear Lexan.
 - 3. Stem: 3/4 inch brass.
 - 4. Accuracy: 2 percent, per ASTM E77.
 - 5. Calibration: Degrees F.
- C. Thermometers - Adjustable Angle: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device; adjustable 360 degrees in horizontal plane, 180 degrees in vertical plane.
 - 1. Size: 9 inch scale.
 - 2. Window: Clear Lexan.
 - 3. Stem: 3/4 inch NPT brass.
 - 4. Accuracy: 2 percent, per ASTM E77.
 - 5. Calibration: Degrees F.

2.04 THERMOMETER SUPPORTS

- A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.
- B. Flange: 3 inch outside diameter reversible flange, designed to fasten to sheet metal air ducts, with brass perforated stem.

2.05 TEST PLUGS

- A. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with neoprene core for temperatures up to 200 degrees F.
- B. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with Nordel core for temperatures up to 350 degrees F.
- C. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with Viton core for temperatures up to 400 degrees F.
- D. Test Kit: Carrying case, internally padded and fitted containing one 2-1/2 inch diameter pressure gages, one gage adapters with 1/8 inch probes, two 1 inch dial thermometers.

2.06 STATIC PRESSURE GAGES

- A. Manufacturers:
 - 1. Dwyer Instruments, Inc: www.dwyer-inst.com.
 - 2. Omega Engineering, Inc: www.omega.com.
 - 3. Weksler Glass Thermometer Corp: www.wekslerglass.com.
 - 4. Weiss
 - 5. H.O. Trerice
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. 3-1/2 inch diameter dial in metal case, diaphragm actuated, black figures on white background, front recalibration adjustment, 2 percent of full scale accuracy.
- C. Inclined manometer, red liquid on white background with black figures, front recalibration adjustment, 3 percent of full scale accuracy.

- D. Accessories: Static pressure tips with compression fittings for bulkhead mounting, 1/4 inch diameter tubing.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide one pressure gage per pump, installing taps before strainers and on suction and discharge of pump. Pipe to gage.
- C. Install pressure gages with pulsation dampers. Provide gage cock to isolate each gauge. Provide siphon on gages in steam systems. Extend nipples and siphons to allow clearance from insulation.
- D. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets. Ensure sockets allow clearance from insulation.
- E. Install thermometers in air duct systems on flanges.
- F. Install thermometer sockets adjacent to controls system thermostat, transmitter, or sensor sockets. Refer to Section 23 0943. Where thermometers are provided on local panels, duct or pipe mounted thermometers are not required.
- G. Locate duct mounted thermometers minimum 10 feet downstream of mixing dampers, coils, or other devices causing air turbulence.
- H. Coil and conceal excess capillary on remote element instruments.
- I. Provide instruments with scale ranges selected according to service with largest appropriate scale.
- J. Install gages and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- K. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate to zero.
- L. Locate test plugs adjacent thermometers and thermometer sockets.

3.02 SCHEDULE

- A. Pressure Gages, Location and Scale Range:
 - 1. Pumps, 0 to 100 psi.
- B. Pressure Gage Tappings, Location:
 - 1. Control valves 3/4 inch & larger - inlets and outlets.
 - 2. Major coils - inlets and outlets.
 - 3. Boiler - inlets and outlets.
- C. Stem Type Thermometers, Location and Scale Range:
 - 1. Headers to central equipment, 0 to 250 degrees F.
 - 2. Coil banks - inlets and outlets, 0 to 250 degrees F.
 - 3. Boilers - inlets and outlets, 0 to 250 degrees F.

END OF SECTION

SECTION 23 0553
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Pipe markers.

1.02 RELATED REQUIREMENTS

- A. Section 09 9123 - Interior Painting: Identification painting.

1.03 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2015.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- F. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Air Handling Units: Nameplates.
- B. Control Panels: Nameplates.
- C. Piping: Pipe markers.
- D. Pumps: Nameplates.
- E. Valves: Tags

2.02 MANUFACTURERS

- A. Brady Corporation: www.bradycorp.com.
- B. Champion America, Inc: www.Champion-America.com.
- C. Seton Identification Products: www.seton.com/aec.
- D. Substitutions: See Section 01 6000 - Product Requirements.

2.03 NAMEPLATES

- A. Manufacturers:
 - 1. Seton Identification Products, a Tricor Direct Company: www.seton.com.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: Laminated three-layer plastic with engraved letters.
 - 1. Letter Color: White.
 - 2. Letter Height: 1/2 inch.
 - 3. Background Color: Black.

2.04 TAGS

- A. Manufacturers:
 - 1. Brady Corporation: www.bradycorp.com.
 - 2. Seton Identification Products, a Tricor Company: www.seton.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

- C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.05 PIPE MARKERS

- A. Manufacturers:
 - 1. Brady Corporation: www.bradycorp.com.
 - 2. Seton Identification Products, a Tricor Company: www.seton.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.
- B. Color: Conform to ASME A13.1.
- C. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.
- F. Color code as follows:
 - 1. Heating, Cooling, and Boiler Feedwater: Green with white letters.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 09 9123 for stencil painting.

3.02 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- F. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.
- G. Identify control panels and major control components outside panels with plastic nameplates.
- H. Identify thermostats relating to terminal boxes or valves with nameplates.
- I. Identify valves in main and branch piping with tags.
- J. Identify air terminal units and radiator valves with numbered tags.
- K. Tag automatic controls, instruments, and relays. Key to control schematic.
- L. Identify piping, concealed or exposed, with plastic pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- M. Install ductwork with plastic nameplates. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.
- N. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 23 0593
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.
- B. Testing, adjustment, and balancing of hydronic systems.
- C. Measurement of final operating condition of HVAC systems.

1.02 RELATED REQUIREMENTS

- A. Section 01 4000 - Quality Requirements: Employment of testing agency and payment for services.
- B. Section 01 9113 - General Commissioning Requirements: Commissioning requirements that apply to all types of work.
- C. Section 23 0800 - Commissioning of HVAC.

1.03 REFERENCE STANDARDS

- A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.
- B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008.
- C. NEBB (TAB) - Procedural Standards for Testing Adjusting and Balancing of Environmental Systems; 2015, Eighth Edition.
- D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2002.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
 - 1. Include certification that the plan developer has reviewed the contract documents, the equipment and systems, and the control system with the Engineer/Architect and other installers to sufficiently understand the design intent for each system.
 - 2. Include at least the following in the plan:
 - a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
 - b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
 - c. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
 - d. Final test report forms to be used.
 - e. Detailed step-by-step procedures for TAB work for each system and issue, including:
 - 1) Terminal flow calibration (for each terminal type).
 - 2) Diffuser proportioning.
 - 3) Branch/submain proportioning.
 - 4) Total flow calculations.
 - 5) Rechecking.
 - 6) Diversity issues.
 - f. Expected problems and solutions, etc.
 - g. Criteria for using air flow straighteners or relocating flow stations and sensors; analogous explanations for the water side.
 - h. Details of how TOTAL flow will be determined; for example:
 - 1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
 - 2) Water: Pump curves, circuit setter, flow station, ultrasonic, etc.

- i. Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and methods to verify this.
 - j. Confirmation of understanding of the outside air ventilation criteria under all conditions.
 - k. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).
 - l. Method of checking building static and exhaust fan and/or relief damper capacity.
 - m. Proposed selection points for sound measurements and sound measurement methods.
 - n. Methods for making coil or other system plant capacity measurements, if specified.
 - o. Time schedule for TAB work to be done in phases (by floor, etc.).
 - p. Description of TAB work for areas to be built out later, if any.
 - q. Time schedule for deferred or seasonal TAB work, if specified.
 - r. False loading of systems to complete TAB work, if specified.
 - s. Exhaust fan balancing and capacity verifications, including any required room pressure differentials.
 - t. Interstitial cavity differential pressure measurements and calculations, if specified.
 - u. Procedures for field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
 - v. Procedures for formal progress reports, including scope and frequency.
 - w. Procedures for formal deficiency reports, including scope, frequency and distribution.
- C. Field Logs: Submit at least twice a week to the Commissioning Authority and Construction Manager.
- D. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.
- E. Progress Reports.
- F. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- 1. Submit under provisions of Section 01 4000.
 - 2. Submit to the the Commissioning Authority and Construction Manager within two weeks after completion of testing, adjusting, and balancing.
 - 3. Revise TAB plan to reflect actual procedures and submit as part of final report.
 - 4. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Engineer/Architect and for inclusion in operating and maintenance manuals.
 - 5. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
 - 6. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
 - 7. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
 - 8. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.
 - 9. Include the following on the title page of each report:
 - a. Name of Testing, Adjusting, and Balancing Agency.
 - b. Address of Testing, Adjusting, and Balancing Agency.
 - c. Telephone number of Testing, Adjusting, and Balancing Agency.
 - d. Project name.
 - e. Project location.
 - f. Project Engineer/Architect.
 - g. Project Engineer.
 - h. Project Contractor.
 - i. Project altitude.
 - j. Report date.

- G. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
 - 1. AABC (NSTSB), AABC National Standards for Total System Balance.
 - 2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
 - 3. SMACNA (TAB).
 - 4. Maintain at least one copy of the standard to be used at project site at all times.
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
- D. TAB Agency Qualifications:
 - 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
 - 2. Having minimum of three years documented experience.
 - 3. Certified by one of the following:
 - a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
 - b. NEBB, National Environmental Balancing Bureau: www.nebb.org/#sle.
 - c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.
- E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.
- F. Pre-Qualified TAB Agencies:
 - 1. TAB Systems, Sioux Falls, SD.
 - 2. Systems Management & Balancing of Minnesota, Minneapolis, MN.
 - 3. MTB, Maple Plain, MN..
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

3.02 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Proper thermal overload protection is in place for electrical equipment.
 - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - 5. Duct systems are clean of debris.
 - 6. Fans are rotating correctly.
 - 7. Fire and volume dampers are in place and open.
 - 8. Air coil fins are cleaned and combed.
 - 9. Access doors are closed and duct end caps are in place.
 - 10. Air outlets are installed and connected.
 - 11. Duct system leakage is minimized.
 - 12. Hydronic systems are flushed, filled, and vented.
 - 13. Pumps are rotating correctly.
 - 14. Proper strainer baskets are clean and in place.
 - 15. Service and balance valves are open.
- B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

- C. Beginning of work means acceptance of existing conditions.

3.03 PREPARATION

- A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
 - 1. Require attendance by all installers whose work will be tested, adjusted, or balanced.
- B. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Engineer/Architect to facilitate spot checks during testing.
- C. Provide additional balancing devices as required.

3.04 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
- C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.05 RECORDING AND ADJUSTING

- A. Field Logs: Maintain written logs including:
 - 1. Running log of events and issues.
 - 2. Discrepancies, deficient or uncompleted work by others.
 - 3. Contract interpretation requests.
 - 4. Lists of completed tests.
- B. Ensure recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. Mark on drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.
- E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- G. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.
- H. Check and adjust systems approximately six months after final acceptance and submit report.

3.06 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- F. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- G. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- H. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- I. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

- J. Adjust speed of supply and exhaust fans to achieve a positive pressure in the head works pump chamber with respect to the wet well.

3.07 WATER SYSTEM PROCEDURE

- A. Adjust water systems to provide required or design quantities.
- B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gages to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.
- C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
- D. Effect system balance with automatic control valves fully open to heat transfer elements.
- E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.
- F. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

3.08 SCOPE

- A. Test, adjust, and balance the following:
 - 1. HVAC Pumps.
 - 2. Packaged Steel Fire Tube Boilers.
 - 3. Air Cooled Water Chillers.
 - 4. Computer Room Air Conditioning Units.
 - 5. Fans.
 - 6. Air Inlets and Outlets.

3.09 MINIMUM DATA TO BE REPORTED

- A. Electric Motors:
 - 1. Manufacturer.
 - 2. Model/Frame.
 - 3. HP/BHP.
 - 4. Phase, voltage, amperage; nameplate, actual, no load.
 - 5. RPM.
 - 6. Service factor.
 - 7. Starter size, rating, heater elements.
 - 8. Sheave Make/Size/Bore.
- B. V-Belt Drives:
 - 1. Identification/location.
 - 2. Required driven RPM.
 - 3. Driven sheave, diameter and RPM.
 - 4. Belt, size and quantity.
 - 5. Motor sheave diameter and RPM.
 - 6. Center to center distance, maximum, minimum, and actual.
- C. Pumps:
 - 1. Identification/number.
 - 2. Manufacturer.
 - 3. Size/model.
 - 4. Impeller.
 - 5. Service.
 - 6. Design flow rate, pressure drop, BHP.
 - 7. Actual flow rate, pressure drop, BHP.
 - 8. Discharge pressure.
 - 9. Suction pressure.
 - 10. Total operating head pressure.
 - 11. Shut off, discharge and suction pressures.
 - 12. Shut off, total head pressure.

- D. Air Moving Equipment:
 - 1. Location.
 - 2. Manufacturer.
 - 3. Model number.
 - 4. Serial number.
 - 5. Arrangement/Class/Discharge.
 - 6. Air flow, specified and actual.
 - 7. Return air flow, specified and actual.
 - 8. Outside air flow, specified and actual.
 - 9. Total static pressure (total external), specified and actual.
 - 10. Inlet pressure.
 - 11. Discharge pressure.
 - 12. Sheave Make/Size/Bore.
 - 13. Number of Belts/Make/Size.
 - 14. Fan RPM.
- E. Exhaust Fans:
 - 1. Location.
 - 2. Manufacturer.
 - 3. Model number.
 - 4. Serial number.
 - 5. Air flow, specified and actual.
 - 6. Total static pressure (total external), specified and actual.
 - 7. Inlet pressure.
 - 8. Discharge pressure.
 - 9. Sheave Make/Size/Bore.
 - 10. Number of Belts/Make/Size.
 - 11. Fan RPM.
- F. Duct Traverses:
 - 1. System zone/branch.
 - 2. Duct size.
 - 3. Area.
 - 4. Design velocity.
 - 5. Design air flow.
 - 6. Test velocity.
 - 7. Test air flow.
 - 8. Duct static pressure.
 - 9. Air temperature.
 - 10. Air correction factor.
- G. Duct Leak Tests:
 - 1. Description of ductwork under test.
 - 2. Duct design operating pressure.
 - 3. Duct design test static pressure.
 - 4. Duct capacity, air flow.
 - 5. Maximum allowable leakage duct capacity times leak factor.
 - 6. Test apparatus:
 - a. Blower.
 - b. Orifice, tube size.
 - c. Orifice size.
 - d. Calibrated.
 - 7. Test static pressure.
 - 8. Test orifice differential pressure.
 - 9. Leakage.

3.10 APPROVAL

- A. The commissioning authority shall provide comments to the engineer.

- B. The engineer shall review the final test and balance report and the commissioning authority report. The engineer will confirm that the test and balance meets design and will have final say on the approval of the test and balance report.

END OF SECTION

SECTION 23 0713
DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Duct insulation.
- B. Insulation jackets.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 09 9123 - Interior Painting: Painting insulation jackets.
- C. Section 22 0553 - Identification for Plumbing Piping and Equipment.
- D. Section 23 0553 - Identification for HVAC Piping and Equipment.

1.03 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2017.
- D. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.
- E. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014.
- F. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2012.
- G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- H. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- I. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- J. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Samples: Submit two samples of any representative size illustrating each insulation type.
- D. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of experience and approved by manufacturer.
 - 1. Applicator to be manufacturer certified in the installation of product.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather, sunlight, and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.07 FIELD CONDITIONS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, RIGID

- A. Manufacturer:
 - 1. Johns Manville: www.jm.com/#sle.
 - 2. Knauf Insulation: www.knaufinsulation.com/#sle.
 - 3. Owens Corning Corp: www.owenscorning.com.
 - 4. CertainTeed Corporation: www.certainteed.com/#sle.
- B. Insulation: ASTM C612; rigid, noncombustible blanket.
 - 1. 'K' Value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
 - 2. Maximum Service Temperature: 450 degrees F.
 - 3. Maximum Water Vapor Absorption: 5.0 percent.
 - 4. Maximum Density: 8.0 lb/cu ft.
- C. Vapor Barrier Jacket:
 - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
 - 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
 - 3. Secure with pressure sensitive tape.
- D. Vapor Barrier Tape:
 - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive acrylic based adhesive.

2.03 JACKETS

- A. Aluminum Jacket: ASTM B209 (ASTM B209M).
 - 1. Thickness: 0.016 inch sheet.
 - 2. Finish: Smooth.
 - 3. Joining: Longitudinal slip joints and 2 inch laps.
 - 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
 - 5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.
 - 6. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that ducts have been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. External Duct Insulation Application:
 - 1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
 - 2. Secure insulation without vapor barrier with staples, tape, or wires.
 - 3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
 - 4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
 - 5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

6. Taper insulation or duct at the top to maintain slope 1" per foot.
7. Finish with smooth aluminum jacketing.

3.03 SCHEDULES

- A. Exterior Ducts:
 1. Rigid glass fiber: 3 inches thick

END OF SECTION

SECTION 23 0719
HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.
- B. Flexible removable and reusable blanket insulation.
- C. Jackets and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 07 8400 - Firestopping.
- C. Section 09 9123 - Interior Painting: Painting insulation jacket.
- D. Section 23 2113 - Hydronic Piping: Placement of hangers and hanger inserts.
- E. Section 23 2300 - Refrigerant Piping: Placement of inserts.

1.03 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- C. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.
- D. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2013).
- E. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2015.
- F. ASTM C591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation; 2015.
- G. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).
- H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- I. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.07 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER

- A. Manufacturers:
 - 1. Johns Manville Corporation: www.jm.com/#sle.
 - 2. Knauf Insulation: www.knaufinsulation.com
 - 3. Owens Corning Corp: www.owenscorning.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
 - 1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 850 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- C. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
 - 1. Maximum Service Temperature: 650 degrees F.
 - 2. Maximum Moisture Absorption: 0.2 percent by volume.
- D. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- E. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- F. Vapor Barrier Lap Adhesive: Compatible with insulation.
- G. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
- H. Fibrous Glass Fabric:
 - 1. Cloth: Untreated; 9 oz/sq yd weight.
 - 2. Blanket: 1.0 lb/cu ft density.
 - 3. Weave: 5 by 5.
- I. Indoor Vapor Barrier Finish:

2.03 CELLULAR GLASS

- A. Manufacturers:
 - 1. Pittsburgh Corning Corporation: www.foamglasinsulation.com.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- B. Insulation: ASTM C552, Type II.
 - 1. 'K' Value: Grade 6, 0.35 at 100 degrees F.
 - 2. Service Temperature: Up to 800 degrees F.
 - 3. Water Vapor Permeability: 0.005 perm inch.
 - 4. Water Absorption: 0.5 percent by volume, maximum.

2.04 JACKETS

- A. PVC Plastic.
 - 1. Manufacturers:
 - a. Johns Manville Corporation: www.jm.com/#sle.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F.
 - b. Maximum Service Temperature: 350 degrees F.
 - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 10 mil.
 - e. Connections: Brush on welding adhesive.
- B. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.

1. Thickness: 0.016 inch sheet.
2. Finish: Smooth.
3. Joining: Longitudinal slip joints and 2 inch laps.
4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Insulated pipes conveying fluids above or below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.
- E. For all systems, provide and install removable blanket insulation jackets on all fittings and accessories not limited to, but including; valves, unions, flanges, strainers, flexible connections, and expansion joints, that require regular maintenance. Insulation shall be encased in an inner and outer jacket of Teflon impregnated fiberglass fabric rated at a temperature exceeding the pipe system design temperature. Manufacturer: Newtex, Zetex Plus or approved equal.
- F. All elbows and fittings shall be pre-formed or mitered fitting and the same materials and thickness as the pipe insulation. Butt joints and seams are to be sealed with the manufacturer's recommended adhesive. No substitution allowed. Failure to provide the same insulation thickness at elbows and fittings will require replacement by the contractor at no cost to the Owner.
- G. All insulation ends shall be sealed waterproof, and end covers shall be stainless steel on systems over 140° F.
- H. Elbows, Tees, and Fittings.
 1. Provide mitered or nesting preformed insulation, wired in place with 20 gauge stainless wire.
 2. Insulation shall be of the same type and thickness as required for the pipe. No substitution allowed. Failure to provide the same insulation at elbows and fittings will require replacement by the contractor at no cost to the Owner.
 3. Joints or voids shall be filled and smoothed with insulating cement or tape as recommended by the manufacturer.
 4. Deformation of insulation jackets by voids is not allowed and subject to replacement by the contractor at no cost to the owner.
- I. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- J. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- K. Glass fiber insulated pipes conveying fluids above ambient temperature.
 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- L. Inserts and Shields:
 1. Application: Piping 1-1/2 inches diameter or larger.
 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 3. Insert location: Between support shield and piping and under the finish jacket.
 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.

5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
 6. ArmaFix EcoLight Pipe Supports: Pipe supports with a load-bearing PET core to support and protect the insulation from crushing or damage, maintaining the thermal integrity of the system and preventing thermal bridging. Armacell insulation is located on the outer part for connection to Armacell's Armaflex insulations. Matches all wall thickness and ID dimensions of Armacell's tube insulation offerings.
- M. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 8400.
- N. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces : Finish with PVC jacket and fitting covers.to 10ft above finished floor.
- O. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping. Provide two coats of UV resistant finish for flexible elastomeric cellular insulation without jacketing.

3.03 SCHEDULE

- A. Heating Systems:
1. Heating Water Supply and Return (141°F to 200°F):
 - a. Glass Fiber Insulation
 - 1) Pipe Size Range: 0 - 1-1/4 inch
 - (a) Thickness: 1.5 inch
 - 2) Pipe size Range: 1-1/2 inch and up
 - (a) Thickness: 2 inch
 - b. Cellular Glass Insulation
 - 1) Pipe Size Range: 0 - 1-1/4 inch
 - (a) Thickness: 1.5 inch
 - 2) Pipe size Range: 1-1/2 inch and up
 - (a) Thickness: 2 inch

END OF SECTION

SECTION 23 2113
HYDRONIC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hydronic system requirements.
- B. Heating water and glycol piping, above grade.
- C. Pipe and pipe fittings for:
 - 1. Heating water piping system.
 - 2. Equipment drains and overflows.
 - 3. Pipe hangers and supports.
 - 4. Unions, flanges, mechanical couplings, and dielectric connections.
- D. Valves:
 - 1. Ball valves.
 - 2. Butterfly valves.
 - 3. Check valves.
- E. Flow controls.

1.02 RELATED REQUIREMENTS

- A. Section 08 3100 - Access Doors and Panels.
- B. Section 09 9123 - Interior Painting.
- C. Section 22 0516 - Expansion Fittings and Loops for Plumbing Piping.
- D. Section 22 0719 - Plumbing Piping Insulation.
- E. Section 23 0516 - Expansion Fittings and Loops for HVAC Piping.
- F. Section 23 0553 - Identification for HVAC Piping and Equipment.
- G. Section 23 0719 - HVAC Piping Insulation.
- H. Section 23 2114 - Hydronic Specialties.
- I. Section 23 2500 - HVAC Water Treatment: Pipe cleaning.
- J. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. ASME BPVC-IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators - Welding Brazing and Fusing Qualifications; 2019.
- B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
- C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
- D. ASME B31.9 - Building Services Piping; 2014.
- E. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- F. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2016.
- G. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- H. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2016.
- I. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2018.
- J. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2008).
- K. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications; 2007 (Reapproved 2013).
- L. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2011-AMD 1.
- M. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.

- N. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings; 2012.
- O. AWWA C606 - Grooved and Shouldered Joints; 2015.
- P. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

1.04 SYSTEM DESCRIPTION

- A. Where more than one piping system material is specified, ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
- B. Use grooved mechanical couplings and fasteners in accessible locations.
- C. Use unions, flanges, and couplings downstream of valves and at equipment or apparatus connections. Do not use direct welded or threaded connections to valves, equipment or other apparatus.
- D. Use non-conducting dielectric connections whenever jointing dissimilar metals.
- E. Provide pipe hangers and supports in accordance with ASME B31.9 unless indicated otherwise.
- F. Use ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- G. Use spring loaded check valves on discharge of pumps.
- H. Use 3/4 inch ball valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment. Pipe to nearest floor drain.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.
- C. Welders Certificate: Include welders certification of compliance with ASME BPVC-IX.
- D. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.
- E. Project Record Documents: Record actual locations of valves.
- F. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.
- B. Welder Qualifications: Certify in accordance with ASME BPVC-IX.

1.07 REGULATORY REQUIREMENTS

- A. Conform to ASME B31.9 code for installation of piping system.
- B. Welding Materials and Procedures: Conform to ASME (BPV IX) and applicable state labor regulations.
- C. Provide certificate of compliance from authority having jurisdiction, indicating approval of welders.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.09 FIELD CONDITIONS

PART 2 PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS

- A. Comply with ASME B31.9 and applicable federal, state, and local regulations.
- B. Piping: Provide piping, fittings, hangers and supports as required, as indicated, and as follows:
 - 1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
 - 2. Use non-conducting dielectric connections whenever joining dissimilar metals.
 - 3. Grooved mechanical joints may be used in accessible locations only.
 - a. Accessible locations include those exposed on interior of building, in pipe chases, and in mechanical rooms, aboveground outdoors, and as approved by Engineer/Architect.
 - b. Use rigid joints unless otherwise indicated.
 - 4. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.
- C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.
- D. Valves: Provide valves where indicated:
 - 1. Provide drain valves where indicated, and if not indicated provide at least at main shut-off, low points of piping, bases of vertical risers, and at equipment. Use 3/4 inch ball valves with cap; pipe to nearest floor drain.
 - 2. For throttling, bypass, or manual flow control services, use ball valves.
 - 3. For shut-off and to isolate parts of systems or vertical risers, use ball or butterfly valves.

2.02 HEATING WATER AND GLYCOL PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M, Schedule 40, black, using one of the following joint types:
 - 1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D1.1/D1.1M welded.
 - 2. Grooved Joints:
 - a. Victaulic Standard Mechanical Couplings, 2 inch (DN50) through 12 inch (DN300): Manufactured in two segments of cast ductile iron, conforming to ASTM A-536, Grade 65-45-12. Gaskets shall be pressure-responsive synthetic rubber, grade to suit the intended service, conforming to ASTM D-2000. (Gaskets used for potable water applications shall be UL classified in accordance with ANSI/NSF-61 for potable water service.) Mechanical Coupling bolts shall be zinc plated (ASTM B-633) heat treated carbon steel track head conforming to ASTM A-449 and ASTM A-183, minimum tensile strength 110,000 psi (758450 kPa) as provided standard Victaulic.
- B. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn, using one of the following joint types:
 - 1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings.
 - a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
 - b. Braze: AWS A5.8M/A5.8 BCuP copper/silver alloy.
 - 2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.
 - 3. Mechanical Press Sealed Fittings: Double pressed type complying with ASME B16.22, utilizing EPDM, nontoxic synthetic rubber sealing elements.
 - a. Manufacturers:
 - 1) Apollo Valves; _____: www.apollovalves.com/#sle.
 - 2) Grinnell Products; _____: www.grinnell.com/#sle.
 - 3) Viega LLC; _____: www.viega.us/#sle.
 - 4. PRO PRESS or ANVIL International are acceptable alternates to solder joints

2.03 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.

1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
- B. Conform to ASME B31.9.
- C. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
- D. Hangers for Cold Pipe Sizes 2 Inches and Greater: Carbon steel, adjustable, clevis.
- E. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
- F. Hangers for Hot Pipe Sizes 6 Inches and Greater: Adjustable steel yoke, cast iron roll, double hanger.
- G. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- H. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Greater: Steel channels with welded spacers and hanger rods, cast iron roll.
- I. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
- J. Wall Support for Pipe Sizes 4 Inches and Greater: Welded steel bracket and wrought steel clamp.
- K. Wall Support for Hot Pipe Sizes 6 Inches and Greater: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
- L. Vertical Support: Steel riser clamp.
- M. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- N. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- O. Floor Support for Hot Pipe Sizes 6 Inches and Greater: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
- P. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- Q. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
- R. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.
- S. In grooved installations, use rigid couplings with offsetting angle-pattern bolt pads or with wedge shaped grooves in header piping to permit support and hanging in accordance with ASME B31.9.

2.04 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

- A. Unions for Pipe 2 Inches and Less:
 1. Ferrous Piping: 150 psig malleable iron, threaded.
 2. Copper Pipe: Bronze, soldered joints.
- B. Flanges for Pipe 2 Inches and Greater:
 1. Ferrous Piping: 150 psig forged steel, slip-on.
 2. Copper Piping: Bronze.
 3. Gaskets: 1/16 inch thick preformed neoprene.
- C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
 1. Dimensions and Testing: In accordance with AWWA C606.
 2. Mechanical Couplings: Comply with ASTM F1476.
 3. Housing Clamps: Malleable iron galvanized to engage and lock, designed to permit some angular deflection, contraction, and expansion.
 4. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
 5. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
 6. When pipe is field grooved, provide coupling manufacturer's grooving tools.
 7. Manufacturers:

- a. Victaulic Company: www.victaulic.com.

2.05 BALL VALVES

- A. Manufacturers:
 - 1. Tyco Flow Control: www.tycoflowcontrol.com.
 - 2. Nibco, Inc: www.nibco.com.
 - 3. Milwaukee Valve Company: www.milwaukeevalve.com.
 - 4. Victaulic Company: www.victaulic.com.
 - 5. Anvil International
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Up To and Including 2 Inches:
 - 1. Bronze one piece body, chrome plated brass ball, teflon seats and stuffing box ring, lever handle with balancing stops, solder ends with union.
- C. Over 2 Inches:
 - 1. Cast steel body, chrome plated steel ball, teflon seat and stuffing box seals, lever handle, flanged.

2.06 BUTTERFLY VALVES

- A. Manufacturers:
 - 1. Hammond Valve: www.hammondvalve.com.
 - 2. Milwaukee Valve Company: www.milwaukeevalve.com.
 - 3. Victaulic Company: www.victaulic.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Body: Cast or ductile iron with resilient replaceable EPDM seat, wafer, lug, or grooved ends, extended neck.
- C. Disc: Construct of aluminum bronze or stainless steel.
- D. Stem: Stainless steel with stem offset from the centerline to provide full 360 degree circumferential setting.
- E. Operator: 10 position lever handle.

2.07 SWING CHECK VALVES

- A. Manufacturers:
 - 1. Apollo Valves; _____: www.apollovalves.com/#sle.
 - 2. Victaulic Company; _____: www.victaulic.com/#sle.
- B. Up To and Including 2 Inches:
 - 1. Bronze body, bronze trim, bronze rotating swing disc, with composition disc, solder ends.

2.08 FLOW CONTROLS

- A. Manufacturers:
 - 1. Tyco Flow Control: www.tycoflowcontrol.com.
 - 2. ITT Bell & Gossett: www.bellgossett.com.
 - 3. Griswold Controls: www.griswoldcontrols.com.
 - 4. Taco, Inc: www.taco-hvac.com.
 - 5. Victaulic
 - 6. Anvil International
 - 7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Prepare pipe for grooved mechanical joints as required by coupling manufacturer.
- C. Remove scale and dirt on inside and outside before assembly.
- D. Prepare piping connections to equipment using jointing system specified.

- E. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- F. After completion, fill, clean, and treat systems. Refer to Section 23 2500 for additional requirements.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and to avoid interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Slope piping and arrange to drain at low points.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 23 0516.
- G. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- H. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.
 - 2. Support horizontal piping as scheduled.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 6. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
 - 7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 8. Provide copper plated hangers and supports for copper piping.
 - 9. Prime coat exposed steel hangers and supports. Refer to Section 09 9123. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- I. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 23 0719.
- J. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 08 3100.
- K. Use eccentric reducers to maintain top of pipe level.
- L. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.
- M. Prepare unfinished pipe, fittings, supports, and accessories, ready for finish painting. Refer to Section 09 9123.
- N. Install valves with stems upright or horizontal, not inverted.
- O. Install pressure independant control valve on all coils 15 GPM and greater.

3.03 SCHEDULES

- A. Hanger Spacing for Copper Tubing.
 - 1. 1/2 inch and 3/4 inch: Maximum span, 5 feet; minimum rod size, 1/4 inch.
 - 2. 1 inch: Maximum span, 6 feet; minimum rod size, 1/4 inch.

3. 1-1/2 inch and 2 inch: Maximum span, 8 feet; minimum rod size, 3/8 inch.
 4. 2-1/2 inch: Maximum span, 9 feet; minimum rod size, 3/8 inch.
 5. 3 inch: Maximum span, 10 feet; minimum rod size, 3/8 inch.
 6. 4 inch: Maximum span, 12 feet; minimum rod size, 1/2 inch.
 7. 6 inch: Maximum span, 14 feet; minimum rod size, 1/2 inch.
 8. 8 inch: Maximum span, 16 feet; minimum rod size, 5/8 inch.
- B. Hanger Spacing for Steel Piping.
1. 1/2 inch, 3/4 inch, and 1 inch: Maximum span, 7 feet; minimum rod size, 1/4 inch.
 2. 1-1/4 inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
 3. 1-1/2 inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
 4. 2 inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
 5. 2-1/2 inches: Maximum span, 11 feet; minimum rod size, 3/8 inch.
 6. 3 inches: Maximum span, 12 feet; minimum rod size, 3/8 inch.
 7. 4 inches: Maximum span, 14 feet; minimum rod size, 1/2 inch.
 8. 6 inches: Maximum span, 17 feet; minimum rod size, 1/2 inch.
 9. 8 inches: Maximum span, 19 feet; minimum rod size, 5/8 inch.

END OF SECTION

SECTION 23 2114
HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Expansion tanks.
- B. Air vents.
- C. Air separators.
- D. Strainers.
- E. Suction diffusers.
- F. Pump connectors.
- G. Combination pump discharge valves.
- H. Pressure-temperature test plugs.
- I. Balancing valves.
- J. Relief valves.
- K. Boiler Emergency Shut-off Button
- L. Glycol fill system.
- M. Glycol system maintenance.

1.02 RELATED REQUIREMENTS

- A. Section 22 1006 - Plumbing Piping Specialties: Backflow preventers.
- B. Section 23 2113 - Hydronic Piping.
- C. Section 23 2500 - HVAC Water Treatment: Pipe cleaning.

1.03 REFERENCE STANDARDS

- A. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. ASME (BPV VIII, 1) - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; The American Society of Mechanical Engineers; 2007.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description and model.
- C. Certificates: Inspection certificates for pressure vessels from authority having jurisdiction.
- D. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.
- E. Maintenance Contract.
- F. Project Record Documents: Record actual locations of flow controls.
- G. Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 EXPANSION TANKS

- A. Manufacturers:
 - 1. Amtrol Inc: www.amtrol.com.
 - 2. ITT Bell & Gossett: www.bellgossett.com.
 - 3. Taco, Inc: www.taco-hvac.com.
 - 4. Grundfos: www.grundfos.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1, rated for working pressure of 125 psi, with flexible EPDM diaphragm or bladder sealed into tank, and steel support stand.
- C. Accessories: Pressure gauge and air-charging fitting, tank drain; precharge to 12 psi.
- D. Automatic Cold Water Fill Assembly: Pressure reducing valve, reduced pressure double check back flow preventer, test cocks, strainer, vacuum breaker, and valved by-pass.

2.02 AIR VENTS

- A. Manufacturers:
 - 1. Armstrong International, Inc: www.armstronginternational.com.
 - 2. ITT Bell & Gossett: www.bellgossett.com.
 - 3. Taco, Inc: www.taco-hvac.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.
- C. Float Type:
 - 1. Brass or semi-steel body, copper, polypropylene, or solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.
 - 2. Cast iron body and cover, float, bronze pilot valve mechanism suitable for system operating temperature and pressure; with isolating valve.
- D. Washer Type:
 - 1. Brass with hygroscopic fiber discs, vent ports, adjustable cap for manual shut-off, and integral spring loaded ball check valve.

2.03 AIR SEPARATORS

- A. Dip Tube Fitting (Where Not Provided By Boiler Manufacturer):
 - 1. Manufacturers:
 - a. ITT Bell & Gossett: www.bellgossett.com.
 - b. Armstrong Pumps
 - c. Amtrol.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. For 125 psi operating pressure; to prevent free air collected in boiler from rising into system.
- B. Centrifugal Air Separators/Strainers:
 - 1. Manufacturers:
 - a. Armstrong International, Inc: www.armstronginternational.com.
 - b. ITT Bell & Gossett: www.bellgossett.com.
 - c. Taco, Inc: www.taco-hvac.com.
 - d. Amtrol.
 - e. Substitutions: See Section 01 6000 - Product Requirements.

2. Steel, tested and stamped in accordance with ASME BPVC-VIII-1; for 125 psi operating pressure, with integral bronze strainer, tangential inlet and outlet connections, and internal stainless steel air collector tube.

2.04 STRAINERS

- A. Manufacturers:
 1. Armstrong International, Inc: www.armstronginternational.com.
 2. Green Country Filtration: greencountryfiltration.com.
 3. WEAMCO: www.weamco.com.
 4. Anvil International, Inc: www.anvilintl.com.
 5. Titan Flow Control
 6. Victaulic; Model Series 732: www.victaulic.com
 7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Size 2 inch and Under:
 1. Screwed brass or iron body for 175 psi working pressure, Y pattern with 1/32 inch stainless steel perforated screen.
- C. Size 2-1/2 inch to 4 inch:
 1. Flanged iron body for 175 psi working pressure, Y pattern with 3/64 inch stainless steel perforated screen.
- D. Size 5 inch and Larger:
 1. Flanged iron body for 175 psi working pressure, basket pattern with 1/8 inch stainless steel perforated screen.

2.05 SUCTION DIFFUSERS

- A. Manufacturers:
 1. ITT Bell & Gossett: www.bellgossett.com.
 2. Anvil International, Inc: www.anvilintl.com.
 3. Victaulic Company of America: www.victaulic.com.
 4. Armstrong Pumps
 5. TACO
 6. Titan Flow Control
 7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Fitting: Angle pattern, cast-iron body, threaded for 2 inch and smaller, flanged for 2-1/2 inch and larger, rated for 175 psi working pressure, with inlet vanes, cylinder strainer with 3/16 inch diameter openings, disposable 5/32 inch mesh strainer to fit over cylinder strainer, 20 mesh start up screen, and permanent magnet located in flow stream and removable for cleaning.
- C. Fitting: Angle pattern, cast-iron body, threaded for 2 inch and smaller, flanged for 2-1/2 inch and larger, rated for 175 psi working pressure, with inlet vanes, cylinder strainer with 3/16 inch diameter openings, disposable fine mesh strainer to fit over cylinder strainer, and permanent magnet located in flow stream and removable for cleaning.
- D. Accessories: Adjustable foot support, blowdown tapping in bottom, gauge tapping in side.

2.06 PUMP CONNECTORS

2.07 COMBINATION PUMP DISCHARGE VALVES

- A. Manufacturers:
 1. Taco, Inc: www.taco-hvac.com.
 2. Victaulic Company of America: www.victaulic.com.
 3. Titan Flow Control
 4. ITT Bell & Gossett: www.bellgossett.com.
 5. Anvil International, Inc: www.anvilintl.com.
 6. Armstrong Pumps
 7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Valves: Straight or angle pattern, flanged cast-iron valve body with bolt-on bonnet for 175 psi operating pressure, non-slam check valve with spring-loaded bronze disc and seat, stainless steel stem, and calibrated adjustment permitting flow regulation.

2.08 PRESSURE-TEMPERATURE TEST PLUGS

- A. Construction: Brass body designed to receive temperature or pressure probe with removable protective cap, and Neoprene rated for minimum 200 degrees F.
- B. Application: Use extended length plugs to clear insulated piping.

2.09 BALANCING VALVES

- A. Manufacturers:
 - 1. Armstrong International, Inc: www.armstronginternational.com.
 - 2. ITT Bell & Gossett: www.bellgossett.com.
 - 3. Taco, Inc: www.taco-hvac.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Size 2 inch and Smaller:
 - 1. Provide ball or globe style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and NPT threaded or soldered connections.
 - 2. Metal construction materials consist of bronze or brass.
 - 3. Non-metal construction materials consist of Teflon, EPDM, or engineered resin.
- C. Size 2.5 inch and Larger:
 - 1. Provide ball or globe style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and flanged, grooved, or weld end connections.
 - 2. Valve body construction materials consist of cast iron, carbon steel, or ductile iron.
 - 3. Internal components construction materials consist of brass, aluminum bronze, bronze, Teflon, EPDM, NORYL, or engineered resin.

2.10 RELIEF VALVES

- A. Manufacturers:
 - 1. Armstrong International, Inc: www.armstronginternational.com.
 - 2. ITT Bell & Gossett: www.bellgossett.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.
- B. Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.

2.11 BOILER EMERGENCY SHUT-OFF BUTTON

- A. Manufacturer:
 - 1. Pilla Electrical Products
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: Push button emergency shut-off switch with 40 mm mushroom operator, inscription of "Emergency Boiler Shutdown" and Pull to Reset operation.
- C. Accessories:
 - 1. Clear hinged cover with inscription "Raise Lid - Push Button".

2.12 GLYCOL FILL SYSTEM

- A. Tank Pumping System
 - 1. Manufacture
 - a. Neptune Chemical Pump Co., Inc:
 - b. Axiom
 - c. ITT
 - d. Wessels
 - 2. Pump mounted under the 18 gal tank, tank lid hinged, stand, PVC suction valve, Poly "Y" strainer with plug in cord.
 - 3. Pipe system to air separator. Include ball valve, check valve, pressure reducing valve and pressure gauge.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install specialties in accordance with manufacturer's instructions.

- B. Where large air quantities can accumulate, provide enlarged air collection standpipes.
- C. Provide manual air vents at system high points and as indicated.
- D. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.
- E. Provide air separator on suction side of system circulation pump and connect to expansion tank.
- F. Provide valved drain and hose connection on strainer blow down connection.
- G. Provide pump suction fitting on suction side of base mounted centrifugal pumps. Remove temporary strainers after cleaning systems.
- H. Provide combination pump discharge valve on discharge side of base mounted centrifugal pumps.
- I. Support pump fittings with floor mounted pipe and flange supports.
- J. Provide radiator balancing valves on water outlet from terminal heating units such as radiation, unit heaters, and fan coil units.
- K. Provide relief valves on pressure tanks, low pressure side of reducing valves, heat exchangers, and expansion tanks.
- L. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.
- M. Pipe relief valve outlet to nearest floor drain.
- N. Where one line vents several relief valves, make cross sectional area equal to sum of individual vent areas.
- O. Clean and flush glycol system before adding glycol solution. Refer to Section 23 2500.
- P. Feed glycol solution to system through glycol fill system, venting system high points. Set to fill at 12 psi.
- Q. Perform tests determining strength of glycol and water solution and submit written test results.
- R. Install pressure independant control valve on all coils 15 GPM and greater.

3.02 MAINTENANCE

- A. See Section 01 7000 - Execution Requirements, for additional requirements relating to maintenance service.
- B. Provide service and maintenance of glycol system for one year from date of Substantial Completion at no extra charge to Owner.

3.03 SCHEDULES

- A. See Schedules on Plans.

END OF SECTION

SECTION 23 2300
REFRIGERANT PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping.
- B. Valves.
- C. Pressure relief valves.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 08 3100 - Access Doors and Panels.
- C. Section 23 0719 - HVAC Piping Insulation.
- D. Section 23 6313 - Air Cooled Refrigerant Condensers.
- E. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. AHRI 710 - Performance Rating of Liquid-Line Driers; 2009.
- B. AHRI 730 (I-P) - Flow Capacity Rating of Suction-Line Filters and Suction-Line Filter-Driers; 2013.
- C. ASHRAE Std 15 - Safety Standard for Refrigeration Systems and Designation and Classification of Refrigerants ; 2019.
- D. ASHRAE Std 34 - Designation and Safety Classification of Refrigerants; 2019.
- E. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
- F. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2013.
- G. ASME B31.5 - Refrigeration Piping and Heat Transfer Components; 2013.
- H. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service; 2013.
- I. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2011-AMD 1.
- J. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

1.04 SYSTEM DESCRIPTION

- A. Where more than one piping system material is specified ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
- B. Provide pipe hangers and supports in accordance with ASME B31.5 unless indicated otherwise.
- C. Liquid Indicators:
 - 1. Use line size liquid indicators in main liquid line leaving condenser.
 - 2. If receiver is provided, install in liquid line leaving receiver.
 - 3. Use line size on leaving side of liquid solenoid valves.
- D. Valves:
 - 1. Use service valves on suction and discharge of compressors.
- E. Refrigerant Charging (Packed Angle) Valve: Use in liquid line between receiver shut-off valve and expansion valve.
- F. Pressure Relief Valves: Use on ASME receivers and pipe to outdoors.
- G. Filter-Driers:
 - 1. Use a filter-drier immediately ahead of liquid-line controls, such as thermostatic expansion valves, solenoid valves, and moisture indicators.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

PART 2 PRODUCTS

2.01 PIPING

- A. Copper Tube: ASTM B280, H58 hard drawn or O60 soft annealed.
 - 1. Fittings: ASME B16.22 wrought copper.
 - 2. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.
- B. Pipe Supports and Anchors:
 - 1. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron adjustable swivel, split ring.
 - 2. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 - 3. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 - 4. Vertical Support: Steel riser clamp.
 - 5. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 - 6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
 - 7. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
 - 8. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.02 VALVES

- A. Service Valves:
 - 1. Forged brass body with copper stubs, brass caps, removable valve core, integral ball check valve, flared or solder ends, for maximum pressure of 500 psi.

2.03 STRAINERS

- A. Straight Line or Angle Line Type:
 - 1. Brass or steel shell, steel cap and flange, and replaceable cartridge, with screen of stainless steel wire or monel reinforced with brass; for maximum working pressure of 430 psi.

2.04 PRESSURE RELIEF VALVES

- A. Straight Through or Angle Type: Brass body and disc, neoprene seat, factory sealed and stamped with ASME UV and National Board Certification NB, selected to ASHRAE Std 15, with standard setting of 235 psi.

2.05 FILTER-DRIERS

- A. Performance:
 - 1. Flow Capacity - Liquid Line: As indicated in schedule, minimum, rated in accordance with AHRI 710.
 - 2. Pressure Drop: 2 psi, maximum, when operating at full connected evaporator capacity.
 - 3. Design Working Pressure: 350 psi, minimum.
- B. Cores: Molded or loose-fill molecular sieve desiccant compatible with refrigerant, activated alumina, activated charcoal, and filtration to 40 microns, with secondary filtration to 20 microns; of construction that will not pass into refrigerant lines.
- C. Construction: UL listed.
 - 1. Connections: As specified for applicable pipe type.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

- A. Install refrigeration specialties in accordance with manufacturer's instructions.

- B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and avoid interference with use of space.
- D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- E. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.5.
 - 2. Support horizontal piping as indicated.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Test refrigeration system in accordance with ASME B31.5.
- C. Pressure test system with dry nitrogen to 200 psi. Perform final tests at 27 inches vacuum and 200 psi using halide torch. Test to no leakage.

END OF SECTION

SECTION 23 2500
HVAC WATER TREATMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Materials.
 - 1. System cleaner.
 - 2. Closed system treatment (water).

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Owner furnished treatment equipment.
- B. Section 01 6000 - Product Requirements: Owner furnished treatment equipment.
- C. Section 23 2113 - Hydronic Piping.
- D. Section 23 2114 - Hydronic Specialties.
- E. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide chemical treatment materials, chemicals, and equipment including electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Indicate placement of equipment in systems, piping configuration, and connection requirements.
- D. Manufacturer's Field Reports: Indicate start-up of treatment systems when completed and operating properly. Indicate analysis of system water after cleaning and after treatment.
- E. Certificate: Submit certificate of compliance from Authority Having Jurisdiction indicating approval of chemicals and their proposed disposal.
- F. Project Record Documents: Record actual locations of equipment and piping, including sampling points and location of chemical injectors.
- G. Operation and Maintenance Data: Include data on chemical feed pumps, agitators, and other equipment including spare parts lists, procedures, and treatment programs. Include step by step instructions on test procedures including target concentrations.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Sufficient chemicals for treatment and testing during required maintenance period.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience. Company shall have local representatives with water analysis laboratories and full time service personnel.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. AmSolv-Amrep, Inc; _____: www.amsolv.com/#sle.
- B. GE Water & Process Technologies; _____: www.gewater.com/#sle.
- C. Nalco, an Ecolab Company; _____: www.nalco.com/#sle.

2.02 REGULATORY REQUIREMENTS

- A. Comply with applicable codes for addition of non-potable chemicals to building mechanical systems and to public sewage systems.
- B. Perform work in accordance with local health department regulations.

2.03 MATERIALS

- A. System Cleaner:
 - 1. Manufacturers:

2. Liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products; sodiumtripoly phosphate and sodium molybdate.
- B. Closed System Treatment (Water):
 1. Sequestering agent to reduce deposits and adjust pH; polyphosphate.
 2. Corrosion inhibitors; boron-nitrite, sodium nitrite and borax, sodium totyltriazole, low molecular weight polymers, phosphonates, sodium molybdate, or sulphites.
 3. Conductivity enhancers; phosphates or phosphonates.

PART 3 EXECUTION

3.01 PREPARATION

- A. Systems shall be operational, filled, started, and vented prior to cleaning. Use water meter to record capacity in each system.
- B. Place terminal control valves in open position during cleaning.
- C. Verify that electric power is available and of the correct characteristics.

3.02 CLEANING SEQUENCE

- A. Concentration:
 1. 50% ethylene glycol
- B. Hot Water Heating Systems:
 1. Refer to section 23 2114 Paragraph 3.01 Q through V for clarification of cleaning required before adding glycol
- C. Flush open systems and glycol filled closed systems with clean water for one hour minimum. Drain completely and refill.
- D. Remove, clean, and replace strainer screens.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.04 CLOSED SYSTEM TREATMENT

- A. Provide one side stream filter on each system. Install isolating and drain valves and necessary piping. Install around balancing valve downstream of circulating pumps unless indicated otherwise.
- B. Introduce closed system treatment through side stream filter when required or indicated by test.

3.05 CLOSEOUT ACTIVITIES

- A. Training: Train Owner's personnel on operation and maintenance of chemical treatment system.
 1. Provide minimum of two hours of instruction for two people.
 2. Have operation and maintenance data prepared and available for review during training.
 3. Conduct training using actual equipment after treated system has been put into full operation.

3.06 MAINTENANCE

- A. Perform maintenance work using competent and qualified personnel under the supervision and in the direct employ of the equipment manufacturer or original installer.
- B. Provide service and maintenance of treatment systems for one year from Date of Substantial Completion.
- C. Provide laboratory and technical assistance services during this maintenance period.
- D. Provide on-site inspections of equipment during scheduled or emergency shutdown to properly evaluate success of water treatment program, and make recommendations in writing based upon these inspections.

END OF SECTION

SECTION 23 3100
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal ductwork.

1.02 RELATED REQUIREMENTS

- A. Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.
- B. Section 23 0713 - Duct Insulation: External insulation and duct liner.
- C. Section 23 3300 - Air Duct Accessories.
- D. Section 23 3700 - Air Outlets and Inlets.

1.03 REFERENCE STANDARDS

- A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals; Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- D. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.
- E. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- F. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- G. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- H. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).
- I. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; 2012, 2nd Edition.

1.04 PERFORMANCE REQUIREMENTS

- A. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA (LEAK).
- C. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of documented experience.

1.07 REGULATORY REQUIREMENTS

- A. Construct ductwork to NFPA 90A standards.

1.08 FIELD CONDITIONS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Aluminum Ducts: ASTM B 209 (ASTM B 209M); aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.
- B. Stainless Steel for Ducts: ASTM A666, Type 304.
- C. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 - 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 - 2. VOC Content: Not more than 250 g/L, excluding water.
 - 3. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
- D. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
- E. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
 - 1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
 - 2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
 - 3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
 - 4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
 - 5. Other Types: As required.
- F. Supply and exhaust systems: 2 inch w.g. pressure class.

2.02 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- C. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).
- D. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Joints shall be minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.
- E. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.
- F. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. Install in accordance with manufacturer's instructions.
- C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- D. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- E. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- F. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

- G. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
- H. Use double nuts and lock washers on threaded rod supports.
- I. Connect terminal units to supply ducts
- J. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp.
- K. Connect flexible ducts to metal ducts with draw bands.

3.02 SCHEDULES

- A. Ductwork Material:
 - 1. All ducts: aluminum or stainless steel

END OF SECTION

SECTION 23 3300
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Backdraft dampers - metal.
- B. Backdraft dampers - fabric.
- C. Backdraft dampers.
- D. Duct test holes.
- E. Flexible duct connections.
- F. Volume control dampers.

1.02 RELATED REQUIREMENTS

- A. Section 23 3100 - HVAC Ducts and Casings.
- B. Section 23 3600 - Air Terminal Units: Pressure regulating damper assemblies.
- C. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers.
- D. Manufacturer's Installation Instructions: Provide instructions for fire dampers.
- E. Project Record Drawings: Record actual locations of access doors and test holes.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Fusible Links: One of each type and size.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 BACKDRAFT DAMPERS - METAL

2.02 BACKDRAFT DAMPERS

- A. Manufacturers:
 - 1. Louvers & Dampers, Inc: www.louvers-dampers.com.
 - 2. Nailor Industries Inc: www.nailor.com.
 - 3. PCI Industries, Inc; Pottorff Brand : www.pottorff.com.
 - 4. Ruskin Company: www.ruskin.com.
 - 5. Greenheck.
 - 6. Price
 - 7. Pottorff
 - 8. Substitutions: See Section 01 6000 - Product Requirements.
- B. Gravity Backdraft Dampers, Size 18 by 18 inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.

2.03 BACKDRAFT DAMPERS - FABRIC

- A. Fabric Backdraft Dampers: Factory-fabricated.
 - 1. Blades: Neoprene coated fabric material.
 - 2. Birdscreen: 1/2 inch nominal mesh of galvanized steel or aluminum.
 - 3. Maximum Velocity: 1000 fpm (5 mps) face velocity.

2.04 DUCT TEST HOLES

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.05 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Flexible Duct Connections: Fabric crimped into metal edging strip.
 - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.
 - a. Net Fabric Width: Approximately 2 inches wide.
 - 2. Metal: 3 inches wide, 24 gage, 0.0239 inch thick galvanized steel.
- C. Maximum Installed Length: 6 inch.

2.06 VOLUME CONTROL DAMPERS

- A. Manufacturers:
 - 1. Louvers & Dampers, Inc: www.louvers-dampers.com.
 - 2. Nailor Industries Inc: www.nailor.com.
 - 3. PCI Industries, Inc; Pottorff Brand : www.pottorff.com.
 - 4. Ruskin Company: www.ruskin.com.
 - 5. Greenheck.
 - 6. Metal Aire
 - 7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.
- C. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.
- D. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
- E. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 3100 for duct construction and pressure class.
- B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- C. Maximum damper leakage rate to meet applicable state Energy Code requirements
- D. Provide duct test holes where indicated and required for testing and balancing purposes.
- E. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
- F. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- G. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.

- H. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.
- I. Max flex duct length of 5'-0".

END OF SECTION

SECTION 23 3416
CENTRIFUGAL HVAC FANS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Backward inclined centrifugal fans.
- B. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 23 0548 - Vibration and Seismic Controls for HVAC.
- B. Section 23 0713 - Duct Insulation.
- C. Section 23 3300 - Air Duct Accessories: Backdraft dampers.
- D. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. AMCA (DIR) - [Directory of] Products Licensed Under AMCA International Certified Ratings Program; <http://www.amca.org/certified/search/company.aspx>.
- B. AMCA 300 - Reverberant Room Method for Sound Testing of Fans; 2014.
- C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on centrifugal fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate assembly of centrifugal fans and accessories including fan curves with specified operating point clearly plotted, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.
- D. Manufacturer's Instructions: Include complete installation instructions.
- E. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect motors, shafts, and bearings from weather and construction dust.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Do not operate fans for any purpose until ductwork is clean, filters are in place, bearings have been lubricated, and fan has been test run under observation.

1.08 EXTRA MATERIALS

- A. See Section 01 6000 - Product Requirements, for additional provisions.
- B. Supply two sets of belts for each fan.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ACME Engineering and Manufacturing Corporation; _____: www.acmefan.com/#sle.
- B. Greenheck
- C. CaptiveAire
- D. Loren Cook Company: www.lorencook.com.

E. Substitutions: See Section 01 6000 - Product Requirements.

2.02 WHEEL AND INLET

- A. Backward Inclined: Steel or aluminum construction with smooth curved inlet flange, heavy back plate, backwardly curved blades welded or riveted to flange and back plate; cast iron or cast steel hub riveted to back plate and keyed to shaft with set screws.

2.03 HOUSING

- A. Heavy gage steel, spot welded for AMCA 99 Class I and II fans, and continuously welded for Class III, adequately braced, designed to minimize turbulence with spun inlet bell and shaped cut
- B. Provide bolted construction with horizontal flanged split housing, where indicated.
- C. Fabricate plug fans without volute housing, in lined steel cabinet. Refer to Section 23 0713.

2.04 ACCESSORIES

- A. Access Doors: Shaped to conform to scroll, with quick opening latches and gaskets.
- B. Scroll Drain: 1/2 inch steel pipe coupling welded to low point of fan scroll.
- C. See schedules for additional accessories.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install fans with resilient mountings and flexible electrical leads. Refer to Section 23 0548.
- C. Install flexible connections between fan inlet and discharge ductwork; refer to Section 23 3300. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.
- D. Provide backdraft dampers on discharge of exhaust fans and as indicated; refer to Section 23 3300.

3.02 SCHEDULES: SEE SCHEDULES ON PLANS

END OF SECTION

SECTION 23 3700
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Duct-mounted supply and return registers/louvers.

1.02 RELATED REQUIREMENTS

- A. Section 09 9123 - Interior Painting: Painting of ducts visible behind outlets and inlets.

1.03 REFERENCE STANDARDS

- A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2012.
- B. ARI 890 - Standard for Air Diffusers and Air Diffuser Assemblies; Air-Conditioning and Refrigeration Institute; 2001.
- C. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets; 2006 (R2011).
- D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.
 - 1. Include complete performance data and descriptive literature including finish and accessory items.
- C. Samples: Submit two of each required air outlet and inlet type.
- D. Project Record Documents: Record actual locations of air outlets and inlets.

1.05 QUALITY ASSURANCE

- A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.
- B. Test and rate louver performance in accordance with AMCA 500-L.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hart & Cooley, Inc: www.hartandcooley.com.
- B. Krueger: www.krueger-hvac.com.
- C. Price Industries: www.price-hvac.com.
- D. Titus: www.titus-hvac.com.
- E. Halton; www.haltoncompany.com
- F. Nailor
- G. Metal Aire
- H. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DUCT-MOUNTED SUPPLY AND RETURN REGISTERS/LOUVERS

- A. Type: Duct-mounted, rectangular register for round-spiral duct with adjustable pivot-ended blades, end caps, built-in volume damper, and dual cover flanges to lay flush on duct surface regardless of diameter. Performance to match manufacturer's catalog data.
- B. Material: 22 gage, 0.0299 inch.
- C. Color: unpainted aluminum.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The contractor shall inspect all equipment for damage upon delivery and shall immediately report damage to the owner and replace or repair such damage to the satisfaction of the owner. Install in accordance with manufacturer's instructions.

- B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.
- C. All diffusers and grilles shall be installed tight on their respective mounting surfaces, installed plumb and true with room dimensions, and accurately centered on projections, recesses, windows, ceiling grids, light fixtures, or doors. Provide appropriate frame wherever necessary to adapt to mounting surface.
- D. Install items in accordance with manufacturer's instructions.
- E. Install diffusers to ductwork with air tight connection.
- F. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 09 9123.

3.02 ADJUSTING AND CLEANING

- A. All installed materials shall have debris removed and shall be vacuumed clean of dust. Remove any strippable protective coating using manufacturer's recommended method.

END OF SECTION

SECTION 23 5100

BREECHINGS, CHIMNEYS, AND STACKS

THIS SECTION IS DESIGNATED N.I.C. AND IS FOR REFERENCE

PART 1 GENERAL

2.01 SECTION INCLUDES

- A. Type B double wall gas vents.

2.02 RELATED REQUIREMENTS

- A. Section 23 0716 - HVAC Equipment Insulation.
- B. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

2.03 REFERENCE STANDARDS

- A. ANSI Z21.66 - American National Standard for Automatic Damper Devices for Use with Gas-Fired Appliances; 2015.
- B. NFPA 31 - Standard for the Installation of Oil Burning Equipment; 2016.
- C. NFPA 211 - Guide for Smoke and Heat Venting; 2016.

2.04 DEFINITIONS

- A. Breeching: Vent Connector.
- B. Chimney: Primarily vertical shaft enclosing at least one vent for conducting flue gases outdoors.
- C. Vent: That portion of a venting system designed to convey flue gases directly outdoors from a vent connector or from an appliance when a vent connector is not used.
- D. Vent Connector: That part of a venting system that conducts the flue gases from the flue collar of an appliance to a chimney or vent, and may include a draft control device.

2.05 DESIGN REQUIREMENTS

- A. Factory built vents and chimneys used for venting natural draft appliances shall comply with NFPA 211 and be UL listed and labeled.

2.06 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating factory built chimneys, including dimensional details of components and flue caps, dimensions and weights, electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate general construction, dimensions, weights, support and layout of breechings. Submit layout drawings indicating plan view and elevations where factory built units are used.
- D. Manufacturer's Instructions: Include installation instructions, and indicate assembly, support details, and connection requirements.
- E. Manufacturer's Certificate: Certify that refractory lined metal stacks meet or exceed specified requirements.

2.07 QUALITY ASSURANCE

- A. Designer Qualifications: Design stacks under direct supervision of a Professional Structural Engineer experienced in design of the type of work specified and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

2.08 REGULATORY REQUIREMENTS

- A. Conform to applicable code for installation of natural gas burning appliances and equipment.
- B. Conform to applicable code for installation of oil burning appliances and equipment.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

3.01 MANUFACTURERS

- A. DuraVent; DuraStack Pro (DIS2): www.duravent.com/#sle.
- B. Schebler
- C. Heatfab by Commercial Products Group of Hart & Cooley, Inc:
www.selkirkcorp.com/heatfab.Simpson Duravent
- D. Metal-Fab, Inc: www.mtlfab.com.
- E. Selkirk Corporation; Model PS: www.selkirkcommercial.com/#sle.
- F. Substitutions: See Section 01 6000 - Product Requirements.

3.02 BREECHINGS, CHIMNEYS, AND STACKS - GENERAL REQUIREMENTS

3.03 TYPE B DOUBLE WALL GAS VENTS

- A. Electrically Actuated Vent Dampers: Same size as draft hood collar, constructed of stainless steel or galvanized steel, with corrosion-resistant components, in compliance with ANSI Z21.66.

PART 3 EXECUTION

4.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. For Type B double wall gas vents, maintain UL listed minimum clearances from combustibles. Assemble pipe and accessories as required for complete installation.

4.02 SCHEDULES

- A. Refer to plans for sizing

END OF SECTION

SECTION 23 7433
PACKAGED OUTDOOR MAKE-UP AIR UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Controls.

1.02 RELATED REQUIREMENTS

- A. Section 23 1123 - Facility Natural-Gas Piping: Natural gas connections.
- B. Section 23 3300 - Air Duct Accessories: Flexible duct connections.
- C. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. AHRI 270 - Sound Performance Rating of Outdoor Unitary Equipment; 2015.
- B. ASHRAE Std 90.2 - Energy-Efficient Design of Low-Rise Residential Buildings; 2007, Including All Addenda.
- C. NEMA MG 1 - Motors and Generators; 2016.
- D. NFPA 54 - National Fuel Gas Code; 2015.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data with dimensions, duct and service connections, accessories, controls, electrical nameplate data, and wiring diagrams.
- C. Shop Drawings: Indicate dimensions, duct and service connections, accessories, controls, electrical nameplate data, and wiring diagrams.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to NFPA 70.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. CaptiveAire
- B. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FABRICATION

- A. Casing and Components: Steel panels, 18 gage, 0.0478 reinforced with structural angles and channels to ensure rigidity; access panels to burner and blower motor assemblies from either side of unit.
- B. Observation Port: On burner section for observing main and pilot flames.
- C. Insulation: Neoprene faced glass fiber insulation 1 inch thick on complete unit.
- D. Finish: Galvanized steel
- E. Outdoor Installation: Weatherproofed casing, with intake louver or hood.

2.03 FILTERS

- A. Units to have louvered weatherhood with 2" aluminum mesh filters.

2.04 BURNERS

- A. Assembly: For natural gas, capable of modulating turn down ratio of 25:1, including electric modulating main gas valve, motorized shut down valve, main and pilot gas regulators, pilot electric gas valve, manual shut-off valve and pilot adjustment valve.
- B. Regulator: Required for initial gas pressure of 2 psi.
- C. Pilot: Electrically ignited by spark rod through high voltage ignition transformer.
- D. Damper: Motorized with end switch to prove position before burner will fire.

2.05 FAN

- A. Fan: Statically and dynamically balanced centrifugal fan mounted on solid steel shaft with heavy duty self-aligning pre-lubricated ball bearings and V-belt drive with matching motor sheaves and belts.
- B. Electrical Characteristics: See plans.

2.06 CONTROLS

- A. Controls: Pre-wire unit for connection of power supply. Field wiring from unit to remote control panel makes unit operative.
- B. Remote Control Panel: On-off-auto switch, indicating lights for supply fan, pilot operation, burner operation, lockout indication, NEMA 1 enclosure and clogged filter indication.
- C. Interlocks: Unit to start exhaust fan through manufacturer provided circuitry on damper end switch closure.
- D. Fan Discharge Thermostat: Controls modulating gas valve to maintain supply air temperature.
- E. Safety Controls:
 - 1. Sense correct air flow before energizing pilot and sense pilot ignition before activating main gas valve.
 - 2. Smoke detection: unit shall shut down on detection of smoke. Smoke detector shall be remote-mounted in exhaust ductwork.
 - 3. Airflow sensors in supply and exhaust ductwork shall alert building alarm panel of loss of airflow.
- F. Manual Reset Low and High Limit Controls: Maintain supply air temperature between set points and shut fan down if temperatures are exceeded.
- G. Unit and associated exhaust fan shall be balanced to achieve a 0.01" positive pressure with respect to the wet well.

2.07 ACCESSORIES

- A. 115V GFCI Outlet
- B. Factory mounted VFD for balancing purposes only. Motor to have shaft grounding.
- C. Contact to start exhaust fan
- D. Factory mounted disconnect switch
- E. Unit mounted DX cooling system condensing units

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install to NFPA 54. Provide connection to natural gas system; refer to Section 23 1123.
- C. Provide flexible duct connections on inlet and outlet from unit; refer to Section 23 3300.

3.02 SCHEDULES: SEE PLANS

END OF SECTION

SECTION 23 8126.13
SMALL-CAPACITY SPLIT-SYSTEM AIR CONDITIONERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air cooled condensing units.
- B. Indoor air handling (fan and coil) units for ductless systems.
- C. Controls.

1.02 RELATED REQUIREMENTS

- A. Section 772 - 772: Includes indoor coil condensate drain.
- B. Section 23 1123 - Facility Natural-Gas Piping.
- C. Section 23 3100 - HVAC Ducts and Casings.
- D. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections and installation and wiring of thermostats and other controls components.

1.03 REFERENCE STANDARDS

- A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2008, Including All Addenda.
- B. AHRI 520 - Performance Rating of Positive Displacement Condensing Units; 2004.
- C. ASHRAE Std 15 - Safety Standard for Refrigeration Systems and Designation and Classification of Refrigerants ; 2019.
- D. ASHRAE Std 23.1 - Methods of Testing for Rating the Performance of Positive Displacement Refrigerant Compressors and Condensing Units that Operate at Subcritical Temperatures of the Refrigerant; 2010.
- E. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. NFPA 54 - National Fuel Gas Code; 2015.
- G. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- H. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2015.
- I. NFPA 211 - Guide for Smoke and Heat Venting; 2016.
- J. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
- C. Shop Drawings: Indicate assembly, required clearances, and location and size of field connections.
- D. Design Data: Indicate refrigerant pipe sizing.
- E. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.
- F. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.
- G. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Filters: One for each unit.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Carrier Corporation: www.carrier.com.
- B. Daikin: www.daikin.com
- C. Mitsubishi
- D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 INDOOR AIR HANDLING UNITS FOR DUCTLESS SYSTEMS

- A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, evaporator coil, and controls; wired for single power connection with control transformer.
 - 1. Location: Ceiling.
- B. Evaporator Coils: Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve.
 - 1. Construction and Ratings: In accordance with AHRI 210/240 and UL 207.
 - 2. Manufacturer: System manufacturer.
- C. Remote Actuators:

2.03 OUTDOOR UNITS

- A. Outdoor Units: Self-contained, packaged, pre-wired unit consisting of cabinet, with compressor and condenser.
 - 1. Construction and Ratings: In accordance with AHRI 210/240 with testing in accordance with ASHRAE Std 23.1 and UL 207.
- B. Compressor: Hermetic, two speed 1800 and 3600 rpm, AHRI 520 resiliently mounted integral with condenser, with positive lubrication, crankcase heater, high pressure control, motor overload protection, service valves and drier. Provide time delay control to prevent short cycling and rapid speed changes.
- C. Air Cooled Condenser: Aluminum fin and copper tube coil, AHRI 520 with direct drive axial propeller fan resiliently mounted, galvanized fan guard.
- D. Accessories: Filter drier, high pressure switch (manual reset), low pressure switch (automatic reset), service valves and gage ports, thermometer well (in liquid line).
 - 1. Provide thermostatic expansion valves.
 - 2. Provide kit for wall mounting outdoor unit.
- E. Operating Controls:
 - 1. Control by room thermostat to maintain room temperature setting.

2.04 ACCESSORY EQUIPMENT

- A. Room Thermostat (Honeywell TH8321U): Wall-mounted, electric solid state microcomputer based room thermostat with remote sensor to maintain temperature setting; low-voltage; with following features:
 - 1. Automatic switching from heating to cooling.
 - 2. Preferential rate control to minimize overshoot and deviation from setpoint.
 - 3. Thermostat Display:
 - a. Time of day.
 - b. Actual room temperature.
 - c. Programmed temperature.
 - d. Day of week.
 - e. System Mode Indication: Heating, Cooling, Auto or On, Off.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.
- B. Verify that proper power supply is available and in correct location.
- C. Verify that proper fuel supply is available for connection.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.
- B. Install in accordance with NFPA 90A and NFPA 90B.
- C. Install gas fired furnaces in accordance with NFPA 54.
- D. Provide vent connections in accordance with NFPA 211.

3.03 SCHEDULE: SEE SCHEDULE ON PLANS.

END OF SECTION

DIVISION 26: Electrical

SECTION 26 0010
BASIC ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES:

- A. Basic Electrical Requirements specifically applicable to Division 26 Sections, in addition to Division 01 - General Requirements.

1.02 SCOPE OF WORK:

- A. The Electrical Contract Installation shall include a complete Electrical Installation for the project. All conduit, fixtures and equipment herein specified, mentioned or shown on Drawings, shall be furnished and installed in place, connected up and ready for normal operation except for such items as are specifically mentioned to be furnished by others.

1.03 WORK INCLUDED:

- A. The Electrical Contract shall include all work under the listed Sections of the Specifications Index and all related Electrical work as shown on the Drawings for the project.
- B. A Complete table of Electrical Reference Symbols is shown on the plans.
- C. Under this Contract the Electrical Contractor shall furnish the Owner with two 3-ring binders of all pertinent systems related documents. Submit manuals to the Engineer for his review. The Engineer will then turn books over to the Owner. The books shall contain the following items:
 - 1. Shop drawings on all major equipment.
 - 2. Operating Instructions for all major equipment.
 - 3. Maintenance Instructions for all major equipment.
 - 4. Wiring diagrams for all equipment.
 - 5. Control drawings for any systems not furnished under other contracts.
- D. The Electrical contractor is responsible for own equipment, such as cranes, lifts, etc. in order to provide a complete installation of Electrical systems.
- E. The Electrical Contractor is responsible for contacting the utility company and coordinating the power connection for the building service. Include all costs in bid.
- F. Coordinate utility service outages and reconnections with Utility Company and Owner.
- G. Branch feeders, branch wiring, receptacles, special outlets, switches, light fixtures, dimmers, contactors, starters, timers, etc., as shown on the plans or required for operation of the electrical system.
- H. Repair of all damage done to the premises as a result of the installation and removal of all debris or surplus material left by those engaged in the work.
- I. All new outside building lighting and sign lighting, including wiring, timers, photocells, switches and circuit breakers.

1.04 SPECIFICATIONS COMPLIANCE

- A. The requirements of these specifications shall be complied with in every respect. Therefore, it shall be absolutely mandatory that the job foreman, all lead electricians, subcontractors and their foreman have completely studied these specifications, be completely knowledgeable as to their entire contents, and maintain a copy at the job-site. Failure to comply with this requirement will be reason to presume the electrician or subcontractor is not in responsible charge of his work due to ignorance of job requirements, and will be reason for the owner to require dismissal and replacement with approved personnel. Every foreman and lead mechanic shall be provided with a complete copy of this specification.

1.05 INCONSISTENCIES

- A. If there is an inconsistency in the quality and/or quantity of Work required by the Contract Documents, either the greater quality and/or quantity of Work indicated shall be provided in accordance with the Engineer/Architect's interpretation without change in the contract sum.

1.06 CODES, FEES AND LATERAL COSTS:

- A. The Electrical Installation shall meet all applicable local, state and federal codes and standards. All permits necessary for a complete electrical installation shall be paid for by this Contractor.

- B. Except in those municipalities which provide state-approved electrical inspection, all installation of electrical equipment wiring shall be inspected by the State Board of Electricity. Allowance shall be made in the bid and contract for the cost of such inspection.
- C. Fees for such inspection will be charged in accordance with the rules and regulations of the State Board of Electricity. Evidence of payment of fees shall be provided by the Contractor with his Request for Payment.

1.07 REGULATORY REQUIREMENTS:

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed by Underwriters Laboratories, Inc. or other testing firm acceptable to authority having jurisdiction.

1.08 SUBMITTALS:

- A. Submit under provisions of Division 01.
- B. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.
- C. The contractor shall submit four (4) copies of shop drawings on all equipment and materials to the engineer for approval. The contractor shall not use any equipment or materials that does not have the engineer's stamped approval.
- D. Mark dimensions and values in units to match those specified.

1.09 PROJECT/SITE CONDITIONS:

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions.

1.10 SEQUENCING AND SCHEDULING:

- A. Construct Work in sequence under provisions of Division 1.

1.11 PRE-CONSTRUCTION COORDINATION AND VERIFICATION:

- A. This Contractor shall coordinate his work with other Contractors on this job. Any conflict which cannot be resolved shall be settled by the Architect/Engineer.
- B. Field verification of scale dimensions on plans is directed since actual locations, distances and levels will be governed by actual field conditions.
- C. The Contractors shall check architectural, structural, plumbing, heating, ventilating and electrical plans to avert possible installation conflicts. Should drastic changes from original plans be necessary to resolve such conflicts this Contractor shall notify the Architect/Engineer and secure written approval and agreement on necessary adjustments before the installation is started.
- D. Discrepancies shown on different plans or between plans and actual field conditions or between plans and specifications shall promptly be brought to the attention of the Architect/Engineer for a decision.
- E. The Contractor shall consider and review the complete set of documents, etc., Architectural, Structural, Mechanical, Electrical, etc., (Drawings and Specifications) as his complete set. He will be responsible for any and all electrical work shown or stated (to be by him), to include this work in his bid and install such items even though they are not specifically shown or stated on the Electrical section of the plans and specifications.
- F. The drawings are indicative of the work to be installed, but do not show all bends, fittings, boxes and specialties required to complete the installation.
- G. All conduits, wires, outlets boxes, switches, receptacles, devices and fixtures shall be included in the work.
- H. Where it is stated that the contractor shall "provide" a device or piece of equipment, it shall mean that such a device or equipments are finished and installed.

1.12 CUTTING, PATCHING, AND FIRESTOPPING:

- A. The Electrical Contractor shall set all sleeves in construction for their Work.
- B. Where cutting is required, it shall be done by the Electrical Contractor.
- C. All patching shall be done by Electrical Contractor.

- D. All conduit and outlet installations and cutting of any kind must be done with great care so as not to leave unsightly surfaces which may not be entirely concealed by plates, escutcheons, or their normal concealing construction, if such unsightly conditions occur, Electrical Contractor will be required, at their own expense, to replace the damaged construction.
- E. This Electrical Contractor shall provide and install firestopping materials per Section 07 8400 - Firestopping.

1.13 SCAFFOLDING:

- A. Furnish and erect all scaffolding, ladders, etc., required in the installation of wiring, equipment and fixtures.

1.14 ADDITIONAL ELECTRICAL COSTS:

- A. If the Mechanical Contractor substitutes equipment for specified units, the mechanical contractor shall be responsible for any additional electrical installation costs for this substitution whether the other equipment was listed as equal in the specification or was approved equal after the project was in the bidding process.

1.15 GUARANTEE:

- A. This Contractor shall be responsible for the proper installation and working of everything in this contract and shall guarantee to remedy free of charge any defects in workmanship and materials that may appear to give or gives rise to trouble of any kind for a period of one year from the time of final acceptance of his work by the Owner.
- B. This Contractor shall be responsible for the proper installation and working of everything in this contract and shall guarantee to remedy free of charge any defects in workmanship and materials that may appear to give or gives rise to trouble of any kind for a period of one year from date of final substantial completion.

PART 2 NOT USED

PART 3 EXECUTION

3.01 EQUIPMENT CONNECTIONS:

- A. Provide necessary power wiring for equipment furnished by others. Verify requirements with the Contractors responsible to supply each piece of equipment. Provide heavy duty disconnect switches as indicated.

3.02 AS-BUILT DRAWINGS:

- A. Contractor shall keep an accurate record of all deviations from contract drawings and specifications. He shall neatly and correctly enter in colored crayon any deviations on drawings affected, and shall keep drawings available for inspection. Extra set of drawings will be furnished for this purpose.
- B. At the completion of the job, and before final acceptance, the Contractor shall provide a complete set of as-built drawings. The Contractor shall show locations for all major electrical devices, including panelboards and all major runs of conduit, the circuiting of each fixture, outlet, etc., shall be shown. Certify to the accuracy of each print, by signature thereon, and deliver same to Architect.

END OF SECTION

SECTION 26 0505
SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical demolition.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify field measurements and circuiting arrangements are as indicated.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition drawings are based on casual field observation and existing record documents.
- D. Report discrepancies to Engineer/Architect before disturbing existing installation.
- E. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

- A. Disconnect electrical systems in walls, floors, and ceilings to be removed.
- B. Coordinate utility service outages with utility company.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
- D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
 - 1. Obtain permission from Owner at least 24 hours before partially or completely disabling system.
 - 2. Make temporary connections to maintain service in areas adjacent to work area.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Remove, relocate, and extend existing installations to accommodate new construction.
- B. Remove abandoned wiring to source of supply.
- C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces. Use materials to match fire rating of wall.
- D. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.
- E. Disconnect and remove abandoned panelboards and distribution equipment.
- F. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- G. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- H. Repair adjacent construction and finishes damaged during demolition and extension work.
- I. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
- J. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

3.04 CLEANING AND REPAIR

- A. See Section 01 7419 - Construction Waste Management and Disposal for additional requirements.
- B. Clean and repair existing materials and equipment that remain or that are to be reused.
- C. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

END OF SECTION

SECTION 26 0519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single conductor building wire.
- B. Power and control tray cable.
- C. Wiring connectors.
- D. Electrical tape.
- E. Heat shrink tubing.
- F. Wire pulling lubricant.
- G. Cable ties.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).
- E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2010.
- F. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2013.
- G. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- H. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2009.
- I. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
- L. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
- M. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
- N. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.
- O. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.
- P. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.
- Q. UL 1277 - Electrical Power and Control Tray Cables with Optional Optical-Fiber Members; Current Edition, Including All Revisions.
- R. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
 - 3. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Engineer/Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
- C. Nonmetallic-sheathed cable is not permitted.
- D. Underground feeder and branch-circuit cable is not permitted.
- E. Service entrance cable is not permitted.
- F. Armored cable is not permitted.
- G. Metal-clad cable is not permitted.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductor Material:
 - 1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
 - 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 - 3. Tinned Copper Conductors: Comply with ASTM B33.
- H. Minimum Conductor Size:

1. Branch Circuits: 12 AWG.
 - a. Exceptions:
 - 1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
 - 2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
 - 3) 20 A, 277 V circuits longer than 150 feet: 10 AWG, for voltage drop.
 2. Control Circuits: 14 AWG.
- I. Conductor Color Coding:
1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 2. Color Coding Method: Integrally colored insulation.
 - a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
 3. Color Code:
 - a. 480Y/277 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - 4) Neutral/Grounded: Gray.
 - b. 208Y/120 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral/Grounded: White.
 - c. Equipment Ground, All Systems: Green.
 - d. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.

2.03 SINGLE CONDUCTOR BUILDING WIRE

- A. Description: Single conductor insulated wire.
- B. Conductor Stranding:
 1. Feeders and Branch Circuits:
 - a. Size 10 AWG and Smaller: Stranded.
 - b. Size 8 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation:
 1. Copper Building Wire: Type THHN/THWN-2, except as indicated below.
 - a. Size 4 AWG and Larger: Type XHHW-2.
 - b. Installed Underground: Type XHHW-2.

2.04 METAL-CLAD CABLE

- A. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
- B. Conductor Stranding:
 1. Size 10 AWG and Smaller: Stranded.
 2. Size 8 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.
- E. Grounding: Full-size integral equipment grounding conductor.
- F. Armor: Steel, interlocked tape.

2.05 POWER AND CONTROL TRAY CABLE

- A. Description: NFPA 70, Type TC cable listed and labeled as complying with UL 1277.

- B. Where exposed run cable is indicated between cable tray and utilization equipment in qualifying industrial establishments as determined by authorities having jurisdiction, provide tray cable marked as Type TC-ER in accordance with NFPA 70.
- C. Conductor Stranding: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation: Type XHHW or XHHW-2.
- F. Jacket: PVC or Chlorinated Polyethylene (CPE).

2.06 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Wiring Connectors for Splices and Taps:
 - 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
 - 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
- C. Wiring Connectors for Terminations:
 - 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
 - 2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
 - 3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
 - 4. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
 - 5. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
- D. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
- E. Mechanical Connectors: Provide bolted type.
- F. Compression Connectors: Provide circumferential type or hex type crimp configuration.

2.07 ACCESSORIES

- A. Electrical Tape:
 - 1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
 - 2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
 - 3. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.
 - 4. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
 - 5. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.
- B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
- C. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
- D. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that field measurements are as indicated.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

- A. Circuiting Requirements:
 - 1. Unless dimensioned, circuit routing indicated is diagrammatic.
 - 2. When circuit destination is indicated without specific routing, determine exact routing required.
 - 3. Arrange circuiting to minimize splices.
 - 4. Include circuit lengths required to install connected devices within 10 ft of location indicated.
 - 5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
 - 6. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is permitted, under the following conditions:
 - a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.
 - b. Increase size of conductors as required to account for ampacity derating.
 - c. Size raceways, boxes, etc. to accommodate conductors.
 - 7. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Installation in Raceway:
 - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 - 2. Pull all conductors and cables together into raceway at same time.
 - 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 - 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- E. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- F. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
- G. Terminate cables using suitable fittings.
 - 1. Metal-Clad Cable (Type MC):
 - a. Use listed fittings.
 - b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
- H. Install conductors with a minimum of 12 inches of slack at each outlet.

- I. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- J. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- K. Make wiring connections using specified wiring connectors.
 - 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 - 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 - 3. Do not remove conductor strands to facilitate insertion into connector.
 - 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
 - 5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- L. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
 - 1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
 - 2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
 - b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
 - 3. Wet Locations: Use heat shrink tubing.
- M. Insulate ends of spare conductors using vinyl insulating electrical tape.
- N. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.
- O. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- P. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

SECTION 26 0526

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground bars.
- E. Ground rod electrodes.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2007.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify exact locations of underground metal water service pipe entrances to building.
 - 2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
 - 3. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

- A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
- B. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- E. Grounding Electrode System:
 - 1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.

- a. Provide continuous grounding electrode conductors without splice or joint.
 - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
2. Metal Underground Water Pipe(s):
 - a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
 - b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
 - c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
3. Metal In-Ground Support Structure:
 - a. Provide connection to metal in-ground support structure that is in direct contact with earth in accordance with NFPA 70.
4. Concrete-Encased Electrode:
 - a. Provide connection to concrete-encased electrode consisting of not less than 20 feet of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
5. Ground Rod Electrode(s):
 - a. Provide two electrodes unless otherwise indicated or required.
 - b. Space electrodes not less than 10 feet from each other and any other ground electrode.
 - c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
6. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
7. Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
 - a. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.
 - b. Where ground bar location is not indicated, locate in accessible location as near as possible to service disconnect enclosure.
 - c. Ground Bar Mounting Height: 18 inches above finished floor unless otherwise indicated.
8. Ground Riser: Provide common grounding electrode conductor not less than 3/0 AWG for tap connections to multiple separately derived systems as permitted in NFPA 70.
- F. Service-Supplied System Grounding:
 1. For each service disconnect, provide grounding electrode conductor to connect neutral (grounded) service conductor to grounding electrode system. Unless otherwise indicated, make connection at neutral (grounded) bus in service disconnect enclosure.
 2. For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed. Do not make any other connections between neutral (grounded) conductors and ground on load side of service disconnect.
- G. Bonding and Equipment Grounding:
 1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
 2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.

3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
 4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
 6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
 7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
 - a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
 - b. Metal gas piping.
- H. Communications Systems Grounding and Bonding:
1. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
 - a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
 - b. Raceway Size: 3/4 inch trade size unless otherwise indicated or required.
 - c. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.

2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
1. Provide products listed, classified, and labeled as suitable for the purpose intended.
 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 0526:
1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.
 - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
 2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
- D. Ground Bars:
1. Description: Copper rectangular ground bars with mounting brackets and insulators.
 2. Holes for Connections: As indicated or as required for connections to be made.
- E. Ground Rod Electrodes:
1. Comply with NEMA GR 1.
 2. Material: Copper-bonded (copper-clad) steel.
 3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that field measurements are as indicated.
- C. Verify that conditions are satisfactory for installation prior to starting work.
- D. Verify that final backfill and compaction has been completed before driving rod electrodes.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.

- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
 - 1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches below finished grade.
- D. Make grounding and bonding connections using specified connectors.
 - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 - 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 - 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- E. Identify grounding and bonding system components in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- C. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION

SECTION 26 0529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 26 0533.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.
- C. Section 26 0533.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2013.
- D. MFMA-4 - Metal Framing Standards Publication; 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 5. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 3000.

1.05 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Comply with applicable building code.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.

2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
 - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
- D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
 1. Comply with MFMA-4.
 2. Channel Material:
 - a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
- E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
- F. Anchors and Fasteners:
 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
 2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
 3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
 4. Hollow Masonry: Use toggle bolts.
 5. Hollow Stud Walls: Use toggle bolts.
 6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
 7. Sheet Metal: Use sheet metal screws.
 8. Wood: Use wood screws.
 9. Plastic and lead anchors are not permitted.
 10. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
 - a. Comply with MFMA-4.
 - b. Channel Material: Use galvanized steel.
 - c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.
 11. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that mounting surfaces are ready to receive support and attachment components.
- B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.

- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- D. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- E. Unless specifically indicated or approved by Engineer/Architect, do not provide support from suspended ceiling support system or ceiling grid.
- F. Unless specifically indicated or approved by Engineer/Architect, do not provide support from roof deck.
- G. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- H. Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 - 4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 3 inch high concrete pad constructed in accordance with Section 03 3000.
 - 5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- I. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.
- J. Secure fasteners according to manufacturer's recommended torque settings.
- K. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect support and attachment components for damage and defects.
- C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- D. Correct deficiencies and replace damaged or defective support and attachment components.
- E. Install hangers and supports as required to adequately and securely support electrical system components, in a neat and workmanlike manner, as specified in NECA 1.
 - 1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
 - 2. Obtain permission from Engineer/Architect before drilling or cutting structural members.
- F. Rigidly weld support members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- G. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- H. In wet and damp locations use steel channel supports to stand cabinets and panelboards 1 inch off wall.
- I. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

END OF SECTION

SECTION 26 0533.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Galvanized steel rigid metal conduit (RMC).
- B. Aluminum rigid metal conduit (RMC).
- C. Intermediate metal conduit (IMC).
- D. Flexible metal conduit (FMC).
- E. Liquidtight flexible metal conduit (LFMC).
- F. Electrical metallic tubing (EMT).
- G. Rigid polyvinyl chloride (PVC) conduit.
- H. Conduit fittings.
- I. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
 - 1. Includes additional requirements for fittings for grounding and bonding.
- C. Section 26 0529 - Hangers and Supports for Electrical Systems.
- D. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.
- B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.
- C. ANSI C80.5 - American National Standard for Electrical Rigid Aluminum Conduit (ERAC); 2005.
- D. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit (EIMC); 2005.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- F. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.
- G. NECA 102 - Standard for Installing Aluminum Rigid Metal Conduit; 2004.
- H. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2003.
- I. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.
- J. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; 2005.
- K. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2013.
- L. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2015.
- M. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- N. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
- O. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- P. UL 6A - Electrical Rigid Metal Conduit-Aluminum, Red Brass, and Stainless Steel; Current Edition, Including All Revisions.
- Q. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.
- R. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

- S. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.
- T. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.
- U. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.
- V. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
 - 4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
 - 5. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.
- B. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs, and conduits 2 inch (53 mm) trade size and larger.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, implies all applications are acceptable. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
 - 1. Under Slab on Grade: Use galvanized steel rigid metal conduit or rigid PVC conduit.
 - 2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit or rigid PVC conduit.
 - 3. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
 - 4. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit elbows for bends.
 - 5. Where steel conduit is installed in direct contact with earth where soil has a resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape to provide supplementary corrosion protection or use PVC-coated galvanized steel rigid metal conduit.

- D. Embedded Within Concrete:
 - 1. Within Slab on Grade: Not permitted.
 - 2. Within Slab Above Ground: Not permitted.
 - 3. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from concrete.
- E. Interior, Damp or Wet Locations: Use aluminum rigid metal conduit.
- F. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), aluminum rigid metal conduit, or electrical metallic tubing (EMT).
- G. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or aluminum rigid metal conduit.
 - 1. Locations subject to physical damage include, but are not limited to:
 - a. Where exposed below 6 feet, except within electrical and communication rooms or closets.
- H. Exposed, Exterior: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or PVC-coated galvanized steel rigid metal conduit.
- I. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or Schedule 40 PVC.
- J. Corrosive Locations Above Ground: Use aluminum rigid metal conduit.
- K. Hazardous (Classified) Locations: Use aluminum rigid metal conduit.
- L. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
 - 1. Maximum Length: 6 feet.
- M. Connections to Vibrating Equipment:
 - 1. Dry Locations: Use flexible metal conduit.
 - 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
 - 3. Maximum Length: 6 feet unless otherwise indicated.
 - 4. Vibrating equipment includes, but is not limited to:
 - a. Motors.

2.02 CONDUIT REQUIREMENTS

- A. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Minimum Conduit Size, Unless Otherwise Indicated:
 - 1. Branch Circuits: 3/4 inch (21 mm) trade size.
 - 2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
 - 3. Control Circuits: 3/4 inch (21 mm) trade size.
 - 4. Flexible Connections to Luminaires: 1/2 inch (16 mm) trade size.
 - 5. Underground, Interior: 1 inch (27 mm) trade size.
 - 6. Underground, Exterior: 1 inch (27 mm) trade size.
- D. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
 - 1. Allied Tube & Conduit: www.alliedeg.com/#sle.
 - 2. Republic Conduit: www.republic-conduit.com/#sle.
 - 3. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com/#sle.
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.

2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.
4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 ALUMINUM RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
 1. Allied Tube & Conduit: www.alliedeg.com/#sle.
 2. Republic Conduit: www.republic-conduit.com/#sle.
 3. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com/#sle.
- B. Description: NFPA 70, Type RMC aluminum rigid metal conduit complying with ANSI C80.5 and listed and labeled as complying with UL 6A.
- C. Fittings:
 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 3. Hazardous (Classified) Locations: Use fittings listed and labeled as complying with UL 1203 for the classification of the installed location.
 4. Material: Use aluminum.
 5. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.05 INTERMEDIATE METAL CONDUIT (IMC)

- A. Manufacturers:
 1. Allied Tube & Conduit: www.alliedeg.com/#sle.
 2. Republic Conduit: www.republic-conduit.com/#sle.
 3. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com/#sle.
- B. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- C. Fittings:
 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 3. Material: Use steel or malleable iron.
 4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.06 FLEXIBLE METAL CONDUIT (FMC)

- A. Manufacturers:
 1. AFC Cable Systems, Inc: www.afcweb.com/#sle.
 2. Electri-Flex Company: www.electriflex.com/#sle.
 3. International Metal Hose: www.metalhose.com/#sle.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.
- C. Fittings:
 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.

2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.

2.07 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Manufacturers:
 1. AFC Cable Systems, Inc: www.afcweb.com/#sle.
 2. Electri-Flex Company: www.electriflex.com/#sle.
 3. International Metal Hose: www.metalhose.com/#sle.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- C. Fittings:
 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 2. Material: Use steel or malleable iron.

2.08 ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
 1. Allied Tube & Conduit: www.alliedeg.com/#sle.
 2. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com/#sle.
- B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- C. Fittings:
 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 2. Material: Use steel or malleable iron.
 3. Connectors and Couplings: Use compression (gland) or set-screw type.
 - a. Do not use indenter type connectors and couplings.

2.09 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- B. Fittings:
 1. Manufacturer: Same as manufacturer of conduit to be connected.
 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.10 ACCESSORIES

- A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil.
- B. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.
- C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- D. Modular Seals for Conduit Penetrations: Rated for minimum of 40 psig; Suitable for the conduits to be installed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install aluminum rigid metal conduit (RMC) in accordance with NECA 102.
- E. Install intermediate metal conduit (IMC) in accordance with NECA 101.
- F. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- G. Conduit Routing:
 - 1. Unless dimensioned, conduit routing indicated is diagrammatic.
 - 2. When conduit destination is indicated without specific routing, determine exact routing required.
 - 3. Conceal all conduits unless specifically indicated to be exposed.
 - 4. Conduits in the following areas may be exposed, unless otherwise indicated:
 - a. Electrical rooms.
 - b. Mechanical equipment rooms.
 - c. Within joists in areas with no ceiling.
 - 5. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
 - 6. Arrange conduit to maintain adequate headroom, clearances, and access.
 - 7. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
 - 8. Route conduits above water and drain piping where possible.
 - 9. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
 - 10. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
 - 11. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
 - a. Heaters.
 - b. Hot water piping.
 - c. Flues.
 - 12. Group parallel conduits in the same area together on a common rack.
- H. Conduit Support:
 - 1. Secure and support conduits in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
 - 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
 - 3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
 - 4. Use conduit strap to support single surface-mounted conduit.
 - a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
 - 5. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
 - 6. Use conduit clamp to support single conduit from beam clamp or threaded rod.
 - 7. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
 - 8. Use of wire for support of conduits is not permitted.
- I. Connections and Terminations:
 - 1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
 - 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
 - 3. Use suitable adapters where required to transition from one type of conduit to another.

4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
 5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
 6. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
 7. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- J. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
 3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
 4. Conceal bends for conduit risers emerging above ground.
 5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
 6. Provide suitable modular seal where conduits penetrate exterior wall below grade.
 7. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- K. Underground Installation:
1. Minimum Cover, Unless Otherwise Indicated or Required:
 - a. Underground, Exterior: 24 inches.
 - b. Under Slab on Grade: 12 inches to bottom of slab.
 2. Provide underground warning tape in accordance with Section 26 0553 along entire conduit length for service entrance where not concrete-encased.
- L. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
 2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
 3. Where conduits are subject to earth movement by settlement or frost.
- M. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
 2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- N. Provide grounding and bonding in accordance with Section 26 0526.

3.03 CLEANING

- A. Clean interior of conduits to remove moisture and foreign matter.

END OF SECTION

SECTION 26 0533.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.
- C. Boxes for hazardous (classified) locations.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 08 3100 - Access Doors and Panels: Panels for maintaining access to concealed boxes.
- C. Section 26 0529 - Hangers and Supports for Electrical Systems.
- D. Section 26 2726 - Wiring Devices:
 - 1. Wall plates.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.
- D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- I. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.
- J. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.
- K. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
 - 4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
 - 5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
 - 6. Coordinate the work with other trades to preserve insulation integrity.
 - 7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
 - 8. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.
- B. Products: Provide products listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 BOXES

- A. General Requirements:
 - 1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
 - 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 - 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
 - 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
 - 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
 - 1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
 - 2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
 - 3. Use suitable concrete type boxes where flush-mounted in concrete.
 - 4. Use suitable masonry type boxes where flush-mounted in masonry walls.
 - 5. Use raised covers suitable for the type of wall construction and device configuration where required.
 - 6. Use shallow boxes where required by the type of wall construction.
 - 7. Do not use "through-wall" boxes designed for access from both sides of wall.
 - 8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 - 9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 - 10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
 - 11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
 - 12. Wall Plates: Comply with Section 26 2726.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
 - 1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
 - 2. NEMA 250 Environment Type, Unless Otherwise Indicated:
 - a. Indoor Clean, Dry Locations: Type 1, painted steel.
 - b. Outdoor Locations: Type 3R, painted steel.
 - c. Indoor Damp or Wet Locations: Type 4X stainless steel..
 - 3. Junction and Pull Boxes Larger Than 100 cubic inches:
 - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
 - 4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
 - a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
 - b. Back Panels: Painted steel, removable.

5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
- D. Boxes for Hazardous (Classified) Locations: Listed and labeled as complying with UL 1203 for the classification of the installed location.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive boxes.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- E. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
- F. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
- G. Box Locations:
 1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 3100 as required where approved by the Architect.
 2. Unless dimensioned, box locations indicated are approximate.
 3. Locate boxes so that wall plates do not span different building finishes.
 4. Locate boxes so that wall plates do not cross masonry joints.
 5. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
 6. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
- H. Box Supports:
 1. Secure and support boxes in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
 3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
- I. Install boxes plumb and level.
- J. Flush-Mounted Boxes:
 1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
- K. Install boxes as required to preserve insulation integrity.
- L. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

- M. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- N. Close unused box openings.
- O. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- P. Provide grounding and bonding in accordance with Section 26 0526.
- Q. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.03 CLEANING

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

END OF SECTION

SECTION 26 0553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Underground warning tape.
- E. Warning signs and labels.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES:
Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

1.03 REFERENCE STANDARDS

- A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2011.
- B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.04 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

- A. Existing Work: Unless specifically excluded, identify existing elements to remain that are not already identified in accordance with specified requirements.
- B. Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - a. Motor Control Centers:
 - 1) Identify ampere rating.
 - 2) Identify voltage and phase.
 - 3) Use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
 - b. Panelboards:
 - 1) Identify voltage and phase.
 - 2) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
 - 3) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Identify spares and spaces.
 - c. Transformers:
 - 1) Identify kVA rating.
 - 2) Identify voltage and phase for primary and secondary.
 - d. Enclosed switches, circuit breakers, and motor controllers:
 - 1) Identify voltage and phase.
 - 2) Identify voltage power source and circuit number. Include location when not within sight of equipment.
 - 3) Identify load(s) served. Include location.
 - e. Transfer Switches:
 - 1) Identify voltage and phase.
 - 2) Identify short circuit current rating based on the specific overcurrent protective device type and settings protecting the transfer switch.
 - 2. Service Equipment:

- a. Use identification nameplate to identify each service disconnecting means.
- 3. Use identification nameplate to identify equipment utilizing series ratings, where permitted, in accordance with NFPA 70.
- 4. Use identification label or handwritten text using indelible marker on inside of door at each fused switch to identify required NEMA fuse class and size.
- 5. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".
- 6. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70, including but not limited to the following.
 - a. Service equipment.
 - b. Industrial control panels.
 - c. Motor control centers.
 - d. Elevator control panels.
 - e. Industrial machinery.
- 7. Use warning signs to identify electrical hazards for entrances to all rooms and other guarded locations that contain exposed live parts operating at 600 V nominal or less with the word message "DANGER; Electrical hazard; Authorized personnel only" or approved equivalent.
- C. Identification for Conductors and Cables:
 - 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 0519.
 - 2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
- D. Identification for Devices:
 - 1. Use identification label to identify fire alarm system devices.
 - 2. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.
 - 3. Use identification label to identify receptacles protected by upstream GFI protection, where permitted.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
 - 1. Materials:
 - a. Indoor Clean, Dry Locations: Use plastic nameplates.
 - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
 - 2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
 - 3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
 - 4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
 - 5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.
- B. Identification Labels:
 - 1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
 - 2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.
- C. Format for Equipment Identification:
 - 1. Minimum Size: 1 inch by 2.5 inches.
 - 2. Legend:
 - a. Equipment designation or other approved description.
 - 3. Text: All capitalized unless otherwise indicated.

4. Minimum Text Height:
 - a. Equipment Designation: 1/2 inch.
5. Color:
 - a. Normal Power System: White text on black background.

2.03 WIRE AND CABLE MARKERS

- A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
- B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- C. Legend: Power source and circuit number or other designation indicated.
- D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
- E. Minimum Text Height: 1/8 inch.
- F. Color: Black text on white background unless otherwise indicated.

2.04 UNDERGROUND WARNING TAPE

- A. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
- B. Non-detectable Type Tape: 6 inches wide, with minimum thickness of 4 mil.
- C. Legend: Type of service, continuously repeated over full length of tape.
- D. Color:
 1. Tape for Buried Power Lines: Black text on red background.

2.05 WARNING SIGNS AND LABELS

- A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- B. Warning Signs:
 1. Materials:
 - a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
 2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
 3. Minimum Size: 7 by 10 inches unless otherwise indicated.
- C. Warning Labels:
 1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
 2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
 3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
 1. Surface-Mounted Equipment: Enclosure front.
 2. Flush-Mounted Equipment: Inside of equipment door.
 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
 4. Elevated Equipment: Legible from the floor or working platform.
 5. Branch Devices: Adjacent to device.
 6. Interior Components: Legible from the point of access.
 7. Conductors and Cables: Legible from the point of access.

- 8. Devices: Outside face of cover.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.
- G. Secure rigid signs using stainless steel screws.
- H. Mark all handwritten text, where permitted, to be neat and legible.

END OF SECTION

SECTION 26 0583
WIRING CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.
- B. Section 26 0533.13 - Conduit for Electrical Systems.
- C. Section 26 0533.16 - Boxes for Electrical Systems.
- D. Section 26 2726 - Wiring Devices.

1.03 REFERENCE STANDARDS

- A. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2015).
- B. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2016.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
 - 1. Colors: Comply with NEMA WD 1.
 - 2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
 - 3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Wiring Devices: As specified in Section 26 2726.
- C. Flexible Conduit: As specified in Section 26 0533.13.
- D. Wire and Cable: As specified in Section 26 0519.
- E. Boxes: As specified in Section 26 0533.16.

2.02 EQUIPMENT CONNECTIONS

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

- A. Make electrical connections in accordance with equipment manufacturer's instructions.

- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to accommodate connection with attachment plug.
- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.
- J. Coolers and Freezers: Cut and seal conduit openings in freezer and cooler walls, floor, and ceilings.

END OF SECTION

SECTION 26 0914
MONITORING AND CONTROL INSTRUMENTATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sensors, analyzers, transmitters, and accessory components.
- B. Parshall flume flow measurement device.

1.02 REFERENCE STANDARDS

- A. ASME B1.20.1 - Pipe Threads, General Purpose (Inch); 2013 (Reaffirmed 2018).
- B. ASME B1.20.2M - Pipe Threads, 60 Deg. General Purpose (Metric); 2006; R 2011.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements,
- B. Product Data: Manufacturer's data sheets on each item of equipment, showing compliance with specified requirements and detailed technical characteristics; where multiple components are shown on the same data sheet, mark the specific component referred to.
- C. Shop Drawings: Provide make, model, power requirements, calibration range, and operating specifications.
- D. Operation and Maintenance Manuals.

1.04 QUALITY ASSURANCE

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 INSTRUMENTATION - GENERAL

- A. In addition to devices indicated, provide all transformers, field preamplifiers, signal conditioners, offset and span adjustments, amplifiers, transducers, transmitters, control devices, signal transmission, and control and power wiring suitable for the application, as necessary to provide complete end-to-end process control loop accuracy from sensor to display and final control element.
- B. Where necessary provide devices that make engineering units conversions and have specific algorithms for applications.
- C. Power Supply: 24 volts DC.
- D. Transmitters: Provide a transmitter for each sensor unless otherwise indicated; transmitter selected to match sensor, with following characteristics unless otherwise indicated:
 - 1. Display: Four digit or analog visual display of measured parameter.
 - 2. Output Signal: 4 to 20 mA DC, proportional to level of measured parameter.
 - 3. Accuracy: Plus/minus 0.5 percent of full scale reading with output error not exceeding Plus/minus 0.25 percent of the calibrated measurement.
 - 4. Mounting: Integral with sensor, pipe mounted, wall mounted or installed in control panel.
 - 5. Location, if Not Integral with Sensor: Where indicated; if not indicated, not more than the distance from the sensor recommended by manufacturer.

2.03 LEVEL INSTRUMENTATION

- A. Manufacturers:
 - 1. Siemens Automation: www.siemens.com/#sle.
 - 2. Endress Hauser.
 - 3. Rosemount.
- B. Level Instrumentation - General:
 - 1. For measurement of hazardous contents, provide relays and housings that are intrinsically safe or explosion proof as defined by NFPA 70 hazard rating for type of contents.
 - 2. Mounting: Easily removed for periodic maintenance.

- C. Parshall Flume Level/Flow Sensor, Ultrasonic Type: Microprocessor based, providing continuous, non-contact level measurement of liquids and solids utilizing microwave pulsed time of flight measurement method, operating in a frequency band approved for industrial use; capable of distinguishing between real echoes, reflections and background noise; automatic compensation for temperature changes.
 - 1. Sensor Range: Estimated Zero to 10 feet. Field verify required distance in existing Parshall Flume structure.
 - 2. Accuracy: Plus/minus one percent of full scale.
 - 3. Temperature Range: Minus 15 degrees F to 105 degrees F.
 - 4. Mounting: Installed vertically above flume. Furnish and install stainless steel mounting bracket fixed to floor.
 - a. Size mounting to eliminate echoing.
 - b. Position sensor to maximize return echo signal and minimize vessel obstructions in sensor line of sight.
- D. Level Switches, Conductivity Type: Detect presence of fluid by measuring electrical resistance between sensor and ground electrode.
 - 1. Electrodes: TP316 stainless steel; lengths as necessary based on application and to meet requirements of control sequence.
 - a. Pump Room. One electrode shall be longer than the other by a maximum of 0.125".
 - 2. Electrode Cladding: Polyolefin.
 - 3. Ground Electrode: Provide a separate ground electrode.
 - 4. Set Points: 1 separate level set points.
 - 5. Relays: Provide a relay switching point for each sensor.
 - 6. Contacts: Rated for maximum 240 volts AC, 5 A.
 - 7. Response Time: Not more than 2 seconds.
 - 8. Mounting: Switch installed vertically; easily accessible for maintenance and calibration.
 - a. Provide stainless steel bracket and secure to wall. Provide sensor with NPT male threads and secure to wall bracket.
 - b. Longest electrode shall be installed 0.0625" above finished floor.
- E. Level Switches, Mercury Float Type: Two normally open mercury switches, encapsulated in epoxy resin with polypropylene casing; suitable for hazardous locations, with explosion proof and corrosion resistant housing, and intrinsically safe relays.
 - 1. Switch Cable: Oil resistant thermoplastic cable with 4 No.18 gage stranded copper conductors, rated for 600 Volt application.
 - 2. Mounting: Wall bracket or mounting plate, stainless steel rods, stainless steel bolts.

2.04 TEMPERATURE INSTRUMENTATION

- A. Temperature Instrumentation:
 - 1. Temperature Ranges: As indicated.
 - 2. Do not use mercury in thermometers.
 - 3. Do not use strap-on temperature sensing devices unless specifically indicated.
 - 4. Provide thermowell for each sensing device installed in liquid systems.
 - 5. For space temperature sensing, include housing suitable for wall mounting.
 - 6. For outside air sensing, provide instrument shelter or sun shield to minimize solar effects and mounting location to minimize building effects.
- B. Temperature Sensors, Resistance Temperature Detector, Continuous Averaging Type: Bendable copper sheath; sufficient length to ensure that resistance represents average over cross-section in which installed.
 - 1. Accuracy: Plus/minus 0.9 degrees F at reference temperature.
 - 2. Mounting: Readily accessible and installed to allow easy replacement.
 - 3. 3 wire, 100 ohm.
 - 4. NEMA 4,4X enclosure for damp or wet locations.
 - 5. NEMA 1 enclosure for dry locations.
 - 6. Outside air temperature sensing elements shall be shielded from direct sunlight.
 - 7. 24 VDC loop powered transmitter with 0-150F range/4-20mA output.
 - 8. Wall mounted for space temperature sensors.

- C. Thermowells: Sized for accurate fit to temperature sensing device and calibrated to compensate for thermal transmission delay.
 - 1. Material: Stainless steel, TP316, unless otherwise indicated.
 - 2. Immersion Length: As indicated on drawings.
 - 3. Connection box sized to accommodate device and transmitter.
 - 4. For insulated pipe, provide lagging extension sufficient to protrude through insulation.
 - 5. Threaded attachment unless otherwise indicated.
 - 6. Fixed Hex Nipples: Male threaded sockets; ASME B1.20.1 (ASME B1.20.2M) threads.
 - 7. Thermowells Used with RTDs and Thermocouples: Provide terminal connection heads rated NEMA 250 Type 4X.

2.05 PROCESS INSTRUMENTATION

- A. Manufacturers:
 - 1. Honeywell Process: www.honeywellprocess.com/en-US/#sle.
 - 2. SMC Sierra Corporation.
- B. Combustible Gas Sensors: Means of collecting representative continuous samples and measuring for presence of explosive vapors; poison resistant.
 - 1. Range: From 0 percent of lower explosive limit (LEL) to 100 percent of lower explosive limit (LEL).
 - 2. Response Time: Less than 10 seconds to indicate 50 percent LEL when exposed to 100 percent LEL.
 - 3. Zero Drift: Less than 3 percent per year.
 - 4. Operational Life: One year, minimum.
 - 5. Provide 90 days of zero and calibration gas.
 - 6. Sample Inlet Location: Representative of area monitored.
 - 7. Housing: Rated for hazardous location Class I, Division 1 or 2.
 - 8. Mounting: Wall mount, provide all necessary stainless steel brackets.
 - 9. Provide remote sensor option. Transmitter to be mounted 60" above finished floor.
 - 10. Ability to test and calibrate at transmitter height.
 - 11. Where sample tube is used, provide size and maximum length as recommended by manufacturer; tubing not crimped or kinked.
 - 12. Location: Sensor shall be located as indicated on drawings or as recommended by manufacturer and representative of area monitored, allowing access to sensor for periodic maintenance and replacement.
- C. Hydrogen Sulfide Gas Sensors: Rated for continuous monitoring of hydrogen sulfide level.
 - 1. Range: from 0 to 0 to 10 ppmv.
 - 2. Accuracy: Plus/minus one percent of full scale reading.
 - 3. Response Time: 90 percent in maximum of 60 seconds.
 - 4. Sample Inlet Location: Representative of area monitored.
 - 5. Housing: Rated for hazardous location Class I, Division 1 or 2.
 - 6. Mounting: Wall mount, provide all necessary stainless steel brackets.
 - 7. Provide remote sensor option. Transmitter to be mounted 60" above finished floor.
 - 8. Ability to test and calibrate at transmitter height.
 - 9. Where sample tube is used, provide size and maximum length as recommended by manufacturer; tubing not crimped or kinked.
 - 10. Location: Sensor shall be located as indicated on drawings or as recommended by manufacturer and representative of area monitored, allowing access to sensor for periodic maintenance and replacement.
- D. Oxygen Gas Sensors: Rated for continuous monitoring of oxygen gas level.
 - 1. Range: 5-25 percent.
 - 2. Accuracy: Plus/minus one percent of full scale reading.
 - 3. Response Time: 90 percent in maximum of 60 seconds.
 - 4. Automatic zeroing, requiring no normal maintenance or periodic recalibration.
 - 5. Housing: Rated for hazardous location Class I, Division 1 or 2.
 - 6. Mounting: Wall mount, provide all necessary stainless steel brackets.
 - 7. Transmitter and sensor to be mounted 60" above finished floor.

8. Location: Sensor shall be located as indicated on drawings or as recommended by manufacturer and representative of area monitored, allowing access to sensor for periodic maintenance and replacement.

2.06 SIGNALING DEVICES

- A. Alarm Signaling Devices.
 1. Manufacturers:
 - a. Allen-Bradley or approved equal.
 - 1) #855H-BCD series combination horn/strobe for use in non hazardous areas.
 - 2) #855XM-CGM series combination horn/strobe for use in Class I Division 2 hazardous locations.
 - b. Federal Signal or approved equal.
 - 1) #27XST series strobe light for use in Class I, Division 1 and 2 hazardous locations.
 - 2) #31X or #41X series vibrating horn for use in Class I, Division 1 and 2 hazardous locations.
 2. Provide red lens for combustible gas alarm.
 3. Provide amber lens for ventilation alarm.
 4. Provide protective lens cover.
 5. Mounting: Wall.
 6. NEMA 4/4X/13 in damp or wet environments.
 7. LED strobe light with single flash.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions and as indicated on drawings.
- B. Provide the services of a qualified technician experienced in installation and operation of type of equipment provided, to supervise installation, calibration, start-up, demonstration, and testing.
- C. Install devices with adequate clearance for maintenance.
- D. Do not obstruct access to or clearances required for maintenance of other equipment and systems.
- E. Local Indicators: Install direct-reading indicator devices, thermometers, and pressure gauges so that they can be easily read from floor level and are readily accessible for maintenance and service.
- F. Adjust or replace devices not complying with specified requirements; except factory sealed devices must be replaced, rather than adjusted.

3.02 FIELD QUALITY CONTROL - SENSOR CALIBRATION - PRIOR TO STARTUP

- A. Calibrate monitoring and control instrumentation; devices with factory calibration certification need not be field calibrated.
- B. Calibrate using methods described below; alternate methods may be used, if approved by Owner beforehand.
- C. Make reports of calibrations performed, documenting methods, and initial, intermediate, and final results.
- D. Calibration Accuracy and Tolerances: As indicated for each device.
- E. Calibration Equipment: Provide equipment of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified. If not otherwise noted, the following minimum equipment calibration requirements apply:
 1. Temperature Sensors and Digital Thermometers: Certified calibration within past year to accuracy of 0.5 degree F and resolution of plus/minus 0.1 degree F.
 2. Pressure Sensors: Accuracy of plus/minus 2.0 percent of the value range being measured (not full range of meter), calibrated within the last year.
 3. Equipment Calibration: According to the manufacturer's recommended intervals and when dropped or damaged; affix calibration tags or keep certificates readily available for inspection.
- F. All Sensors:

1. Verify that sensor location is appropriate and away from potential causes of erratic operation.
 2. Verify that sensors with shielded cable are grounded only at one end.
 3. For sensor pairs that are used to determine a temperature or pressure difference, for temperature make sure they are reading within 0.2 degree F of each other, and for pressure, within tolerance equal to 2 percent of the reading, of each other.
 4. Tolerances for critical applications may be tighter.
- G. Sensors Without Transmitters:
1. Make a reading with a calibrated test instrument within 6 inches of the site sensor.
 2. Verify that the sensor reading is within the specified tolerances of the instrument-measured value.
 3. If not, install offset, calibrate or replace sensor.
- H. Sensors With Transmitters:
1. Disconnect sensor.
 2. Connect a signal generator in place of sensor to simulate desired characteristic.
 3. Connect ammeter in series between transmitter and process control panel.
 4. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter.
 5. Repeat for the maximum characteristic matching 20 mA to the potentiometer span or maximum and verify at the process control system.
 6. Record all values and recalibrate controller as necessary to comply with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction.
 7. Reconnect sensor.
 8. Make a reading with a calibrated test instrument within 6 inches of the site sensor.
 9. Verify that the sensor reading, via the permanent local display or the process control system, is within the specified tolerances of the instrument-measured value.
 10. If not, replace sensor and repeat.
- I. After calibration, perform calibration accuracy check:
1. Conduct two-point accuracy check of calibration of each control system sensing element and transmitter by comparing value from test instrument to corresponding sensor/transmitter output variable.
 2. Use digital indicating test instruments at least twice as accurate as specified sensor accuracy, with calibration traceable to National Institute of Standards and Technology standards.
 3. Verify that sensing element-to-control system readout accuracies at two points are within specified product accuracy tolerances.
 4. If not, recalibrate or replace device and repeat calibration check.

3.03 OWNER PERSONNEL TRAINING

- A. Content: Include each type of sensor, meter, analyzer, and transmitter, covering calibration, operation, maintenance, and testing.
- B. Operating and Maintenance Personnel Training:
1. Sessions: One.
 2. Training Hours: 1, minimum, per unique equipment item.

END OF SECTION

SECTION 26 0915
SUPERVISORY AND PROCESS CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General Requirement.
- B. Enclosures.
- C. Programmable Logic Controller (PLC).
- D. Operator Interface.
- E. Control Components.
- F. Sequence of Operation.

1.02 RELATED REQUIREMENTS

- A. The requirements within this section apply to all components of the controls system unless indicated otherwise.
- B. Section 26 2716 - Electrical Cabinets and Enclosures: Cabinets and terminal blocks.

1.03 REFERENCE STANDARDS

- A. NEMA ICS 1 - Industrial Control and Systems General Requirements; 2000 (Reaffirmed 2015).
- B. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000 (R2005), with errata, 2008.
- C. NEMA ICS 6 - Industrial Control and Systems: Enclosures; 1993 (Reaffirmed 2016).
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. NFPA 870 - Standard for Fire Protection in Wastewater Treatment and Collection Facilities; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. Underwriters Laboratories (UL). UL 508 Industrial Control Panel Equipment.

1.04 GENERAL REQUIREMENT

- A. Contractor shall use a Controls System Integrator (CSI) to furnish, install, calibrate, start-up, test, and adjust all required equipment for a complete process control system. Equipment shall be furnished as required to meet the requirements shown on the Plans and include within the Specifications and also include any incidental items necessary for a complete system even though it is not detailed.
- B. It is the intent of the Construction Documents that all control equipment specified be supplied by a single-source supplier. The supplier shall assume full responsibility along with the Contractor for furnishing, installing, and start-up procedures so as to make the system operate per the intent of the Construction Documents.
- C. It is the responsibility of the CSI to examine all new and existing equipment that will be powered from or will receive or send signals from equipment within in the Specifications and Plans. The CSI shall provide all necessary devices to interface with existing and new equipment including but not limited to signal converters, amplifiers, and isolation devices.
- D. Provide safety stop system meeting NFPA 79 requirements.
- E. Major work items include but are not limited to:
 - 1. Process instrumentation, control panels, controllers, programmable controllers, and operator interfaces.
 - 2. Provide all software, programming, and configuration required to implement specifications and control functions as shown on the Drawings.
 - 3. Connection to and integration with Ethernet networks for motor control.
 - a. All network devices shall be powered by uninterruptible power supply with a capacity to sustain load for a minimum of 15 minutes.
 - 1) Provide UPS power to any network switches mounted outside SPCP1 including the motor control center.

4. PLC systems furnished and installed in control panels completely wired, and ready to run specified processes.
5. Complete operating Supervisory Control And Data Acquisition (SCADA) system with all necessary software and hardware.
6. Provide and configure all software to support functions shown and specified.
7. Provide all network drivers, components, and configuration to make a fully functional control network.
8. Provide remote access capability through internet and existing city network to support PLC and HMI systems.
 - a. Provide firewall and security to prevent unauthorized access to control system.
 - b. Coordinate network design with city of Storm Lake technology partner:
 - 1) Rebnord Technologies. 210 Sale Barn Road, Storm Lake, IA 50588
 - 2) Jason Knapton
 - 3) Phone: 712-732-6449
9. Provide new control system to control and monitor lift station equipment.
 - a. SPCP1 Pump Control Panel
 - 1) PLC processor and I/O.
 - 2) Operator interface.
 - b. HMI/SCADA:
 - 1) Control, adjust, monitor, alert, and alarm status of equipment at local operator interface.
 - 2) Provide monitoring and remote control of lift station from existing SCADA system at the waste water treatment facility.
 - (a) Configure systems and network to communicate with existing SCADA system.
 - (1) Utilize existing private network connection between lift station and waste water treatment facility.
 - (2) Coordinate required network settings with Rebnord Technologies.
 - (b) Existing SCADA system is Rockwell Automation Factory Talk View Supervisory Edition (SE).
 - (1) Remove graphical and all other references from demolished lift station control system.
 - (2) Add graphic displays to show all lift station operations, and provide means for operators to make adjustments.

1.05 ADMINISTRATION REQUIREMENTS

- A. Coordination:
 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.

1.06 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 1. Catalog cut sheets for all components and devices.
 2. Dimension drawings, wiring and/or hydraulic drawings for field and pipeline mounted equipment.
 3. System schematic drawings illustrating all components being supplied including elevations, legend, bill of material, construction details, and layout with complete pneumatic and electrical connections. Actual system schematic drawings shall be provided. Manufacturers catalog cuts or standard drawings merely showing "typical" circuitry are not acceptable.
 4. As-built drawings shall be provided upon project completion in CAD and PDF format.
 5. Communications and network diagrams.
 6. Fabrication and nameplate legend drawings.
- C. Operation and maintenance manuals.

1. Manufacturers O&M manuals for all equipment supplied.
2. Recommended maintenance intervals and procedures.
3. Operational manual for operator interface displays, including but not limited to; screen shots, explanation of graphics, navigation, step by step procedures, security, passwords, and alarms.
4. As-built drawings of entire system in CAD and PDF format.
5. Recommended spare parts list.
6. Specific parameter settings of electronic equipment including but not limited to variable frequency drives (VFD's).
7. Final copy of PLC program subroutines with comments in PDF format.
8. USB drive containing final PLC and operator interface programs.
9. PLC I/O point list; identify point tag, description, type, range, location, and point address.
10. All documentation to be provided electronically and two copies in 3-ring binders with labeled tabs separating sections.

1.07 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Control System Integrator (CSI) Qualifications
 1. Company specializing in components and programming of the products specified in this section with service facilities within 200 miles of Project.
 2. The CSI shall have ability to provide 24 hr., 7 day a week emergency services during and after the warranty period.
- C. The control panel shall be built by a registered UL 508 Industrial Control Panel builder. Each control panel shall bear a serialized "Enclosed Industrial Control Panel Label." Panels that utilize intrinsically safe barriers shall be upgraded from standard 508A to standard 698 and bear serialized label to that effect. The control panel submittal shall contain a copy of the front page of the control panel builders UL508A and 698 (if applicable) standard that shows their UL file number. The name on the front page of the UL Standard shall match the name in the title block of the control panel submittal.
- D. Products: Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and indicated.
- E. All equipment shall be furnished by a single supplier. The supplier shall be responsible for the correct operation of the equipment as specified.
- F. Contractor shall guarantee system operation and workmanship for a period of one year from date the system was accepted by the owner.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store components in a clean, dry area; maintain temperature to NEMA ICS 1.

1.09 FIELD CONDITIONS

- A. Maintain temperature above 32 degrees F and below 104 degrees F during and after installation of products.
- B. Maintain area free of dirt and dust during and after installation of products.

1.10 SEQUENCING AND SCHEDULING

- A. Prerequisite activities: Do not start key project activities until prerequisite activities have been completed and satisfied.
 1. Shop drawing reviews by engineer.

PART 2 PRODUCTS

2.01 GENERAL

- A. Devices supplied shall be of the latest field proven models, unless otherwise specified to match existing equipment.
- B. Instruments and devices performing similar operations shall be of the same type and model, and shall be from a single manufacturer.

- C. Analog measurements and control signals shall be 4 to 20 mA DC except as indicated. Signals where required by special devices may be 0 to 5 volts or 0 to 10 volts DC. Standard pneumatic signals shall be 3 to 15 psig.
- D. Electronic components shall be protected from transient voltage.

2.02 ENCLOSURES

- A. Control Station Enclosures: NEMA ICS 6.
- B. Relay Enclosures: NEMA ICS 6.
- C. Fabrication: Shop fabricate control panels to NEMA ICS 1, using cabinets and terminal blocks furnished in accordance with Section 26 0533.16.
- D. All components shall be mounted to the enclosure back panel. Components shall not be mounted to the enclosure sides.
- E. 25% free space shall be maintained within enclosure back panels for future components.
- F. Shall have engraved label identifying panel name on panel door.
- G. PLC and I/O enclosures shall have fused service receptacle within the enclosure.
- H. Panel mounted components shall have matching style and appearance.
- I. Panel mounted components with digital displays installed outdoors shall be protected from direct sunlight.
- J. Panel mounted devices shall be a minimum of 4 feet above finished floor elevation.
- K. Each source of foreign voltage in a control enclosure shall be isolated by providing disconnecting means or pull-apart terminal blocks.
- L. Penetrations through the top of control enclosures is not permissible.
- M. Terminal blocks shall be furnished, installed, and wired to each I/O point of a chassis or rack mounted I/O module. Terminal blocks shall be provided and connected to each unused I/O point. Enclosures shall have 25% spare terminal blocks for future connection.
 - 1. Terminal blocks shall not be installed when distributed I/O modules are used. Field wires shall directly terminated to distributed I/O terminal bases.
 - 2. Terminal blocks shall not be installed when factory wired I/O interface modules (IFM's) are used. Field wires shall directly terminate to the IFM.
- N. Indoor and outdoor control panel and instrument enclosures shall be suitable for operation in the ambient conditions. Heating, cooling, and dehumidifying equipment shall be provided in enclosures to maintain electronic components within manufacturers recommended ambient temperature and humidity operating ranges. All equipment installed in hazardous or classified areas shall be suitable for use in the area.
 - 1. Indoor, dry: NEMA 12 painted steel.
 - 2. Indoor, wet, damp, or corrosive: NEMA 4X, type 316 stainless steel.
 - 3. Outdoor: NEMA 4X, type 316 stainless steel.
- O. Control panel wiring
 - 1. Single conductors shall be flexible stranded copper type MTW, and shall be rated for 600 volts.
 - 2. Signal cables shall be #18 AWG shielded twisted pair or triad cables with copper conductors.
 - 3. Wire numbers shall be marked using plastic coated cloth type labels with black text printed on white background.
 - 4. Incoming power source shall accept 120 VAC single phase.
 - 5. Circuit breaker shall be provided in control panel for incoming power source overcurrent protection and disconnecting means.
 - 6. Individual fuse protection with disconnecting means shall be provided for each I/O module, and each electrical component that consumes power.
 - 7. Individual fuse protection with disconnecting means shall be provided for each field installed device that consumes power.
 - 8. Primary and secondary fuse protection with disconnecting means shall be provided on all power supplies.
 - 9. Fuse blocks and disconnecting means shall be labeled.

P. Protection: Each control panel to be equipped with transient voltage surge suppressor.

2.03 PROGRAMMABLE LOGIC CONTROLLER (PLC)

A. Manufacturer

1. Rockwell Automation, Allen-Bradley; CompactLogix or ControlLogix series.

B. General

1. Furnish and install complete PLC system with all necessary components to make a fully functional system as specified within the Plans and Specifications.
2. PLC shall be configured to perform the specified operations.
3. PLC and related components shall be mounted inside the control panel.
4. I/O design shall be chassis or rack based.
5. All components shall meet UL standards.
6. Processor shall have minimum 2 MB user memory.
7. Primary program language shall be ladder diagram.
8. Digital inputs shall be 120 VAC or 24 VDC as required.
9. Digital outputs shall be relay type, or shall be protected by buffer relays. 120 VAC or 24 VDC as required.
10. Analog outputs shall be 4-20 mA DC, unless otherwise required.
11. Analog inputs shall be 4-20 mA DC, unless otherwise required.
12. Service conditions:
 - a. 32F-140F
 - b. 5-95% relative humidity non-condensing
13. Provide uninterruptible power supply to all chassis, racks, and I/O modules.
 - a. Size to maintain full load for a minimum of 20 minutes.
 - b. Shall have maintenance free, sealed, leak proof battery.
 - c. Shall have audible alarm when on battery, and when battery level is low.
 - d. Shall have dry contact for remote monitoring of alarm state.
14. Controller shall utilize Ethernet communications and shall have ability of communicating with other PLC's, computers, and operator interfaces.
 - a. I/O devices shall communicate on dedicated Ethernet network.
 - b. HMI/SCADA shall communicate on dedicated Ethernet network, and shall communicate to existing SCADA system in wastewater treatment facility over existing network.
 - c. Shall have ability for remote support connection over the internet.
15. Provide minimum spare I/O points:
 - a. 8 digital inputs.
 - b. 8 digital outputs.
 - c. 2 analog outputs.
 - d. 2 analog inputs.

2.04 OPERATOR INTERFACE

A. General

1. Furnish and install complete Human Machine Interface (HMI) system with all necessary components to make a fully functional system including software, hardware, and programming.
2. Operator interface shall be configured to perform the specified operations.
3. Shall use Ethernet as means of communication to PLC.
4. Shall have ability for remote support connection over the internet.
5. Shall be panel mounted in door of control panel SPCP1.
6. Contractor is responsible for ensuring compatibility between specified operator interface and PLC. If compatibility is an issue an alternate device must be submitted for approval.
7. Furnish and install uninterruptible power supply.
 - a. Size to maintain full load for a minimum of 20 minutes.
 - b. Shall have maintenance free, sealed, leak proof battery.
 - c. Shall have audible alarm when on battery, and when battery level is low.

B. HMI terminals

1. Manufacturer

- a. Rockwell Automation, Allen-Bradley; PanelView Plus 7, or PanelView 5000 Series Graphic Terminal.
 - b. Maple Systems; P Series Graphic Terminal.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- 2. Color touchpad display.
- 3. 10 inch minimum display size.

2.05 CONTROL COMPONENTS

- A. Manufacturers.
 - 1. Allen-Bradley/Rockwell Automation; www.ab.rockwellautomation.com.
 - 2. Eaton Corporation; www.eaton.com/#sle.
 - 3. Schneider Electric; Square D Products; www.schneider-electric.us/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Circuit breakers.
 - 1. Shall be Allen Bradley 1492-SP series or approved equal.
- C. Fuse holders.
 - 1. Shall be Allen Bradley 1492-H series with blown fuse indicator or approved equal.
- D. Push buttons, operators, & signaling devices.
 - 1. All panel mounted push buttons and selector switches shall be heavy duty and oil-tight/water-tight. Dry areas shall use Allen-Bradley Bulletin 800T or approved equal. Wet or damp areas shall use Allen-Bradley Bulletin 800H or approved equal.
 - 2. Rotary switches shall be provided with knob lever operators.
 - 3. Emergency stop switches shall be trigger action two position maintained, twist release, & red.
 - 4. All devices shall have legend plates describing operation.
- E. Control relays.
 - 1. Allen-Bradley Bulletin 700, Type HB, or equal.
 - 2. General purpose control relays shall be provided with dust covers and with plug-in configuration. Sockets to be DIN rail mounted.
 - 3. Minimum rating of 10 amps at 150 volts and 3PDT. If more poles are required, relays shall be paralleled.
 - 4. Mechanical flag indicator to show status of contacts.
- F. Remote Alarm Monitor.
 - 1. Manufacturer: Sensaphone or approved equal.
 - a. Model: SCD-1200-CD Web-Based Monitoring through the Cloud.
 - b. Requirements.
 - 1) Communication method:
 - (a) Ethernet
 - 2) Supervised.
 - 3) 12 digital inputs.
 - 4) 12 alarm status LEDs.
 - 5) Battery backup; 8 hour rechargeable battery to maintain continuous power during power outage.
 - 6) 120 VAC plug in type power supply.
 - 7) Alarm notification methods: E-mail, text messages, and voice phone calls.
 - (a) Multiple contact types per user.
 - 8) Wall mounted NEMA 1 enclosure with clear door.
 - c. Coordinate monthly subscription payment with owner.
 - d. Include 1 year subscription in owners name. Start subscription during startup and commissioning phase.
 - e. Mount inside SPCP-1 enclosure.
- G. Pump Relay.
 - 1. Provide pump over temperature relay for Pump 1 and Pump 2 as recommended by the pump manufacturer.

PART 3 EXECUTION

3.01 FIELD INSTALLATION AND TESTING REPORTS

- A. Complete adjustment, test, calibration, and status reports for all work.
- B. Test electrical grounding in panels.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Furnish a complete working system by a competent manufacturer's representative and include instruction to the Owner on proper operation and maintenance.
- C. Follow manufacturers' installation instructions for all materials and equipment, unless otherwise indicated or directed by Engineer.
- D. Wiring connected to components and assemblies, including power wiring in accordance with requirements of Section 26.
- E. Electrical raceways as specified in Section 26.
- F. Identification as specified in Section 26.

3.03 FIELD QUALITY CONTROL

- A. Field testing may not be done contiguously, and may require multiple trips to the site. The Contractor shall determine the number of testing periods requiring separate trips to the site in order to complete functional and performance testing requirements.
- B. Functional Testing:
 - 1. Prior to facility startup and performance evaluation period, inspect, test, and document that all equipment is ready for operation.
 - 2. Provide equipment calibration testing for all components.
 - 3. Confirm application software and programming is complete and ready for performance testing.
 - 4. Test all control related network media, devices, configuration, and operation.
- C. Correct deficiencies and replace damaged or defective equipment.

3.04 CLOSEOUT ACTIVITIES

- A. Performance Testing:
 - 1. Coordinate performance testing with Owner and Engineer. Notify Owner and Engineer four weeks prior to the start of performance testing.
 - 2. Engineer and Owner may actively participate in tests, and reserve the right to test or retest specified functions and hold final decision-making rights as to whether testing is acceptable and complete.
- B. Demonstration: Demonstrate proper operation of entire system to Owner, and correct deficiencies or make adjustments as directed.
- C. Perform local, manual, remote, and automatic mode tests on all equipment.
- D. Training: Train Owner's personnel on operation, adjustment, and maintenance of all systems.
 - 1. Provide an integrated training program for Owner's personnel to meet the specific needs of the Owner's personnel.
 - 2. Including training sessions in a classroom setting and in the field. Train managers, engineers, operators, and maintenance personnel.
 - 3. The Owner reserves the right to record and reuse training sessions.
 - 4. Location: At project site.

3.05 SEQUENCE OF OPERATION

- A. Overview: Provide control of waste water pumping station primarily consisting of five waste water pumps, wet well level, parshall flume flow, and building HVAC systems.
- B. General:
 - 1. If motor or device is called to run and does not start within 10 seconds, lock out device and alarm.
 - 2. If motor or device fails during operation, lock out device and alarm.
 - 3. Display readings of all instruments on local operator interface.

4. Display readings of all instruments and status of all outputs on existing SCADA interface at wastewater treatment plant.
 5. Provide hand-off-auto operation on operator interface for each output.
 6. Monitor HOA Auto selector switch position of each motor controller within the motor control center. Enable/disable automatic control based on switch position.
 7. Display status of every input and output with description of device connected at operator interface.
 8. Interlock related set-points to prevent corruption of set-points so unexpected operation does not occur.
 9. At operator interface; provide operator adjustable time delays before energizing or de-energizing equipment.
 10. MCC
 - a. Normal automatic control and monitoring shall be done over EtherNet/IP.
 - b. At a minimum monitor running, overload fault, and other available faults of each FVNR starter.
 - c. At a minimum monitor running, fault, amperage, and speed (Hz) for each VFD and soft starter.
- C. Wet well level
1. Level transmitter 0-100%.
 - a. Provide operator adjustable setpoint for Stage 1 target level.
 - b. Provide operator adjustable setpoint for pump off level.
 - c. Provide operator adjustable setpoint for Stage 2 pump on level.
 - d. Provide operator adjustable setpoint for Stage 3 pump on level.
 - e. Provide operator adjustable setpoint for high level warning.
 - f. Provide operator adjustable setpoint for high level alarm.
 2. Float level sensors.
 - a. Pump Off Float - shall override automatic control and de-energize all pumps.
 - b. Backup Mode Low Level Float - shall be used in backup mode to energize pumps.
 - c. Backup Mode High Level Float - shall be used in backup mode to energize pumps.
 - d. High Level Alarm Float - shall indicate alarm.
- D. Lift station pumps.
1. Run pumps for minimum time as recommended by the pump manufacturer.
 2. Limit number of starts per hour as recommended by the pump manufacturer.
 3. Monitor pump 1 and pump 2 over temperature relay; Lockout affected pump from all operation (automatic or manual) and alarm.
 4. Pumps 1 and 2 (60HP)
 - a. Pumps operate on variable frequency drives.
 - b. Provide read only setpoint for pump 1 and 2 minimum pump speed. Pumps shall not be allowed to operate below this speed as recommended by the pump manufacturer.
 - c. Pumps 1 and 2 shall be used as primary pumps to maintain wet well level and shall automatically vary speed to maintain wet well level setpoint.
 - d. When level is at or above the target setpoint; start pumps 1 and 2 simultaneously.
 - e. When pump initially energizes operate pump at 100% speed for recommended duration by manufacturer. Then reduce speed to minimum, and begin automatic adjustment to maintain level setpoint.
 - f. Both pumps shall operate at same speed.
 - g. If level continues to decrease below target setpoint, shut off one pump.
 - 1) If running on one pump, and level continues to increase beyond target setpoint, turn on second pump. Operate both pumps at minimum speed and automatically adjust to maintain level.
 - h. If level is at or below the pump off setpoint shut off all pumps.
 5. Pumps 3, 4, and 5 (300HP).
 - a. Pumps operate on soft starters.
 - b. No more than two of the three pumps shall operate simultaneously.
 - c. Pumps shall be sequenced such that two 300HP pumps can not start at the same time, and a 300HP pump can not start at the same time as Pumps 1 and 2.

- d. Automatically rotate lead and lag pump sequence each time the lead pump shuts off.
- e. Energize one pump when level is at or above Stage 2 pump on level. Shut off pump when level is at or below the Stage 1 target level.
- f. Energize second pump when level is at or above Stage 3 pump on level. Shut off pump when level is at or below the Stage 2 target level.
- 6. Lift station pumps - Backup Mode Control.
 - a. Provide selector switch in door of SPCP1 to select backup mode level control.
 - b. Provide operator enable/disable from operator interface to automatically initiate backup mode if high level alarm float is reached, or if PLC failure is detected.
 - c. Pumps shall operate on backup float sensors in backup mode, and shall operate independent from primary PLC controller. This is to provide backup operation of pumps in the event of level or primary PLC failure.
 - d. All pumps shall stop if level is at the stop pump float.
 - e. Provide operator adjustable time delays before energizing or de-energizing pumps.
 - f. Pumps 1 and 2 (60HP).
 - 1) Energize one pump when level is at or above Backup Mode Low Level Float and operate at fixed speed (100%). Stop pump when level is at or below Pump Stop Float.
 - (a) Start second pump after time delay providing level is at or above Backup Mode Low Level Float and operate at fixed speed (100%).
 - (b) Stop second pump if level is below Backup Mode Low Level Float.
 - g. Pumps 3, 4, and 5 (300HP)
 - 1) Start one pump when level is at or above Backup Mode High Level Float. Stop pump when level is at or below Backup Mode Low Level Float.
 - (a) Start second pump after time delay providing level is at or above Backup Mode High Level Float.
 - (b) Stop second pump if level is at or below Backup Mode High Level Float.
 - 2) Pumps shall be sequenced such that two 300HP pumps can not start at the same time, and a 300HP pump can not start at the same time as Pumps 1 and 2.
- 7. Pump starting shall be staggered after a loss of main power or control power.
 - a. Starting shall be staggered no matter if operating in normal mode, or backup mode.
 - b. No pump shall start until power has been restored for a minimum of 3 seconds.
 - 1) Pumps 1 and 2 can simultaneously start as required.
 - 2) Pumps 3, 4, or 5 can be staggered on after Pumps 1 and 2 are running at speed.
- E. Monitor combustible gas, oxygen, and hydrogen sulfide transmitters in grit room and grit room entrance.
 - 1. Provide alarm setpoints at operator interface for each transmitter. Limit setpoints within required alarm range.
 - 2. Energize horn/strobes in designated areas when alarm condition is present.
 - 3. Initiate alarm dialer to notify personnel of alarm.
 - 4. Transmitters and horn/strobes shall be connected to battery back up power supply with capacity to operate on backup for a minimum of 20 minutes.
- F. Monitor and alert when generator is running.
- G. Monitor generator alarm condition.
- H. Monitor and alert when auto transfer switch is in emergency position.
- I. Monitor SPCP1 control power loss alarm.
- J. Monitor grinder system running.
- K. Monitor grinder system alarm.
- L. Monitor grinder air handler alarm.
- M. Monitor surge protection device alarm and alerts.
- N. Monitor 3 phase power monitor alarm.
 - 1. Provide operator adjustable delay before alarm is initiated.
 - 2. Provide operator enable/disable to lock-out equipment when in alarm state.

- a. Condition must return to normal, and operator must reset/acknowledge condition before equipment can be put back into normal.
- O. Monitor dry well MAU air handler flame failure alarm.
- P. Monitor dry well MAU air handler clogged filter alert.
- Q. Monitor grit room supply and exhaust air flow switches.
 - 1. Energize horn/strobes in designated areas when alarm condition is present.
 - 2. Initiate alarm dialer to notify personnel of alarm.
 - 3. Air flow switches and Horn/strobes shall be connected to battery back up power supply with capacity to operate on backup supply for a minimum of 20 minutes.
- R. Monitor dry well area supply and exhaust air flow switches.
 - 1. Energize horn/strobes in designated areas when alarm condition is present.
 - 2. Initiate alarm dialer to notify personnel of alarm.
 - 3. Air flow switches and Horn/strobes shall be connected to battery back up power supply with capacity to operate on backup supply for a minimum of 20 minutes.
- S. Boiler System
 - 1. Monitor hot water supply and return flow switches.
 - 2. Monitor outside air temperature.
 - 3. Provide operator adjustable setpoint range to enable hot water system when outside temperature is at or below the temperature range:
 - a. Enable boiler.
 - b. Energize one of two hot water pumps.
 - 4. Automatically rotate lead hot water pump after 48 hours of pump operation or after each time the lead pump stops.
 - 5. If one pump fails, automatically rotate lead pump.
 - 6. If either flow switch is not satisfied when a pump is called to run; alarm and lock-out heating system.
- T. Parshall Flume Flow
 - 1. Display flow in gallons per minute on operator interface.
 - 2. Accumulate daily total gallons and display on operator interface.
 - a. Store daily totals in PLC memory for 60 days, and display on operator interface.
 - b. Reset daily total each day at midnight.
- U. Monitor flood sensor in pump room; alarm if liquid is detected.
- V. Monitor MCC room temperature. Provide operator adjustable setpoints for low and high temperature alarm.
- W. Monitor grinder room temperature. Provide operator adjustable setpoints for low and high temperature alarm.
- X. Monitor grinder room high level float sensor; alarm if high level is detected.
- Y. Provide emergency stop button in door of SPCP1. Emergency stop system to disable PLC outputs, and motors operated by SPCP1.
 - 1. Provide battery backup power to emergency stop system to prevent triggering false emergency stop during power outages. Battery backup shall be sized to provide power for a minimum of 20 minutes.
- Z. Alarms
 - 1. Outputs to alarm dialer. Consult with owner before configuring.
 - a. Equipment failure: motor failure failure.
 - b. Power alarm: 3 phase power alarm, generator alarm, emergency stop, PLC control power loss, etc.
 - c. Condition alarm: Temperature alarm, level alarm, ventilation alarm, hazardous gas alarm,
 - 2. Provide means to enable/disable individual alarms from operator interface.
 - 3. Provide operator adjustable time delay (minimum range 0-300 seconds) for each alarm condition.
 - 4. Provide historical alarm record at operator interface.

5. Energize alarm strobe at SPCP1 during alarm condition.

SECTION 26 2100
LOW-VOLTAGE ELECTRICAL SERVICE ENTRANCE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical service requirements.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 DEFINITIONS

- A. Service Point: The point of connection between the facilities of the serving utility and the premises wiring as defined in NFPA 70, and as designated by the Utility Company.

1.04 REFERENCE STANDARDS

- A. IEEE C2 - National Electrical Safety Code; 2012.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. No later than two weeks following date of the Agreement, notify Utility Company of anticipated date of service.
- B. Coordination:
 - 1. Verify the following with Utility Company representative:
 - a. Utility Company requirements, including division of responsibility.
 - b. Exact location and details of utility point of connection.
 - c. Utility easement requirements.
 - d. Utility Company charges associated with providing service.
 - 2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for electrical service and associated equipment.
 - 3. Coordinate arrangement of service entrance equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- C. Arrange for Utility Company to provide permanent electrical service. Prepare and submit documentation required by Utility Company.
- D. Utility Company charges associated with providing permanent service to be paid by Contractor..
- E. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Utility Company representative.
- F. Scheduling:
 - 1. Where work of this section involves interruption of existing electrical service, arrange service interruption with Owner.
 - 2. Arrange for inspections necessary to obtain Utility Company approval of installation.

1.06 QUALITY ASSURANCE

- A. Comply with the following:
 - 1. IEEE C2 (National Electrical Safety Code).
 - 2. NFPA 70 (National Electrical Code).
 - 3. The requirements of the Utility Company.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.
- B. Store products indoors in a clean, dry space having a uniform temperature to prevent condensation (including outdoor rated products which are not weatherproof until completely and properly installed). Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle products carefully to avoid damage to internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 ELECTRICAL SERVICE REQUIREMENTS

- A. Provide new electrical service consisting of all required conduits, conductors, equipment, metering provisions, supports, accessories, etc. as necessary for connection between Utility Company point of supply and service entrance equipment.
- B. Electrical Service Characteristics: As indicated on drawings.
- C. Utility Company: MidAmerican Energy.
- D. Division of Responsibility:
 - 1. Pad-Mounted Utility Transformers:
 - a. Transformer: Existing.
 - b. Transformer Grounding Provisions: Furnished and installed by Contractor per Utility Company requirements.
 - c. Secondary:
 - 1) Trenching and Backfilling: Provided by Contractor.
 - 2) Conduits: Furnished and installed by Contractor.
 - 3) Conductors: Furnished and installed by Contractor (Service Point at transformer).
 - 2. Terminations at Service Point: Provided by Utility Company.
- E. Products Furnished by Contractor: Comply with Utility Company requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that ratings and configurations of service entrance equipment are consistent with the indicated requirements.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Verify and mark locations of existing underground utilities.

3.03 INSTALLATION

- A. Install products in accordance with manufacturer's instructions and Utility Company requirements.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances and required maintenance access.
- D. Provide required support and attachment components in accordance with Section 26 0529.
- E. Provide grounding and bonding for service entrance equipment in accordance with Section 26 0526.
- F. Identify service entrance equipment, including main service disconnect(s) in accordance with Section 26 0553.

END OF SECTION

SECTION 26 2200
LOW-VOLTAGE TRANSFORMERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General purpose transformers.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- C. Section 26 0529 - Hangers and Supports for Electrical Systems.
- D. Section 26 0533.13 - Conduit for Electrical Systems: Flexible conduit connections.

1.03 REFERENCE STANDARDS

- A. 10 CFR 431, Subpart K - Energy Efficiency Program for Certain Commercial and Industrial Equipment - Distribution Transformers; Current Edition.
- B. IEEE C57.94 - IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type General Purpose Distribution and Power Transformers; 1982 (R2006).
- C. IEEE C57.96 - Guide for Loading Dry-Type Distribution and Power Transformers; 2013.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- E. NECA 409 - Standard for Installing and Maintaining Dry-Type Transformers; 2009.
- F. NEMA ST 20 - Dry-Type Transformers for General Applications; 2014.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 506 - Standard for Specialty Transformers; Current Edition, Including All Revisions.
- I. UL 1561 - Standard for Dry-Type General Purpose and Power Transformers; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include voltage, kVA, impedance, tap configurations, insulation system class and rated temperature rise, efficiency, sound level, enclosure ratings, outline and support point dimensions, weight, required clearances, service condition requirements, and installed features.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

1.07 FIELD CONDITIONS

- A. Ambient Temperature: Do not exceed the following maximum temperatures during and after installation of transformers.
 - 1. Greater than 10 kVA: 104 degrees F maximum.
 - 2. Less than 10 kVA: 77 degrees F maximum.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Source Limitations: Furnish transformers produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 TRANSFORMERS - GENERAL REQUIREMENTS

- A. Description: Factory-assembled, dry type transformers for 60 Hz operation designed and manufactured in accordance with NEMA ST 20 and listed, classified, and labeled as suitable for the purpose intended.
- B. Unless noted otherwise, transformer ratings indicated are for continuous loading according to IEEE C57.96 under the following service conditions:
 - 1. Altitude: Less than 3,300 feet.
 - 2. Ambient Temperature:
 - a. Greater than 10 kVA: Not exceeding 104 degrees F.
 - b. Less than 10 kVA: Not exceeding 77 degrees F.
- C. Core: High grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Keep magnetic flux densities substantially below saturation point, even at 10 percent primary overvoltage. Tightly clamp core laminations to prevent plate movement and maintain consistent pressure throughout core length.
- D. Impregnate core and coil assembly with non-hydroscopic thermo-setting varnish to effectively seal out moisture and other contaminants.
- E. Basic Impulse Level: 10 kV.
- F. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.
- G. Isolate core and coil from enclosure using vibration-absorbing mounts.
- H. Nameplate: Include transformer connection data, ratings, wiring diagrams, and overload capacity based on rated winding temperature rise.

2.03 GENERAL PURPOSE TRANSFORMERS

- A. Description: Self-cooled, two winding transformers listed and labeled as complying with UL 506 or UL 1561; ratings as indicated on the drawings.
- B. Primary Voltage: 480 volts delta, 3 phase.
- C. Secondary Voltage: 208Y/120 volts, 3 phase.
- D. Insulation System and Allowable Average Winding Temperature Rise:
 - 1. Less than 15 kVA: Class 180 degrees C insulation system with 115 degrees C average winding temperature rise.
 - 2. 15 kVA and Larger: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.
- E. Coil Conductors: Continuous aluminum windings with terminations brazed or welded.
- F. Winding Taps:
 - 1. Less than 3 kVA: None.
 - 2. 3 kVA through 15 kVA: Two 5 percent full capacity primary taps below rated voltage.
 - 3. 15 kVA through 300 kVA: Two 2.5 percent full capacity primary taps above and four 2.5 percent full capacity primary taps below rated voltage.
 - 4. 500 kVA and Larger: Two 2.5 percent full capacity primary taps above and two 2.5 percent full capacity primary taps below rated voltage.
- G. Energy Efficiency: Comply with 10 CFR 431, Subpart K.
- H. Sound Levels: Standard sound levels complying with NEMA ST 20.
- I. Accessories:
 - 1. Lug Kits: Sized as required for termination of conductors as indicated on the drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that suitable support frames and anchors are installed where required and that mounting surfaces are ready to receive transformers.

- C. Perform pre-installation tests and inspections on transformers per manufacturer's instructions and as specified in NECA 409. Correct deficiencies prior to installation.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install transformers in accordance with NECA 409 and IEEE C57.94.
- D. Use flexible conduit, under the provisions of Section 26 0533.13, 2 feet minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.
- E. Arrange equipment to provide minimum clearances as specified on transformer nameplate and in accordance with manufacturer's instructions and NFPA 70.
- F. Install transformers plumb and level.
- G. Transformer Support:
 - 1. Provide required support and attachment in accordance with Section 26 0529, where not furnished by transformer manufacturer.
 - 2. Use integral transformer flanges, accessory brackets furnished by manufacturer, or field-fabricated supports to support wall-mounted transformers.
 - 3. Unless otherwise indicated, mount floor-mounted transformers on properly sized 3 inch high concrete pad constructed in accordance with Section 03 3000.
 - 4. Use trapeze hangers assembled from threaded rods and metal channel (strut) to support suspended transformers. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- H. Provide grounding and bonding in accordance with Section 26 0526.
- I. Remove shipping braces and adjust bolts that attach the core and coil mounting bracket to the enclosure according to manufacturer's recommendations in order to reduce audible noise transmission.
- J. Where not factory-installed, install lugs sized as required for termination of conductors as indicated.
- K. Where furnished as a separate accessory, install transformer weathershield per manufacturer's instructions.

3.03 ADJUSTING

- A. Measure primary and secondary voltages and make appropriate tap adjustments.
- B. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.04 CLEANING

- A. Clean dirt and debris from transformer components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 2416

PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Lighting and appliance panelboards.
- B. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; Federal Specification; Revision E, 2013.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards; 2009.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- E. NEMA PB 1 - Panelboards; 2011.
- F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; 2013.
- G. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- K. UL 67 - Panelboards; Current Edition, Including All Revisions.
- L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.
- M. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
 - 4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 5. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
 - 1. Include characteristic trip curves for each type and rating of overcurrent protective device upon request.
- C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
 - 1. Include dimensioned plan and elevation views of panelboards and adjacent equipment with all required clearances indicated.
 - 2. Include wiring diagrams showing all factory and field connections.
- D. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Panelboard Keys: Two of each different key.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature:
 - a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
- C. Short Circuit Current Rating:
 - 1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
 - 2. Listed series ratings are not acceptable.
- D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- F. Bussing: Sized in accordance with UL 67 temperature rise requirements.
 - 1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.

2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- G. Conductor Terminations: Suitable for use with the conductors to be installed.
- H. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 2. Boxes: Galvanized steel unless otherwise indicated.
 - a. Provide wiring gutters sized to accommodate the conductors to be installed.
 3. Fronts:
 - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
 - b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
- J. Load centers are not acceptable.

2.03 LIGHTING AND APPLIANCE PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
 1. Main and Neutral Lug Material: Copper, suitable for terminating copper conductors only.
 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
 1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
 2. Phase and Neutral Bus Material: Copper.
 3. Ground Bus Material: Copper.
- D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.
- E. Enclosures:
 1. Provide surface-mounted or flush-mounted enclosures as indicated.
 2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
 3. Provide clear plastic circuit directory holder mounted on inside of door.

2.04 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
 2. Interrupting Capacity:
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
 - 1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
 - 2) 35,000 rms symmetrical amperes at 480 VAC.
 - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 3. Conductor Terminations:
 - a. Lug Material: Copper, suitable for terminating copper conductors only.
 4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
 5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

6. Provide the following circuit breaker types where indicated:
 - a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
7. Do not use tandem circuit breakers.
8. Do not use handle ties in lieu of multi-pole circuit breakers.

2.05 SOURCE QUALITY CONTROL

- A. Factory test panelboards according to NEMA PB 1.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive panelboards.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
- D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required support and attachment in accordance with Section 26 0529.
- F. Install panelboards plumb.
- G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.
- H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.
- I. Provide minimum of three spare 1 inch trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.
- J. Provide grounding and bonding in accordance with Section 26 0526.
- K. Install all field-installed branch devices, components, and accessories.
- L. Provide filler plates to cover unused spaces in panelboards.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers. Tests listed as optional are not required.
- D. Test GFCI circuit breakers to verify proper operation.
- E. Test AFCI circuit breakers to verify proper operation.
- F. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.
- C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.05 CLEANING

- A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 2419
MOTOR-CONTROL CENTERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Low-voltage (600 V and less) standard (non-arc-resistant) NEMA motor control centers.
- B. Motor Control Center Units:
 - 1. Combination Magnetic Motor Starter Units.
 - 2. Variable Frequency Drives.
 - 3. Combination Soft Starter Units.
 - 4. Control and Lighting Transformer.
 - 5. Lighting and Power Panelboard.
- C. Overcurrent Protective Devices.
- D. Motor Control Accessories:
 - 1. Auxiliary contacts.
 - 2. Pilot devices.
 - 3. Terminal blocks.
 - 4. Control and timing relays.
 - 5. Control power transformers.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- C. Section 26 0529 - Hangers and Supports for Electrical Systems.
- D. Section 26 2200 - Low-Voltage Transformers: For integration into equipment specified in this section, where indicated.
- E. Section 26 2416 - Panelboards: For integration into equipment specified in this section, where indicated.
- F. Section 26 2923 - Variable-Frequency Motor Controllers.

1.03 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; Federal Specification; Revision E, 2013.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NECA 402 - Recommended Practice for Installing and Maintaining Motor Control Centers; 2007.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- E. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000 (R2005), with errata, 2008.
- F. NEMA ICS 2.3 - Instructions for the Handling, Installation, Operation, and Maintenance of Motor Control Centers; 1995 (R2008).
- G. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices; 2000 (R2010).
- H. NEMA ICS 6 - Industrial Control and Systems: Enclosures; 1993 (Reaffirmed 2016).
- I. NEMA ICS 18 - Motor Control Centers; 2001 (R2007).
- J. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- K. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.
- M. UL 845 - Motor Control Centers; Current Edition, Including All Revisions.
- N. ISO 9001 Quality Management Systems.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
 - 2. Coordinate the work to provide motor controllers and associated overload relays suitable for use with the actual motors to be installed.
 - 3. Coordinate the work to provide motor controllers and associated wiring suitable for interface with control devices to be installed.
 - 4. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 5. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 6. Coordinate with manufacturer to provide shipping splits suitable for the dimensional constraints of the installation.
 - 7. Notify Engineer/Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for motor control centers, enclosures, units, overcurrent protective devices, and other installed components and accessories.
- C. Shop Drawings: Indicate dimensions, voltage, bus ampacities, unit arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum twenty years documented experience.
- C. The manufacturer shall have ISO 9001 registered facilities for the design, manufacture, and testing of MCC's.
- D. MCC sections and individual MCC units shall be designed and manufactured in accordance with UL 854 requirements.
- E. MCC sections and individual MCC units shall be UL listed, where possible.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store motor control centers in accordance with manufacturer's instructions, NECA 402, and NEMA ICS 2.3.
- B. Store in a clean, dry space having a uniform temperature to prevent condensation. Where necessary, provide temporary enclosure space heaters or temporary power for permanent factory-installed space heaters.
- C. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- D. Handle carefully to avoid damage to internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Motor Control Centers - Basis of Design: Rockwell Automation, Inc.; Allen-Bradley Products; Centerline 2100 NEMA MCC: ab.rockwellautomation.com.
- B. Substitutions: See Section 01 6000 - Product Requirements.
- C. Products other than basis of design are subject to compliance with specified requirements and prior approval of Engineer. By using products other than basis of design, Contractor accepts

responsibility for costs associated with any necessary modifications to related work, including any design fees.

- D. Source Limitations: Furnish motor control centers and associated components produced by a single manufacturer and obtained from a single supplier.

2.02 MOTOR CONTROL CENTERS

- A. Provide motor control centers consisting of all required components, control power transformers, instrumentation and control wiring, accessories, etc. as necessary for a complete operating system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Description: Dead-front standard (non-arc-resistant) type motor control center assemblies complying with NEMA ICS 18, and listed and labeled as complying with UL 845; ratings, configurations and features as indicated on the drawings.
- D. The contractor shall confirm motor full-load amperage ratings and provide those ratings to the MCC manufacturer to achieve proper sizing of the drives, soft starters, motor branch circuit, and overload protection.
- E. Configuration:
 - 1. Arrangement: Front-mounted units only (no rear-mounted units or back-to-back configuration).
 - 2. NEMA Classification and Wiring Type: NEMA ICS 18, Class I, Type B (B-T for units size 3 or smaller).
- F. Service Conditions:
 - 1. Provide motor control centers and associated components suitable for operation under the following service conditions without derating:
 - a. Altitude:
 - 1) Class 1 Km Equipment (devices utilizing power semiconductors, e.g. variable frequency controllers): Less than 3,300 feet.
 - 2) Class 2 Km Equipment (electromagnetic and manual devices): Less than 6,600 feet.
 - b. Ambient Temperature: Between 32 degrees F and 104 degrees F.
 - 2. Provide motor control centers and associated components suitable for operation at indicated ratings under the service conditions at the installed location.
- G. Ratings
 - 1. The MCC shall be rated for the system voltage as indicated on the contract drawings.
 - 2. The MCC horizontal and vertical power bus bracing shall be rated to meet or exceed the available fault current as shown on the contract drawings, but shall not be less than 42,000 A rms symmetrical.
 - 3. All MCC units shall have a full rated short-circuit rating that meets or exceeds the available fault current as shown on the contract drawings.
 - 4. Listed series short-circuit current ratings are not acceptable.
 - 5. All circuit breakers used in the motor control center shall have full-rated short-circuit current ratings based on the applied MCC voltage.
- H. Enclosures:
 - 1. Comply with NEMA ICS 6.
 - 2. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 2 (drip-proof).
 - 3. Finish: Manufacturer's standard unless otherwise indicated.
 - a. Vertical wireways and unit back plates shall be painted high-visibility gloss white.
 - b. All unpainted parts shall be plated for corrosion resistance.
 - 4. Removable closing plates on each end of the MCC shall cover all horizontal bus and horizontal wireway openings.
- I. Structure
 - 1. The MCC shall be of dead front construction and shall consist of one or more vertical sections bolted together to form a rigid, free-standing assembly. The systems shall be

- designed to allow for the addition of future sections at either end and to permit the interchanging of units.
2. Vertical sections shall be rigid, free-standing structures.
 - a. Vertical sections shall have internal mounting angles running continuously within the shipping block.
 - b. An external mounting channel that is required to maintain structure integrity is not acceptable.
 - c. Vertical sections shall be 90 in. high, 15 deep, and 20 in. wide, except where larger dimensions are required.
 - d. 71 in. high, reduced height sections shall be provided, if specified on the contract drawings.
 - e. Vertical sections shall be provided with a removable steel lifting angle on all shipping blocks. The angle shall run the length of the shipping block.
 - f. Lifting eyes are not acceptable.
 - g. Each standard section shall be capable of being subdivided into 12 usable, unit spaces.
 - h. One unit space shall constitute one-half space factor and shall be 6.5 in. in height.
 - i. Two unit spaces shall constitute one space factor and shall be 13 in. in height.
 3. Horizontal wireways.
 - a. Horizontal wireways shall be located at the top and bottom of the MCC
 - b. Horizontal wireways shall be 6 in. in height and extend the full depth of the vertical section to allow maximum flexibility in locating conduit for MCC feeds and loads.
 - 1) Pull-boxes to extend the height of the top horizontal wireway by 12 in. shall be provided, as required by the contractor.
 - c. Horizontal wireways shall be continuous across the length of the MCC, except where access needs to be denied due to electrical isolation requirements.
 - d. The horizontal wireways shall be isolated from the power bus.
 - e. The horizontal wireways shall have removable covers held in place by captive screws.
 4. Provide a full height vertical wireway, independent of the plug-in units, in each standard vertical section.
 - a. The vertical wireway shall be isolated from the vertical and horizontal buses.
 - b. The vertical wireway shall be covered with a hinged and secured door.
 - c. Wireway tie bars shall be provided.
 - d. Isolation between the wireway and units shall be provided.
- J. Bussing:
1. Horizontal Power Bus
 - a. Size for a maximum temperature rise of 117 degrees F over an ambient temperature of 104 degrees F, in compliance with NEMA ICS 18 and UL 845 requirements.
 - b. The horizontal bus material shall be copper with tin plating.
 - c. The horizontal bus shall be rated as shown on the drawings.
 - d. The horizontal bus shall be supported, braced, and isolated from the vertical bus with a high strength, non-conductive, non-tracking, glass polyester material.
 - e. For standard sections, the horizontal bus shall be continuous within each shipping block and shall be braced within each section.
 - f. Horizontal bus splices shall have at least two bolts on each side.
 2. Vertical Bus.
 - a. The vertical power bus shall have an effective rating of 600 A. If a center horizontal bus construction is utilized, then the rating shall be 300 A above and below the horizontal bus for an effective rating of 600 A. If a top or bottom mounted horizontal bus is utilized, then the full bus must be rated for 600 A.
 - b. The vertical bus material shall be copper with tin plating.
 - c. The vertical bus shall attach to the horizontal bus with at least two bolts.
 - d. The vertical bus shall be continuously braced by a high strength, non-conductive, no-tracking, glass-filled polyester material and isolated from the unit spaces by a non-conductive, polycarbonate molded cover.
 - e. The vertical bus shall be isolated from the horizontal power bus except where necessary to connect the vertical power bus to the horizontal power bus.
 - f. Automatic shutters shall cover the plug-in stab openings when units are removed.

3. Ground Bus.
 - a. Provide a ground bus system consisting of a horizontal ground bus connected to vertical ground buses mounted in each section.
 - b. Provide a tin-plated copper 0.25 x 2 in. horizontal ground bus mounted in the bottom of the MCC unless otherwise specified in the drawings.
 - c. Provide a pressure-type mechanical lug mounted on the ground bus in the incoming line section.
 - d. Provide a unit ground stab on all unit inserts. The ground stab shall establish unit insert grounding to the vertical ground bus before the plug-in power stabs engage the power bus. The grounding shall be maintained until after the plug-in power stabs are disengaged.
 - e. Provide solidly bonded equipment ground bus through full length of motor control center, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
 4. Neutral Bus.
 - a. If neutral loads are specified within the MCC, provide neutral connection plates in sections with horizontal neutral bus as indicated on the contract drawings.
 - b. Horizontal neutral bus shall be provided in all sections.
 - c. Neutral bus rating shall be half of the horizontal power bus rating.
 - d. For neutral loads that are served, Vertical neutral bus in 9 in. wireway shall be provided in sections with plug-in units as defined on the contract drawings.
 5. Phase and Neutral Bus Material: tin-plated copper.
- K. Disconnects
1. Main Disconnect.
 - a. Configure for top or bottom incoming feed as indicated or as required for the installation. Provide top-mounted pullbox as indicated or as required to facilitate installation of incoming feed.
 - b. If no overcurrent protection is indicated, provide a main incoming-line lug compartment.
 2. Feeder Disconnects: Circuit breaker type.
 - a. Minimum frame size shall be 125 A.
- L. Conductor Terminations: Suitable for use with the conductors to be installed.
1. Line Conductor Terminations:
 - a. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - b. Main and Neutral Lug Type: Mechanical.
- M. Metering Compartment
1. MCC's shall include a plug-in metering unit.
 2. Units shall include the following:
 - a. Fusible disconnect with fuses.
 - 1) Disconnect must be operable with the unit door closed.
 - b. Fused control circuit transformer.
 - c. Current transformers shipped loose to be installed by the contractor onto incoming power conductors.
 - d. Solid-state power monitor with door mounted display.
 3. Power Monitor.
 - a. Power Monitors shall be capable of displaying the following:
 - 1) Line current for all three phases with plus or minus 0.2 percent full-scale accuracy.
 - 2) Average three phase current with plus or minus 0.2 percent full-scale accuracy.
 - 3) Line-to-neutral and line-to-line voltage with plus or minus 0.2 percent full-scale accuracy.
 - 4) Current and voltage unbalance.
 - 5) Real, reactive, apparent, and true power with plus or minus 0.4 percent full-scale accuracy.
 - 6) KWh, KVARh, and KVAHnet.
 - 7) True RMS to the 45th harmonic.

- 8) Frequency at plus or minus 0.5%.
 - 9) Power factor at plus or minus 0.4%.
 - b. Power monitors shall include min/max logs and trend logs with up to 45,867 data points.
 - c. Power monitors shall be capable of performing distortion analysis with THD, Crest Factor (I, V) and Distortion power factor.
 - d. The power monitor shall include EtherNet/IP communication module.
 - e. Power monitors shall include two form-C relays.
 - f. Power monitors shall be Allen-Bradley PowerMonitor 5000 unit or approved equal.
- N. Future Provisions:
- 1. Prepare designated spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
 - 2. Arrange and equip horizontal bus and ground bus to accommodate future installation of additional motor control sections.
- O. EtherNet/IP Communication:
- 1. The MCC shall have Ethernet wiring incorporated into its design.
 - a. The MCC shall have factory installed industrial Ethernet cabling incorporated throughout the vertical section across the entire line up.
 - b. Each motor starter, electronic overload relay, power monitor, AC drive, and soft starter unit in the MCC shall be supplied with a means to communicate via EtherNet/IP network.
 - c. Plug-in units should be able to move around without impacting the network.
 - d. Maintenance activities should be able to be performed without impacting the network.
 - 2. Industrial Ethernet Switch.
 - a. The MCC shall have managed industrial Ethernet switch(s) with Ports to connect each EtherNet/IP enabled device. One switch for entire MCC is desired.
 - b. Ethernet Switches shall be provided with spare ports to accommodate network expansion and future plug-in unit inserts.
 - c. The managed industrial Ethernet switch shall deliver optimal network security, network resiliency, and flexibility. The functionality should include port based control/prioritization, switch-level ring support, VLAN segmentation, and other Layer-2 switch features.
 - d. The managed industrial Ethernet switch shall have the ability to include, if needed, Gigabit ports, CIP Sync functionality, Network Address Translation (NAT), and an Industrial SD Card.
 - e. The managed industrial Ethernet switch shall include redundant terminal blocks for customer supplied/connection of an external 24V DC UPS.
 - 3. Industrial Ethernet Switch Layout.
 - a. Layout - Fixed-Mount Switch Unit
 - 1) The managed industrial Ethernet Switch shall be mounted in a fixed-mount, Switch Unit in the top section.
 - 2) If more than one switch is required, the industrial Ethernet cable shall connect each switch to one another in a ring topology.
 - 3) The switch Unit shall be provided with a locking latch.
 - 4) The Switch Unit shall be provided with a door mounted viewing window.
 - 5) The Switch Unit shall be provided with a door mounted external network connector.
 - 4. Industrial Ethernet Cabling
 - a. Industrial Ethernet Cable Ratings.
 - 1) The industrial Ethernet cable shall be 600V UL Category 5e PLTC rated
 - 2) The use of a 300V rated cable is not acceptable.
 - 3) Ethernet Switch-to-Device cable labels shall be located on both ends of the cable to specify where the cable is connected to on both ends.
 - 4) A detailed Ethernet network table and Ethernet network diagram specifying IP addresses, subnet masks, device locations, cable label details and 24V DC capacities shall be included in the MCC documentation.
 - b. Layout - Homerun (direct switch-to-device) Ethernet connections.

- 1) An industrial Ethernet cable shall be routed from the managed industrial Ethernet Switch directly to the EtherNet/IP device in each unit, or to the first and last device in a ring topology.
 - (a) The industrial Ethernet cable shall be routed through the top or bottom horizontal wireway and transition through the vertical wireway directly to the EtherNet/IP device.
 - (b) The industrial Ethernet cable shall be secured to vertical wireway tie bars.
- 2) The EtherNet/IP device within each unit shall be factory connected to the industrial Ethernet switch directly by using a 600V - UL rated Category 5e PLTC rated industrial Ethernet cable.
- c. Power Supplies.
 - 1) Power supplies shall provide 24V DC for the devices that require it.
 - 2) The MCC manufacturer shall check the user's design to confirm that adequate power supplies have been specified to conform with network requirements.
 - 3) Power supply output shall be rated 8 A, 24V DC.
 - 4) Power supplies shall be Allen-Bradley Bulletin 1606-XLS240E or approved equal.
 - 5) Power supply units shall be provided with a buffer module to provide a minimum of 500 ms ride-through at full load (the buffer module is optional for the standard Ethernet power supply).
 - 6) Buffer modules shall be Allen-Bradley Bulletin 1606-XLBUFFER or approved equal.
 - 7) Two (2) 24V DC adapters allowing four (4) power connections shall be provided:
 - (a) In each vertical wireway of standard sections to simplify installation, relocation and addition of plug-in units.
 - (b) Each 24V DC adapter in the vertical wireway shall be connected to the power supply.
 - 8) The power supply units shall be provided with a door mounted external 120V AC connection for laptop power and Ethernet network connection.
 - 9) Redundant 24V DC power shall be provided for all Ethernet enabled devices. Choose one type of 24V DC redundant for the MCC application as they are mutually exclusive:
 - (a) A Redundancy Unit shall be included that provides the capabilities of interconnecting two independent power supplies in a redundant way (N+1) and whose output is connected to the 24 V DC circuit. The Redundancy Unit shall be powered by one of the following options:
 - (1) Two Rockwell Automation-supplied 24VDC power supply units.
 - (2) One Rockwell Automation-supplied 24VDC power supply unit and one external power input provided by the contractor.
 - (3) Two external 24V DC power inputs provided by the contractor.
 - (b) Two 8 A power supply modules shall be placed in the same power supply unit and wired in parallel with blocking diodes whose output is connected to the 24V DC circuit.
5. EtherNet/IP Interface for Motor Starter Units.
 - a. Motor starter units shall have an electronic overload relay that incorporates the following features:
 - 1) Built-in EtherNet/IP communication.
 - 2) Overload relay I/O powered by using 24V DC.
 - 3) Status indicators for status indication.
 - 4) Overload relays shall have a reset button on the outside of the unit door.
 - 5) Selectable trip of NEMA Class 5 to 30. Unless indicated, the trip class shall be set for NEMA Class 20 operation.
 - 6) Up to six (6) inputs and three (3) outputs of direct I/O. Additional I/O can be provided with an add-on module to the overload relay. Input voltage shall match the overload relay power voltage.
 - 7) Protective functions.
 - (a) Functions shall provide a programmable trip level, warning level, time delay, and inhibit window.

- (b) Protective functions shall include Thermal overload, Phase loss, Stall, Jam, Underload, Current imbalance, Remote trip, and PTC thermistor input.
 - (c) Ground fault protection is not required.
 - (1) If ground fault protection is required, the protection range shall be 500 mA to 5 A
 - (d) PTC Thermistor input is required.
 - (e) Voltage protection is required.
 - (1) Input Fusing shall not be used on NEMA 3 and smaller starters.
- 8) Current monitoring functions shall include phase current, average current, full load current, current imbalance percent, percent thermal capacity utilized, and ground fault current (if required).
- 9) Voltage, energy, and frequency measuring capabilities shall be included when voltage protection is required.
- 10) Diagnostic information shall include device status, warning status, time to reset, trip status, time to overload trip, and history of last five trips.
- 11) Preventative maintenance information shall include Allowable starts per hour, required Time between starts, Starts counter, Starts available, Time until next start, total operating hours, and elapsed operating time.
- 12) Overload relay shall include an on-board logic processor to allow basic logic to be performed within the overload relay based on network data and the status of the inputs to the overload relay.
- 13) The overload relay shall support the following CIP messaging types: Polled I/O messaging, Chang-of-state/cyclic messaging, Explicit messaging, Group 4 offline node recovery messaging, and Unconnected Message Manager (UCMM).
- 14) The overload relay shall provide the following functions to minimize network configuration time: Full parameter object support, Configuration consistency value, and Add-on-Profile.
- 15) The overload relay shall include a E300 Control Station connected to the overload relay by a single cable.
- b. The overload relay shall be Allen-Bradley E300 model or approved equal.
- 6. EtherNet/IP Interface for Variable Frequency AC Drives and Solid-State Reduced Voltage Motor Controllers.
 - a. The EtherNet/IP communication interface shall be supplied to allow for communication between the solid-state component and the Ethernet network.
- 7. EtherNet/IP Interface for Other Units.
 - a. Provide an EtherNet/IP interface for other units as indicated on the contract drawings.
 - b. Refer to the contract drawing wiring diagrams for points to be monitored.
- 8. Programming and Testing.
 - a. The MCC manufacturer shall load the IP Address and Subnet Mask into each unit and Ethernet switch.
 - b. The IP Address shall be as indicated on the contract drawings or as provided by the contractor.
 - c. The MCC manufacturer shall test the MCC to ensure that each unit communicates properly prior to shipment.
 - d. The MCC manufacturer shall provide a portable solid-state data storage device containing applicable electronic data sheet (EDS) files for the EtherNet/IP devices.
 - e. The IP Address shall be visible on the unit Nameplate for any units containing an EtherNet/IP enabled device.
 - f. All firmware will be provided with the same revision level of firmware across all similar intelligent electronic devices.
 - 1) E300 overload relays.
 - 2) PowerFlex 523, PowerFlex 525, PowerFlex 527 drives.
 - 3) PowerFlex 753, PowerFlex 755 drives.
 - 4) Stratix 5700 switches.
 - 5) PowerMonitor 5000 energy meters.
 - 6) SMC Flex Starters.

2.03 MOTOR CONTROL CENTER UNITS

- A. The minimum compartment height shall be 6.5 in. and this shall be considered one-half space factor.
- B. NEMA size 5 FVNR starters and below shall be provided as plug-in units.
 - 1. Plug-in units shall consist of a unit assembly, unit support pan, and unit door assembly.
 - 2. Units shall be supplied with removable doors. The unit doors shall be fastened to the structure so that the doors can be closed when the unit is removed.
 - 3. A unit support pan shall be provided for support and guiding units. Unit support pans shall remain in the structure when units are removed to provide isolation between units.
 - 4. A service position shall be provided for plug-in units that allows for the unit to be supported, but disengaged from the bus. The unit shall be capable of being padlocked in the service position. This position is to be used to isolate a unit from the bus to allow service to be performed on the connected load equipment.
- C. Power Stabs.
 - 1. Unit stabs for engaging the power bus shall be tin-plated copper and provided with stainless back-up springs to provide and maintain a high-pressure, 4-point connection to the vertical bus.
 - 2. Wiring from the unit disconnecting means to the plug-in stabs shall not be exposed on the rear of the unit. A separate isolated pathway shall be provided for each phase to minimize the possibility of unit fault conditions reaching the power bus system.
 - 3. Power cable termination at the plug-in stab shall be a maintenance-free crimp type connection.
- D. Withdrawable Power Stabs.
 - 1. Plug-in units shall have the capacity of withdrawing the power stabs, allowing the primary voltage to be disconnected with the unit door closed.
 - 2. The withdrawable assembly shall accept a standard 1/4" hex-style drive socket.
 - a. A complete power engagement shall occur when turning the mechanism 1/4 turn in clockwise direction.
 - b. Complete power disengagement shall occur when turning the mechanism 1/4 turn in counter-clockwise direction.
 - 3. The withdrawable stabs design shall include a set of stab assembly-mounted shutters.
 - a. Shutters shall automatically open before the power stabs can extend and connect to the vertical bus.
 - b. Shutters shall close as soon as the power stabs are disconnected from the vertical bus and are completely inside the stab housing.
 - 4. The withdrawable stabs design shall include interlock mechanisms.
 - a. A through-the-door mechanism shall allow the unit to be locked in the 'Power Stabs Disconnected' position.
 - 1) This mechanism shall be such that it can be padlocked to prevent the connection of the stabs to the vertical bus even when the unit is inserted into the vertical section.
 - 2) Unit door shall be capable of opening with the padlock and lockout engaged.
 - b. Unit disconnect handle must be in the OFF position (load side of the disconnect device removed from the line power) before the stabs can be disconnected from the vertical bus.
 - 1) Mechanism shall also allow the removal of the unit from the vertical section but only after the disconnect handle has been turned OFF and the power stabs have been disconnected from the vertical bus.
 - 2) Unit stabs have to be disconnected (withdrawn) before the unit can be re-inserted into the vertical section.
 - 5. The withdrawable stabs design shall include feedback mechanisms that are verifiable with the unit door closed.
 - a. A two-position indication system shall be provided (Power Stabs Connected/Disconnected) and shall be visible from the door.
 - 1) Connected with Red Indication-Primary voltage stabs fully engaged and connected to the vertical bus.

- 2) Disconnected with Green Indication-Primary voltage stabs fully disconnected from the vertical bus.
 - b. A set of test points shall be located on the front of the unit for identification of:
 - 1) Power stabs position: a positive continuity check between these probes shall verify that all three power stabs have been disconnected from the vertical bus and completely withdrawn inside the stab housing.
 - 2) Stab-mounted shutters position: a positive continuity check between these probes shall verify that the shutters are closed, meaning that all three power stabs have been disconnected and withdrawn inside the stab housing.
 - c. Withdrawable power stabs with door closed mechanism shall not increase the original unit height design so total space in the motor control center is optimized.
- E. Disconnect Handle.
1. Plug-in units shall be provided with a heavy-duty, non-conductive, industrial duty, flange mounted handle mechanism for control of each disconnect switch or circuit breaker.
 2. Use of rotary operators is not acceptable.
 3. Disconnect handles may pivot in the vertical or horizontal plane.
 4. On-off condition shall be indicated by the handle position, red and green color indicators with the words ON and OFF, and the international symbols 1 and 0 along with a pictorial indication of the handle position.
 5. Handles shall be capable of being locked in the OFF position with up to three padlocks.
 6. Plug-in units shall be provided with interlocks per NEMA and UL requirements. Interlocks shall be provided for the following:
 - a. Prevention of unit insertion or withdrawal with the disconnect in the ON position.
 - b. Prevention of the unit door from being opened with the disconnect in the ON position.
 - 1) A feature for intentionally defeating this interlock by qualified personnel shall be provided.
 - c. Prevention of the disconnect switch from being moved to the ON position if the unit door is open.
 - 1) A feature for intentionally defeating this interlock by qualified personnel shall be provided.
- F. Doors
1. Each unit shall be provided with a removable door mounted on removable pin-type hinges.
 2. The unit doors shall be capable of being opened at least 110 degrees.
 3. The unit doors shall be removable from any location in the MCC without disturbing any other units doors.
 4. The unit door shall be fastened to the structure so it can be closed to cover the unit space when the unit is removed.
 5. The unit doors shall be held closed with quarter-turn latches.
- G. Combination Magnetic Motor Starter Units:
1. Description: NEMA ICS 2, Class A combination motor controllers with magnetic contactor(s), externally operable disconnect and overload relay(s).
 2. Configuration: As indicated on drawings.
 3. Use of non-standard starter sizes smaller than specified standard NEMA sizes is not permitted.
 - a. Minimum size shall be NEMA size 1.
 4. Disconnects: Circuit breaker type.
 - a. Circuit Breakers: Motor circuit protectors (magnetic-only) unless otherwise indicated or required.
 - b. Provide externally operable handle with means for locking in the OFF position. Provide safety interlock to prevent opening the cover with the disconnect in the ON position with capability of overriding interlock for testing purposes.
 - c. Provide auxiliary interlock for disconnection of external control power sources where applicable.
 5. Motor starter shall be Allen-Bradley Bulletin 500 or 300 or approved equal.
 6. Overload Relays: Solid-state type unless otherwise indicated.
 7. In addition to the hold-in contact, starters shall be provided with one normally open and one normally closed auxiliary contact, and any additional auxiliary contacts shown in the

- contract drawings. The starter shall be capable of accommodating up to six contacts in addition to the hold-in contact.
8. Provide a control power transformer with a rated secondary voltage of 120V AC. The control power transformer shall be provided with primary and secondary fusing.
 9. Overload relays shall have a reset button located on the outside of the unit door.
 10. Provide a door mounted selector switch for Hand-Off-Auto operation. The hand mode shall provide local control at the MCC unit door. In the Auto mode, control shall be provided through a remote contact.
 11. Provide door mounted 120V AC push-to-test pilot lights with LED lamps for ON Green and OFF Red status indication.
- H. Variable Frequency Drives
1. Variable frequency drives shall be PowerFlex 753, or PowerFlex 755 drives.
 2. Refer to Section 26 2923 Variable-Frequency AC Drive Units.
 3. Provide control power transformer with a rated secondary voltage of 120V AC. The control power transformer shall be provided with primary and secondary fusing.
 4. Provide door-mounted pilot devices per the contract drawing wiring diagrams.
 5. Provide door-mounted 120V AC push-to-test pilot lights with LED lamps for OFF Red and AT-SPEED Green status indication.
 6. Provide a door mounted selector switch for Hand-Off-Auto operation. The hand mode shall provide local control at the MCC unit door. In the Auto mode, control shall be provided through a remote contact.
 7. Provide a door-mounted human interface module for programming, display, and control.
 8. Provide one isolated, configurable analog input and output.
 9. Provide an integrated network safety safe-torque-off capable of EtherNet/IP control.
 10. Provide line and load filters per plans and specifications.
 11. Emergency run bypass contactor is required.
 - a. If required, emergency run bypass shall be fully rated for the motor load and be capable of starting the motor at full voltage. The emergency run bypass shall be provided with the same type of solid-state overload relay protection as for the electromechanical starter units.
- I. Combination Soft Starter Units
1. Refer to Section 26 2924 Solid-State Reduced Voltage Controller Unit (Soft Starter).
 2. Disconnect means for solid-state controllers shall be an Inverse Time Circuit Breaker.
 3. Unit short-circuit current rating shall be greater than or equal to the available fault current as shown on the contract drawings.
 4. Provide a control power transformer with a rated secondary voltage of 120V AC. The control power transformer shall be provided with primary and secondary fusing.
 5. The controller shall be Allen-Bradley SMC Flex and shall include the following features:
 - a. Integrated bypass contactor that is closed once the motor is up to full speed.
 - b. Electronic overload protection with adjustable trip class.
 - c. Four programmable auxiliary contacts.
 - d. Selectable control capabilities: soft start, kick start, current limit start, dual ramp, full voltage, linear speed, preset slow speed, soft stop.
 - e. Additional control capabilities: none required.
 - f. LCD display.
 - g. Keypad programming for configuration.
 - h. Built-in selectable protective functions for: overload, jam, stall, excessive starts per hour, underload, over/under voltage, voltage unbalance.
 - i. Metering capabilities for: current, voltage, kW, kWh, power factor, motor thermal capacity utilized, elapsed time.
 - j. Ground fault protection (1 A to 5 A) required
 6. Provide an input isolation contactor.
 7. The SMC unit shall be provided with line side protective modules. The modules shall contain capacitors and metal oxide varistors (MOV's) that protect the internal power circuitry from severe electrical transients and/or high electrical noise.
 8. Provide door-mounted 120V AC push-to-test pilot lights with LED lamps for ON Green and OFF Red status indication.

9. Provide a door mounted selector switch for Hand-Off-Auto operation. The hand mode shall provide local control at the MCC unit door. In the Auto mode, control shall be provided through a remote contact.
- J. Control and Lighting Transformer
1. Refer to Section 26 2200 Low-Voltage Transformers.
 2. Provide control and lighting transformers as shown on the drawings. The rating shown on the drawings shall be the minimum acceptable rating.
 3. The insulation shall be 180 °C insulation with 80 °C rise.
 4. Provide circuit breaker with thermal magnetic trip for primary protection.
 5. Provide secondary fuse protection for the transformer.
 6. The Primary circuit breaker compartment and transformer compartment shall be interlocked together and factory wired together.
 7. Unit construction is dependent on the MCC NEMA enclosure type.
 - a. Units in a NEMA Type 1 enclosure shall be provided with vented doors.
 - b. Units in a NEMA Type 1 enclosure with gasketed doors shall be provided with filters over the vent openings.
 - c. Units in a NEMA Type 12 enclosure shall be provided with a non-vented door. If transformer derating is required, then the transformer shall be upsized to provide equivalent rating as shown on the contract drawings.
 8. Control and power transformers that are specifically designed for use in motor control centers and for use with motor control circuits are exempt from NEMA TP-1 energy efficient requirements.
 9. Disconnecting means for transformers shall be circuit breakers with thermal-magnetic trip units for 250 A and smaller frames; provide an electronic trip unit for 400 A and larger frames.
- K. Lighting and Power Panelboard
1. Refer to Section 26 2416 Panelboards.
 2. Provide lighting panel as shown on the drawings.

2.04 OVERCURRENT PROTECTIVE DEVICES

- A. Overload Relays:
1. Provide overload relays and, where applicable, associated current elements/heaters, selected according to actual installed motor nameplate data, in accordance with manufacturer's recommendations and NFPA 70; include consideration for motor service factor and ambient temperature correction, where applicable.
 2. Inverse-Time Trip Class Rating: Class 20 unless otherwise indicated or required.
 3. Trip-free operation.
 4. Visible trip indication.
 5. Resettable.
 - a. Employ manual reset unless otherwise indicated.
 - b. Employ remote reset where indicated.
 - c. Do not employ automatic reset with two-wire control.
 6. Solid-State Overload Relays:
 - a. Basis of Design: Allen-Bradley E1 Plus or approved equal.
 - b. If EtherNet/IP communication is required, refer to the part of this section titled 'EtherNet/IP Interface for Motor Starter Units', which takes precedence over this overload relay requirement.
 - c. Selectable inverse-time trip class rating; 10, 15, 20, or 30 for E1 overloads, or 5, 10, 15, 20, or 30 for E300 overloads..
 - d. Set for class 20 unless otherwise indicated on the contract drawings.
 - e. Overload protection.
 - f. Trip current adjustment range of 5:1.
 - g. Phase loss protection.
 - h. Phase imbalance protection.
 - i. Ground Fault and Jam protection shall be provided.
 - 1) If ground fault protection is required, it shall have a selectable trip value between 20 mA and 5 A.
 - j. Ambient temperature insensitive.

- k. Thermal memory.
 - l. Repeat Trip Accuracy: Plus/minus 2 percent, minimum.
 - m. Trip test function.
 - n. Bipolar latching relay with one normally open and one normally closed contact, rated NEMA B600 for use in motor contactor control circuits.
- B. Circuit Breakers:
- 1. Interrupting Capacity (not applicable to motor circuit protectors):
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than specified minimum requirements.
 - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 - 2. Motor Circuit Protectors:
 - a. Description: Instantaneous-trip circuit breakers furnished with magnetic instantaneous tripping elements for short circuit protection, but not with thermal inverse time tripping elements for overload protection; UL 489 recognized only for use as part of a listed combination motor controller with overload protection; ratings, configurations, and features as indicated on the drawings.
 - b. Provide field-adjustable magnetic instantaneous trip setting.
 - 3. Molded Case Circuit Breakers:
 - a. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers; listed and labeled as complying with UL 489, and complying with UL 489 where applicable; ratings, configurations, and features as indicated on the drawings.
 - 1) Provide thermal magnetic circuit breakers for circuit breaker frame sizes less than 400 amperes.
 - 2) Provide electronic trip circuit breakers for circuit breaker frame sizes 400 amperes and above.
 - b. Minimum Interrupting Capacity:
 - 1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
 - 2) 35,000 rms symmetrical amperes at 480 VAC.
 - c. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
 - 1) Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 225 amperes and larger.
 - d. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.
 - 1) Provide the following field-adjustable trip response settings:
 - (a) Long time pickup, adjustable by replacing interchangeable trip unit or by setting dial.
 - (b) Long time delay.
 - (c) Short time pickup and delay.
 - (d) Instantaneous pickup.
 - (e) Ground fault pickup and delay where ground fault protection is indicated.

2.05 MOTOR CONTROL ACCESSORIES

- A. Auxiliary Contacts:
 - 1. Comply with NEMA ICS 5.
 - 2. Provide auxiliary contact on Auto position of each selector switch to be monitored by control system.
 - 3. Provide interlocking contact(s) at each motor control bucket for emergency stop circuit.
 - 4. Provide interlocking contact at each motor control bucket for enable/disable.
 - 5. Provide number and type of contacts indicated or required to perform necessary functions, including holding (seal-in) circuit and interlocking, plus one normally open (NO) and one normally closed (NC) spare contact for each starter unit, minimum.
- B. Pilot Devices:
 - 1. Comply with NEMA ICS 5; heavy-duty type.
 - 2. Pilot devices shall be rated NEMA Type 4/13 water tight/oil tight.

3. For units with vertically operated disconnect handles:
 - a. When three or less pilot devices are utilized, they shall be Allen-Bradley Bulletin 800H 30.5mm devices or approved equal.
 - b. When more than three devices are required, the use of Allen-Bradley Bulletin 800F 22.5mm devices or approved equal is permitted.
 - c. For Drives pilot devices:
 - 1) 800H 30.5mm devices or approved equal shall be provided for all PowerFlex 70 drives.
 - 2) 800F 22.5mm devices or approved equal shall be provided for all Power Flex 750 and PowerFlex 520 series drives.
 - d. For units with horizontally operated disconnect handles:
 - 1) The devices shall be Allen-Bradley Bulletin 800F or approved equal.
4. Pushbuttons: Unless otherwise indicated, provide momentary, non-illuminated type with extended button operator; normally open or normally closed as indicated or as required.
5. Selector Switches: Unless otherwise indicated, provide maintained, non-illuminated type with knob operator; number of switch positions as indicated or as required.
6. Indicating Lights: Push-to-test type unless otherwise indicated.
7. Provide LED lamp source for indicating lights and illuminated devices.
- C. Terminal Blocks.
 1. Control terminal blocks shall be provided on all contactor and starter units.
 - a. Control terminal blocks shall be a pull-apart design on all plug-in units for easy removal of the unit from the structure.
 - b. Control terminal blocks on non-plug-in contactor and starter units shall be fixed type.
 - c. Control Terminal Blocks: Include 25 percent spare terminals.
 2. Power terminal blocks shall be provided on all contactor and starter units, rated NEMA size 3 (100 A) and below that utilize vertically operated disconnects.
 - a. Power terminal blocks shall be pull-apart for NEMA size 1 and 2 (30 A and 60 A contactors).
 - b. Power terminal blocks for NEMA size 3 starters (100 A contactors) shall be non-pull-apart.
 3. Terminal blocks shall not be located adjacent to or inside the vertical wireway.
- D. Control and Timing Relays:
 1. Comply with NEMA ICS 5.
 2. Provide number and type of relays indicated or required to perform necessary functions.
- E. Control Power Transformers:
 1. Size to accommodate burden of contactor coil(s) and all connected auxiliary devices, plus 200 VA spare capacity.
 2. Include primary and secondary fuses.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of the motor control centers and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive motor control centers.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install motor control centers in accordance with NECA 1 (general workmanship), NECA 402, and NEMA ICS 2.3.
- C. Arrange equipment to provide required clearances and maintenance access, including accommodations for any drawout devices.
- D. Provide required support and attachment in accordance with Section 26 0529.
- E. Install motor control centers plumb and level.

- F. Unless otherwise indicated, mount motor control centers on properly sized 4 inch high concrete pad constructed in accordance with Section 03 3000.
- G. Provide grounding and bonding in accordance with Section 26 0526.
- H. Install all field-installed devices, components, and accessories.
- I. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.
- J. Set field-adjustable motor controllers and associated components according to installed motor requirements, in accordance with manufacturer's recommendations and NFPA 70.
- K. Set field-adjustable circuit breaker tripping function settings as directed.
- L. Provide filler plates to cover unused spaces.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Before energizing motor control center, perform insulation resistance testing in accordance with NECA 402 and NEMA ICS 2.3.
- C. Inspect and test in accordance with NETA ATS, except Section 4.
- D. Perform inspections and tests listed in NETA ATS, Section 7.16.2.1.
- E. Motor Starters: Perform inspections and tests listed in NETA ATS, Section 7.16.1.1. Tests listed as optional are not required.
- F. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.
 - 1. Perform inspections and tests listed in NETA ATS, Section 7.14. The insulation-resistance test on control wiring listed as optional is not required.
- G. Correct deficiencies and replace damaged or defective motor control centers or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of motor control center covers and doors.

3.05 CLEANING

- A. Clean dirt and debris from motor control center enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred surfaces to match original factory finish.

3.06 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate proper operation of motor controllers to Owner, and correct deficiencies or make adjustments as directed.
- B. Training: Train Owner's personnel on operation, adjustment, and maintenance of motor control center and associated devices.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of two hours of training.
 - 3. Location: At project site.

END OF SECTION

SECTION 26 2726

WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
- B. Wall dimmers.
- C. Receptacles.
- D. Wall plates.

1.02 RELATED REQUIREMENTS

- A. Section 26 0533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for; 2017h.
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); 2017g.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2015).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2016.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- I. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.
- K. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
 - 3. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
 - 4. Notify Engineer/Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
- B. Sequencing:
 - 1. Do not install wiring devices until final surface finishes and painting are complete.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Products: Listed, classified, and labeled as suitable for the purpose intended.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND PROTECTION

- A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
- D. Provide GFCI protection for receptacles installed within 6 feet of sinks.
- E. Unless noted otherwise, do not use combination switch/receptacle devices.

2.02 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices, Unless Otherwise Indicated: Gray with stainless steel wall plate.

2.03 WALL SWITCHES

- A. Manufacturers:
 - 1. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 - 2. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
- B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.

2.04 RECEPTACLES

- A. Manufacturers:
 - 1. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 - 2. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
- B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
 - 2. NEMA configurations specified are according to NEMA WD 6.
- C. Convenience Receptacles:
 - 1. Standard Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
- D. GFCI Receptacles:
 - 1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
 - a. Provide test and reset buttons of same color as device.
 - 2. Standard GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
 - 3. Weather Resistant GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

2.05 WALL PLATES

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell-wiring.com/#sle.
 - 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 - 3. Lutron Electronics Company, Inc: www.lutron.com.
 - 4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.

- B. Wall Plates: Comply with UL 514D.
 - 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 - 2. Size: Standard.
 - 3. Screws: Metal with slotted heads finished to match wall plate finish.
- C. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.
- D. Galvanized Steel Wall Plates: Rounded corners and edges, with corrosion resistant screws.
- E. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.
- F. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- F. Verify that openings in access floor are in proper locations.
- G. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of wiring devices provided under this section.
 - 1. Mounting Heights: Unless otherwise indicated, as follows:
 - a. Wall Switches: 48 inches above finished floor to top of box.
 - b. Wall Dimmers: 48 inches above finished floor to top of box.
 - c. Fan Speed Controllers: 48 inches above finished floor to top of box.
 - d. Receptacles: 20 inches above finished floor to top of box or 6 inches above counter.
 - 2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 - 3. Where multiple receptacles or wall switches are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
 - 4. Locate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Engineer/Architect to obtain direction prior to proceeding with work.
 - 5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.

- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Unless otherwise indicated, GFCI receptacles may be connected to provide feed-through protection to downstream devices. Label such devices to indicate they are protected by upstream GFCI protection.
- I. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- J. Install wall switches with OFF position down.
- K. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
- L. Do not share neutral conductor on branch circuits utilizing wall dimmers.
- M. Install vertically mounted receptacles with grounding pole on bottom and horizontally mounted receptacles with grounding pole on left.
- N. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- O. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each wiring device for damage and defects.
- C. Operate each wall switch with circuit energized to verify proper operation.
- D. Test each receptacle to verify operation and proper polarity.
- E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- F. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.

3.06 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

SECTION 26 2813

FUSES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fuses.

1.02 RELATED REQUIREMENTS

- A. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- B. Section 26 2816.16 - Enclosed Switches: Fusible switches.

1.03 REFERENCE STANDARDS

- A. NEMA FU 1 - Low Voltage Cartridge Fuses; 2012.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. UL 248-1 - Low-Voltage Fuses - Part 1: General Requirements; Current Edition, Including All Revisions.
- D. UL 248-10 - Low-Voltage Fuses - Part 10: Class L Fuses; Current Edition, Including All Revisions.
- E. UL 248-12 - Low-Voltage Fuses - Part 12: Class R Fuses; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate fuse clips furnished in equipment provided under other sections for compatibility with indicated fuses.
 - 2. Coordinate fuse requirements according to manufacturer's recommendations and nameplate data for actual equipment to be installed.
 - 3. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard data sheets including voltage and current ratings, interrupting ratings, time-current curves, and current limitation curves.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Fuses: One set(s) of three for each type and size installed.
 - 3. Fuse Pullers: One set(s) compatible with each type and size installed.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Bussmann, a division of Eaton Corporation: www.cooperindustries.com/#sle.
- B. Littelfuse, Inc: www.littelfuse.com/#sle.

2.02 APPLICATIONS

- A. Service Entrance:
 - 1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.

- 2. Fusible Switches Larger Than 600 Amperes: Class L, time-delay.
- B. Feeders:
 - 1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
 - 2. Fusible Switches Larger Than 600 Amperes: Class L, time-delay.
- C. Individual Motor Branch Circuits: Class RK5, time-delay.

2.03 FUSES

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.
- C. Provide fuses of the same type, rating, and manufacturer within the same switch.
- D. Comply with UL 248-1.
- E. Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.
- F. Voltage Rating: Suitable for circuit voltage.
- G. Class R Fuses: Comply with UL 248-12.
- H. Class L Fuses: Comply with UL 248-10.
- I. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that fuse ratings are consistent with circuit voltage and manufacturer's recommendations and nameplate data for equipment.
- B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Do not install fuses until circuits are ready to be energized.
- B. Install fuses with label oriented such that manufacturer, type, and size are easily read.

END OF SECTION

SECTION 26 2816.16
ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Enclosed safety switches.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 2813 - Fuses.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- C. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- F. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- G. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.
- H. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 4. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.
- C. Shop Drawings: Indicate outline and support point dimensions, voltage and current ratings, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
- D. Project Record Documents: Record actual locations of enclosed switches.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed switch internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ABB/GE: www.geindustrial.com/#sle.
- B. Eaton Corporation: www.eaton.com/#sle.
- C. Schneider Electric; Square D Products: www.schneider-electric.us/#sle.
- D. Siemens Industry, Inc: www.usa.siemens.com.
- E. Source Limitations: Furnish enclosed switches and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 ENCLOSED SAFETY SWITCHES

- A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature: Between -22 degrees F and 104 degrees F.
- D. Horsepower Rating: Suitable for connected load.
- E. Voltage Rating: Suitable for circuit voltage.
- F. Short Circuit Current Rating:
 - 1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
- G. Enclosed Safety Switches Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- H. Provide with switch blade contact position that is visible when the cover is open.
- I. Fuse Clips for Fusible Switches: As required to accept fuses indicated.
 - 1. Where NEMA Class R fuses are installed, provide rejection feature to prevent installation of fuses other than Class R.
- J. Conductor Terminations: Suitable for use with the conductors to be installed.
- K. Provide insulated, groundable fully rated solid neutral assembly where a neutral connection is required, with a suitable lug for terminating each neutral conductor.
- L. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.
- M. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 - c. Indoor Wet, Damp Locations Type 4 or 4X.
 - 2. Finish for Painted Steel Enclosures: Manufacturer's standard, factory applied grey unless otherwise indicated.

- N. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.
- O. Heavy Duty Switches:
 - 1. Comply with NEMA KS 1.
 - 2. Conductor Terminations:
 - a. Lug Material: Copper, suitable for terminating copper conductors only.
 - 3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings of the enclosed switches are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive enclosed safety switches.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required support and attachment in accordance with Section 26 0529.
- E. Install enclosed switches plumb.
- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.
- G. Provide grounding and bonding in accordance with Section 26 0526.
- H. Provide fuses complying with Section 26 2813 for fusible switches as indicated or as required by equipment manufacturer's recommendations.

3.03 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.04 CLEANING

- A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 2913
ENCLOSED CONTROLLERS

PART 2 PRODUCTS

1.01 ENCLOSED CONTROLLERS

- A. Provide enclosed controller assemblies consisting of all required components, control power transformers, instrumentation and control wiring, accessories, etc. as necessary for a complete operating system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Description: Enclosed controllers complying with NEMA ICS 2, and listed and labeled as complying with UL 60947-1 and UL 60947-4-1; ratings, configurations and features as indicated on the drawings.
- D. Service Conditions:
 - 1. Provide controllers and associated components suitable for operation under the following service conditions without derating:
 - a. Altitude:
 - 1) Class 1 Km Equipment (devices utilizing power semiconductors, e.g. variable frequency controllers): Less than 3,300 feet.
 - 2) Class 2 Km Equipment (electromagnetic and manual devices): Less than 6,600 feet.
 - b. Ambient Temperature: Between 32 degrees F and 104 degrees F.
 - 2. Provide controllers and associated components suitable for operation at indicated ratings under the service conditions at the installed location.
- E. Short Circuit Current Rating:
- F. Conductor Terminations: Suitable for use with the conductors to be installed.
- G. Enclosures:
 - 1. Comply with NEMA ICS 6.
 - 2. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - 3. Finish: Manufacturer's standard unless otherwise indicated.
- H. Instrument Transformers:
 - 1. Comply with IEEE C57.13.
 - 2. Select suitable ratio, burden, and accuracy as required for connected devices.
 - 3. Current Transformers: Connect secondaries to shorting terminal blocks.
 - 4. Potential Transformers: Include primary and secondary fuses with disconnecting means.

1.02 OVERCURRENT PROTECTIVE DEVICES

- A. Overload Relays:
 - 1. Provide overload relays and, where applicable, associated current elements/heaters, selected according to actual installed motor nameplate data, in accordance with manufacturer's recommendations and NFPA 70; include consideration for motor service factor and ambient temperature correction, where applicable.
 - 2. Inverse-Time Trip Class Rating: Class 20 unless otherwise indicated or required.
 - 3. Trip-free operation.
 - 4. Visible trip indication.
 - 5. Resettable.
 - a. Employ manual reset unless otherwise indicated.
 - b. Do not employ automatic reset with two-wire control.

END OF SECTION

SECTION 26 2923
VARIABLE-FREQUENCY MOTOR CONTROLLERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Variable Frequency Drive Units

1.02 RELATED REQUIREMENTS

- A. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. NEMA ICS 3 - Industrial Control and Systems: Medium Voltage Controllers Rated 2001 to 7200 Volts AC; 2005 (Reaffirmed 2010).
- B. NEMA ICS 7.1 - Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable Speed Drive Systems; 2006.
- C. NEMA ICS 7 - Industrial Control and Systems: Adjustable-Speed Drives; 2006.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- E. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 508 - Underwriters Laboratory Inc.
- H. IEEE 519 - Standard Practices and Requirements for Harmonic Control in Electrical Power Systems.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.
- C. Shop Drawings: Indicate front and side views of enclosures with overall dimensions and weights shown; conduit entrance locations and requirements; and nameplate legends.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.
- C. The VFD and all associated optional equipment shall be UL listed or recognized.
- D. The VFD shall contain a UL label attached.
- E. The VFD shall be factory pre-wired, assembled, and tested as a complete package.
- F. All inspection and testing procedures shall be developed and controlled under the guidelines of the Supplier's quality system and must be registered to ISO 9001.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Source Limitations: Furnish variable frequency motor controllers and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 DESCRIPTION

- A. Variable Frequency Controllers: Enclosed controllers suitable for operating the indicated loads, in compliance with requirements of NEMA ICS 7. Select unspecified features and options in accordance with NEMA ICS 3.1.
 - 1. Employ microprocessor-based inverter logic isolated from power circuits.
 - 2. Employ pulse-width-modulated inverter system.
 - 3. Design for ability to operate controller with motor disconnected from output.
- B. Enclosures: NEMA 250, Type 1, suitable for equipment application in places regularly open to the public.
- C. Finish: Manufacturer's standard enamel.

2.03 OPERATING REQUIREMENTS

- A. Rated Input Voltage: 480 volts, three phase, 60 Hertz.
 - 1. The supply input voltage tolerance shall be $\pm 10\%$ of nominal line voltage.
- B. Motor Nameplate Voltage: 460 volts, three phase, 60 Hertz.
- C. Rated Continuous Amperage Output: Output shall be rated at minimum for connected motor Full Load Amps operating at a minimum 1.15 Service Factor.
 - 1. If plans specify a higher drive output then size drive based on plans.
- D. Displacement Power Factor:
 - 1. Six Pulse VFD; Between 1.0 and 0.95, lagging, over entire range of operating speed and load.
- E. Minimum Efficiency at Full Load: 96.5 percent.
- F. Operating Ambient without derating: 0 °C to 40 °C (32 °F to 104 °F) .
- G. Operating relative humidity: 5% to 95% non-condensing.
- H. Operating elevation shall be up to 1000 Meters (3,300 ft) without drating.
- I. Systems rated at Normal Duty loads shall provide 110% overload capability for up to one minute and 150% for up to 3 seconds.
- J. Systems rated at Heavy Duty loads shall provide 150% overload capability for up to one minute and 180% for up to 3 seconds.
- K. Input Control Signal: Communication; EtherNet/IP as primary control means.
 - 1. Shall utilize hardwired Input Control Signals for Hand operation.
 - 2. Shall utilize hardwired Input Control Signals when operating in backup mode.
- L. Safety stop circuit: Hard wired input to disable drive from all operation.

2.04 VARIABLE FREQUENCY DRIVE UNITS

- A. Features
 - 1. Variable Frequency Controllers: Enclosed controllers suitable for operating the indicated loads, in compliance with requirements of NEMA ICS 7. Select unspecified features and options in accordance with NEMA ICS 3.1.
 - 2. Hardware
 - a. Utilize diode bridge or SCR bridge on the input rectifier.
 - b. Utilize DC bus inductor on all six-pulse VFD's only.
 - c. Utilize switching logic power supply operating from the DC bus.
 - d. Incorporate phase to phase and phase to ground MOV protection on the AC input line.
 - e. Microprocessor based inverter logic shall be isolated from power circuits.
 - f. Utilize latest generation IGBT inverter sections.
 - g. Battery receptacle for Lithium battery power to the Real Time Clock.
 - h. Ethernet port for direct network cable connections.
 - i. Additional DPI port for handheld and remote HIM options.
 - j. Dedicated Digital Input for hardware enable.
 - k. Conformal coated printed circuit boards.
 - 3. Control Logic
 - a. Ability to operate controller with motor disconnected from output.

- b. Design to attempt five automatic restarts following fault condition before locking out and requiring manual restart.
 - c. Provide a controlled shut down, when properly protected, with no component failure in the event of an output phase to phase or phase to ground short circuit. Provide annunciation of the fault condition.
 - d. Provide multiple programmable stop modes including Ramp, Coast, DC-Brake, Ramp-to-Hold, Fast Braking, and Current Limit Stop.
 - e. Provide multiple acceleration and deceleration rates.
 - f. Adjustable output frequency up to 650Hz.
- 4. DeviceLogix Control
 - a. Ability to control outputs and manage status information locally within the VFD.
 - b. Ability to function stand-alone or complimentary to supervisory control.
 - c. Ability to speed reaction time by processing in the VFD.
 - d. Ability to provide scaling, selector switches, or other data manipulations not already built into the VFD.
 - e. Ability to read inputs/write outputs and exclusively control the VFD.
 - f. Ability to provide an option for decision making if communications is lost with main controller.
 - g. Ability to control other VFD's via a peer-to-peer EtherNet/IP network.
 - h. Ability to write programs off-line.
- 5. Motor Control Modes
 - a. Selectable Sensorless Vector, Flux Vector, V/Hz, and Adjustable Voltage Control modes selectable through programming.
 - b. The drive shall be supplied with a Start-up and Auto-tune mode.
 - c. The V/Hz mode shall be programmable for fan curve or full custom patterns.
 - d. Capable of Open Loop V/Hz.
- 6. Current Limit
 - a. Programmable current limit from 20 to 160% of rated output current.
 - b. Current limit shall be active for all drive states: accelerating, constant speed, and decelerating.
 - c. The drive shall employ PI regulation with an adjustable gain for smooth transition in and out of current limit.
- 7. Acceleration / Deceleration
 - a. Accel/Decel settings shall provide separate adjustments to allow either setting to be adjusted from 0-3600 seconds.
 - b. A second set of remotely selectable accel/decel settings shall be accessible through digital inputs.
- 8. Speed Profiles
 - a. Programming capability shall allow the user to produce speed profiles with linear acceleration/deceleration or "S Curve" profiles that provide changing accel/decel rates.
 - b. S Curve profiles shall be adjustable.
- 9. Adjustments
 - a. A digital interface can be used for all set-up, operation and adjustment settings.
 - b. All adjustments shall be stored in nonvolatile memory (EEPROM).
 - c. No potentiometer adjustments shall be required.
 - d. EEPROM memory for factory default values shall be provided.
 - e. Software must be available for trending and diagnostics, as well as online and offline programming functionality.
- 10. Process PID Control
 - a. The drive shall incorporate an internal process PI regulator with proportional and integral gain adjustments as well as error inversion and output clamping functions.
 - b. The feedback shall be configurable for normal or square root functions. If the feedback indicates that the process is moving away from the set-point, the regulator shall adjust the drive output until the feedback equals the reference.
 - c. Process control shall be capable of being enabled or disabled with a hardwire input. Transitioning in and out of process control shall be capable of being tuned for faster response by preloading the integrator.

- d. Protection shall be provided for a loss of feedback or reference signal.
- 11. Skip Frequencies
 - a. Three adjustable set points that lock out continuous operation at frequencies which may produce mechanical resonance shall be provided.
 - b. The set points shall have a bandwidth adjustable from Maximum Reverse Speed to Maximum Forward Speed.
- 12. Fault Reset / Run
 - a. The drive shall provide up to nine automatic fault reset and restarts following a fault condition before locking out and requiring manual restart.
 - b. The automatic mode shall not be applicable to a ground fault, shorted output faults and other internal microprocessor faults.
 - c. The time between restarts shall be adjustable from 0.5 seconds to 30 seconds.
- 13. Run on Power Up
 - a. A user programmable restart function shall be provided to allow restart of the equipment after restoration of power after long duration power outages. Restart time dependent on presence of incoming signal.
- 14. Fault Memory
 - a. The last 32 fault codes shall be stored and time stamped in a fault buffer.
 - b. Information about the drive's condition at the time of the last fault such as operating frequency, output current, dc bus voltage and twenty-seven other status conditions shall be stored.
 - c. A power-up marker shall be provided at each power-up time to aid in analyzing fault data.
 - d. The last 32 alarm codes shall be stored and time stamped for additional troubleshooting reference.
- 15. Overload Protection
 - a. The drive shall provide internal class 10 adjustable overload protection.
 - b. Overload protection shall be speed sensitive and adjustable.
 - c. A viewable parameter shall store the overload usage.
- 16. Auto Economizer
 - a. An auto economizer feature shall be available to automatically reduce the output voltage when the drive is operating in an idle mode (drive output current less than programmed motor FLA). The voltage shall be reduced to minimize flux current in a lightly loaded motor thus reducing kW usage.
 - b. When the load increases, the drive shall automatically return to normal operation.
- 17. Terminal Blocks
 - a. Separate terminal blocks shall be provided for control and power wiring.
 - b. I/O terminal blocks shall be removable with wiring in place.
- 18. Flying Start
 - a. The drive shall be capable of determining the speed and direction of a spinning motor and adjust its output to "pick-up" the motor at the rotating speed.
- 19. Inputs and Outputs
 - a. The Input / Output option modules shall consist of both analog and digital I/O.
 - b. No jumpers or switches shall be required to configure digital inputs and outputs.
 - c. All digital input and output functions shall be fully programmable.
 - d. The control terminal blocks shall be rated for 115V AC
 - e. Inputs shall be optically isolated from the drive control logic.
 - f. The control interface card shall provide input terminals for access to fixed drive functions that include start, stop, external fault, speed, and enable.
 - g. The VFD shall be capable of supporting up to 7 analog inputs, 7 analog outputs, 21 digital inputs, 7 relay outputs, 7 transistor outputs, and 3 positive temperature coefficient (PTC) inputs.
 - h. The Input / Output option modules shall have the following features:
 - 1) Analog Inputs:
 - (a) Quantity two (2) differentially isolated, $\pm 10V$ (bi-polar), 88k ohm input impedance, 11 bit plus sign.
 - (b) Analog inputs shall be user programmable for a variety of uses including frequency command and process loop input. Analog inputs shall be user

programmable for function scaling (including invert), offset, signal loss detect, and square root.

- 2) Analog Outputs:
 - (a) Quantity two (2) $\pm 10V$ (bi-polar) / 11 bit & sign, 2k ohm minimum load, 4-20 mA, 11 bit plus sign, 400 ohm maximum load.
 - (b) The analog output shall be user programmable to be proportional to one of fourteen process parameters including output frequency, output current, encoder feedback, and output power.
 - (c) Programming shall be available to select either absolute or signed values of these parameters.
- 3) Digital Inputs:
 - (a) Quantity of six (6) digital inputs rated 24V DC/155V AC.
 - (b) All inputs shall be individually programmable for multiple functions including; Start, Run, Stop, Auxiliary Fault, Speed Select, Jog and Process PI functions.
- 4) Digital Outputs:
 - (a) At least one (1) relay output (N.O or N.C.).
 - (b) For 240V AC or 24V DC, N.O. contact output ratings shall be 2 amp maximum, general purpose (inductive)/resistive N.C. contact output ratings shall be 2 amp maximum, resistive only.
 - (c) Relays shall be programmable to multiple conditions including: Fault, Alarm, At Speed , Drive Ready, and PI Excess Error.
 - (d) Timers shall be available for each output to control the amount of time, after the occurring event that the output relay actually changes state.
 - (e) At least one (1) transistor output.
 - (f) For 24V DC, transistor output rating shall be 1 amp max, Resistive.
20. Reference Signals
 - a. The drive shall be capable of using the following input reference signals:
 - 1) Analog Inputs.
 - 2) Preset speeds.
 - 3) Remote Potentiometer
 - 4) Digital MOP
 - 5) Human Interface Module.
 - 6) Communications Modules.
21. Loss of Reference
 - a. The drive shall be capable of sensing reference loss conditions.
 - b. In the event of loss of the reference signal, the drive shall be user programmable to the following:
 - 1) Fault the drive and coast to stop.
 - 2) Issue a minor fault.
 - 3) Alarm and maintain last reference.
 - c. When using a communications network to control the drive, the communications adapter shall have these configurable responses to network disruptions and controller idle (fault or program) conditions:
 - 1) Fault.
 - 2) Stop.
 - 3) Zero Data.
 - 4) Hold Last State.
 - 5) Send Fault Configuration.
22. Metering
 - a. At a minimum, the following parameters shall be accessible through the Human Interface Module, if installed:
 - 1) Output Current in Amps.
 - 2) Output Voltage in Volts.
 - 3) Output Power in kW.
 - 4) Elapsed MWh.
 - 5) DC Bus Voltage.
 - 6) Frequency.

- 7) Heatsink Temperature.
- 8) Last eight faults.
- 9) Elapsed Run Time.
- 10) IGBT Temperature.
- 23. Faults
 - a. At a minimum, the following faults shall be accessible through the Human Interface Module:
 - 1) Power Loss.
 - 2) Undervoltage.
 - 3) Overvoltage.
 - 4) Motor Overload.
 - 5) Heat Sink Over-temperature.
 - 6) Maximum Retries.
 - 7) Phase to Phase and Phase to Ground Faults.
- 24. Predictive Diagnostics.
 - a. At a minimum, the following predictive diagnostic features shall be provided:
 - 1) Relay Output Life Cycles based on load type and amps.
 - 2) Hours of Fan Life based on load and ambient temperature.
 - 3) Motor Bearing life based on expected hours of use.
 - 4) Motor Lubrication schedule based on hours of use.
 - 5) Machine Bearing life based on expected hours of use.
- 25. Real-Time Clock
 - a. Shall be capable of providing time stamped events.
 - b. Shall have the ability to be set locally or via a remote controller.
 - c. Shall provide the ability to be programmable for month, day, year and local time zones in HH:MM:SS.
- B. Harmonic Mitigation Techniques.
 - 1. Drive Input Line Reactor
 - a. Provide a drive input line reactor mounted within the drive system enclosure for drives that are less than 100 horsepower.
 - b. The line reactor shall meet the following specifications:
 - 1) The construction shall be iron core with an impedance of 3 percent.
 - 2) The winding shall be copper or aluminum wound.
 - 3) The insulation shall be Class H with a 115 °C rise over 50 °C ambient.
 - 4) The unit shall be rated for system voltage, ampacity, and frequency.
- C. Output Filtering
 - 1. 3% output line reactor.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surface is suitable for controller installation.
- B. Do not install controller until building environment can be maintained within the service conditions required by the manufacturer.
- C. Verify that field measurements are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install in accordance with NEMA ICS 7.1 and manufacturer's instructions.
- B. Provide required support and attachment in accordance with Section 26 0529.
- C. Tighten accessible connections and mechanical fasteners after placing controller.
- D. Identify variable frequency controllers in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. Start-up Service
 - 1. At a minimum, the start-up shall include:
 - a. Perform pre-Power Check.
 - b. Megger Motor Resistances: Phase-to-Phase and Phase-to-Ground

- c. Verify system grounding per manufacturer's specifications.
 - d. Verify power and signal grounds.
 - e. Check connections.
 - f. Check environment.
 - 2. Drive Power-up and Commissioning:
 - a. Measure Incoming Power Phase-to-Phase and Phase-to-Ground.
 - b. Measure DC Bus Voltage.
 - c. Measure AC Current Unloaded and Loaded.
 - d. Measure Output Voltage Phase-to-Phase and Phase-to-Ground.
 - e. Verify input reference signal.
 - 3. All measurements shall be recorded.
 - 4. Drive shall be tuned for system operation.
 - 5. Drive parameter listing shall be provided.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.17. The insulation-resistance test on control wiring listed as optional is not required.

3.04 ADJUSTING

- A. Make final adjustments to installed controller to assure proper operation of load system. Obtain performance requirements from installer of driven loads.

3.05 CLOSEOUT ACTIVITIES

- A. Demonstrate operation of controllers in automatic and manual modes.
- B. Training
- 1. Provide a quantity of one 2-hour session of on-site instruction.
 - 2. The basis of the training shall be the variable frequency drive, the engineered drawings, and the user manual. At a minimum the training shall:
 - a. Review the engineered drawings identifying the components shown on the drawings.
 - b. Review starting / stopping and speed control options for the controllers.
 - c. Review operation of the HIM for programming and monitoring of the VFD.
 - d. Review the maintenance requirements of the variable frequency drive.
 - e. Review safety concerns with operating the variable frequency drives.

END OF SECTION

SECTION 26 2924

SOLID-STATE REDUCED VOLTAGE CONTROLLER UNIT (SOFTSTART)

PART 1 GENERAL

1.01 SECTION INCLUDES

1.02 SOLID-STATE REDUCED-VOLTAGE CONTROLLER UNIT

1.03 ENCLOSED SOLID-STATE REDUCED-VOLTAGE CONTROLLER

A. RELATED REQUIREMENTS

1. Section 03 3000- <<134; or _____>>: Housekeeping pads.
2. Section 26 0548 – Vibration and Seismic Controls for Electrical Systems. Includes requirements for the seismic qualification of equipment specified in this section.
3. Section 26 0553 – Identification products and requirements.
4. Section 26 2813- Fuses

1.04 REFERENCE STANDARDS

- A. NEMA ICS 7 – Industrial Control and Systems: Adjustable-Speed Drives; 2006
- B. NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum); 2014
- C. NETA ATS – Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013
- D. NFPA 70 – National Electrical Code; Most Recent Edition Adopted by authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL508 – Underwriters Laboratory Inc.
- F. IEEE519 – Standard Practices and Requirements for Harmonic Control in Electrical Power Systems.

1.05 SUBMITTALS

- A. Refer to Section _01 3000 – Administrative Requirements, for submittal procedures.
- B. Manufacturer Drawings
 1. Elevation drawings showing dimensional information
 2. Structure descriptions showing
 - a. Enclosure ratings
 - b. Fault ratings
 - c. Other information as required for approval
 3. Conduit entrance locations
 4. Unit descriptions including amperage ratings, frame sizes, trip settings, pilot devices, etc.
 5. Nameplate Information
 6. Schematic wiring diagrams
- C. Product Data
 1. Publications on solid-state reduced-voltage controller.
 2. Data sheets and publications on all major components including but not limited to the following
 - a. Contactors
 - b. Circuit breakers and fuse information including time current characteristics
 - c. Control power transformers
 - d. Pilot devices
 - e. Relays
- D. Specification Response
 1. Detailed response to this specification showing where in the literature each requirement is satisfied.
 2. All clarifications and exceptions must be clearly identified.
- E. Installation Instructions
 1. Provide a copy of the manufacturer's installation instructions which includes the following:
 - a. Receiving, handling, and storage instructions
- F. FINAL SUBMITTALS

1. The contractor shall provide certification that the solid-state reduced-voltage controller has been installed in accordance with the manufacturer's instructions.
2. The contractor shall provide certification that the Contractor has properly adjusted any timing devices required in the starting circuitry.
3. Final Drawings
 - a. The manufacturer shall provide final drawings reflecting the "As-Shipped" state of the installed equipment.
 - b. Manufacturer drawings shall be provided in DWG format.
 - c. Manufacturer drawings do not need to be stamped is a drawing schedule is provided that lists the drawing numbers, revision levels, and status of drawings (Preliminary, Approval, Final, etc.)
 - d. The contractor shall be responsible for making changes to the "As-Shipped" drawings from the manufacturer to reflect any field modifications.
4. Maintenance Data
 - a. Solid Stat Reduced-Voltage controller installation instructions and User Manual.
 - b. Installation / Operation instructions for major components.
 - c. Parameter Data Listing
 - d. Solid State reduced-voltage controller spare parts listing and pricing.
 - e. Include name and phone number for local distributor for the spare parts.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: The manufacturer shall have a minimum of 25 years of experience in the manufacture of solid-state reduced-voltage controllers.
- B. Products: Listed, classified, and labeled as suitable for the application.
- C. The controller and all associated optional equipment shall be cULus Listed.
- D. The controller, with enclosure shall be factory pre-wired, assembled, and tested as a complete package.
- E. The manufacturer shall maintain factory trained and authorized service facilities within 100 miles of the project and shall have a demonstrated record of service for at least the previous ten years.
- F. Support personnel are to be direct employees of the manufacturer and be available 24 hours per day through a toll-free number.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. The contractor shall coordinate the shipping of equipment with the manufacturer.
- B. The contractor shall store the equipment in a clean and dry space.
- C. The contractor shall protect the units from dirt, water, construction debris and traffic.
- D. During storage the contractor shall connect internal space heaters (if specified) with temporary power.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Source limitations: Furnish reduced-voltage controllers and associated components produced by and obtain from a single supplier.

2.02 OPERATING REQUIREMENTS

- A. The solid-state reduced-voltage controller shall accept an input voltage: from 460 three-phase, 60 Hertz. The supply input voltage tolerance shall be plus 10 percent or minus 15 percent.
- B. The solid-state reduced-voltage controller shall have a minimum short circuit current rating of 65 kA when protected with a type CC/J/L fuses (up to 600V).
- C. Environmental Ratings
 1. Storage ambient temperature range: -25...+ 75°C.
 2. Operating ambient temperature range: 0... 40°C.
 3. The relative humidity range: 5% to 95% non-condensing.
 4. Operating elevation: up to 2000 meters.

2.03 SOLID-STATE REDUCED-VOLTAGE CONTROLLER UNIT DESIGN

- A. The open-type controller device shall consist of a power structure and a logic component.
- B. Power Structure
 - 1. The family of devices must be available from 1...480 A in a line connection
 - 2. The power structure shall include an electro-mechanical SCR bypass device.
 - 3. The power structure shall include built-in 3-phase current monitoring and overload protection.
 - 4. There shall be a current transformer on each phase of the device for current measurements.
 - 5. For ratings 1...480 A, SCRs shall have the following minimum repetitive peak inverse voltage ratings
 - a. 1400V for units rated 200...480V
 - b. 1600V for units rated 200...600V
- C. Logic Component
 - 1. The logic component shall be an integral part of the power structure so it cannot be removed and misplaced.
 - 2. The control module shall provide digital microprocessor control and supervision of all controller operation, including pulse firing of the SCRs.
 - 3. The control module shall consist of the following.
 - a. Self-tuning power supply accepting control power input from 100...240V AC or 24V AC/DC, 50/60 Hz.
 - b. Logic control circuitry incorporating a latch circuit for three-wire control.
 - c. Input / output circuitry
 - d. DIP switches are to be used for secure setting of the setup parameters
 - e. A POT setting is to be used for setting up the motor FLA
 - f. Integrated LED to indicate fault and running status
 - 4. The control terminals shall have the following characteristics
 - a. The control terminal wiring connector shall be easily accessible and located on the front top of the device.
 - b. The terminals shall be UL rated for 300 Volts, 10 Amps maximum.
 - c. The terminals are UL Recognized to accept a maximum of two (2) wires rated #24...#14 AWG.

2.04 SOLID-STATE REDUCED-VOLTAGE CONTROLLER UNIT MODES

- A. Starting Modes
 - 1. Soft start with Selectable Kickstart
 - a. Programmable initial torque value of 15...65% of locked rotor torque.
 - b. Programmable acceleration ramp time from 0...30 seconds.
 - c. A selectable kickstart, or boost, shall be provided at the beginning of the voltage ramp. The kickstart shall provide a current pulse of 550% of the full load current. The kickstart time shall be adjustable from 0...2 seconds.
 - 2. Current limit start
 - a. Provides means of limiting the maximum starting current
 - b. Adjustable from 150...450% of motor full load current.
- B. Stopping Modes
 - 1. Soft stop
 - a. The soft stop option shall provide a voltage ramp-down for an extended motor stopping time.
 - b. Soft stop shall be initiated by a dedicated Soft Stop input. A coast-to-rest stop shall still be possible with a separate stop input.
 - c. Programmable voltage ramp down time from 100...300% of the start time selected.
 - d. The load shall stop when the motor voltage drops to a point where the load torque is greater than the motor torque

2.05 SOLID-STATE REDUCED-VOLTAGE CONTROLLER UNIT FEATURES

- A. Overload Protection
 - 1. Shall meet applicable standards as a motor thermal protective device.

2. Shall utilize three-phase current sensing. The use of two current transformers shall be unacceptable.
 3. Selectable trip classes of 10, 15, and 20 shall be provided as standard.
 4. Electronic thermal memory shall provide enhanced motor protection.
- B. Digital I/O
1. A minimum of two (2) auxiliary contacts shall be provided for customer use
 2. The contacts shall be rated for 240V AC maximum.
 3. Contact configurations shall be programmable and contain the following configurations:
 - a. Aux1 (N.O.) Normal/Up-to-Speed
 - b. Aux 2 (N.O./N.C.) Normal/Up-to-Speed
 - c. Fault Aux (N.O.) Fault
- C. Input Control Signal: Communication; EtherNet/IP as primary control means.
1. Shall utilize hardwired Input Control Signals for Hand operation.
 2. Shall utilize hardwired Input Control Signals when operating in backup mode.
- D. Protection and Diagnostics
1. Pre-start line fault advising of shorted SCR or missing load connection with phase indication.
 2. Phase imbalance protection
 3. Running line fault advising power loss, shorted SCR, or missing load connection.
 4. SCR Over temperature
 5. The overload is the only defeatable protection provided as standard with the controller.
 6. When fault conditions are detected, the controller shall inhibit starting or shutting down SCR pulse firing.
 7. An auxiliary contact that is user programmable for fault indication shall be provided for customer use.

PART 3 EXECUTION

3.01 FIELD INSTALLATION AND TESTING

- A. Install in accordance with NEMA ICS 7.1 and manufacturer's instructions.
- B. Provide required support and attachment in accordance with Section 26 0529
- C. Provide fuses in fusible switches and control circuit per design documents.
- D. Identify motor controllers <<in accordance with Section 26 0859; in accordance with Section ____; ____; or None – N/A>>.

3.02 FIELD QUALITY CONTROL

- A. Start-up personnel shall be direct employees of the manufacturer and shall be degreed engineers.
- B. The contractor shall verify all field measurements prior to the fabrication of the solid-state reduced-voltage controller.
- C. At a minimum, the start-up service shall include:
 1. Pre-power check
 - a. Megger motor resistance: phase-to-phase and phase-to-ground
 - b. Verify system grounding per manufacturer's specifications
 - c. Verify power and signal grounds
 - d. Check connections
 - e. Check environment
 2. Power-up and commissioning
 - a. Measure incoming power phase-to-phase and phase-to-ground
 - b. Measure DC bus voltage
 - c. Measure AC current unloaded and loaded
 - d. Measure output voltage phase-to-phase and phase-to-ground
 3. Recording of all measurements
 4. Tuning for system operation
 5. Providing a parameter list

3.03 CLOSEOUT ACTIVITIES

A. TRAINING

1. Manufacturer to provide a quantity of one (1) session of on-site instruction.
2. The service engineer shall perform training.
3. The instruction shall include the operational and maintenance requirements of the controller
4. The basis of the training shall be the installed controller, the engineered drawings and the user manual. At a minimum, the training shall do the following:
 - a. Review of the engineered drawings identifying the components shown on the drawings.
 - b. Review starting / stopping options for the controller.
 - c. Review operation of the Human Interface for programming and monitoring of the controller.
 - d. Review the maintenance requirements of the controller.
 - e. Review safety concerns with operating the controller.

B. SPARE MATERIALS

1. Provide one (1) set of three (3) of each size power fuse utilized.
2. Provide spares equal to 10 percent of the installed quantity for primary and secondary control power fuses.
3. Provide one (1) spare control relay for each unique relay utilized on the project.

C. WARRANTY

1. The manufacturer shall provide their standard parts warranty for eighteen (18) months from the date of shipment or twelve (12) months from the date of being energized, whichever occurs first.
2. The manufacturer shall confirm this warranty as part of the submittal.
3. This warranty applies only to stand alone solid-state reduced-voltage controllers.

END OF SECTION.

SECTION 26 3600
TRANSFER SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Transfer switches for low-voltage (600 V and less) applications and associated accessories:
 - 1. Automatic transfer switches.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- C. NEMA ICS 10 Part 1 - Industrial Control and Systems Part 1: Electromechanical AC Transfer Switch Equipment; 2005.
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 1008 - Transfer Switch Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate compatibility of transfer switches to be installed with work provided under other sections or by others.
 - 2. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
 - 3. Coordinate arrangement of equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Coordinate the work with placement of supports, anchors, etc. required for mounting.
 - 5. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features.
- C. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing all factory and field connections.

1.06 QUALITY ASSURANCE

- A. Comply with the following:
 - 1. NFPA 70 (National Electrical Code).
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store transfer switches in accordance with manufacturer's instructions.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's instructions to avoid damage to transfer switch components, enclosure, and finish.

1.08 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Transfer Switches - Other Acceptable Manufacturers:
 - 1. ABB/GE: www.geindustrial.com/#sle.
 - 2. ASCO Power Technologies: www.ascopower.com.
 - 3. Eaton Corporation: www.eaton.com/#sle.
 - 4. Thomson Power Systems: www.thomsonps.com/#sle.
 - 5. Same as manufacturer of engine generator(s) used for this project.
 - a. Cummins.
- B. Products other than basis of design are subject to compliance with specified requirements and prior approval of Engineer. By using products other than basis of design, Contractor accepts responsibility for costs associated with any necessary modifications to related work, including any design fees.
- C. Source Limitations: Furnish transfer switches and accessories produced by a single manufacturer and obtained from a single supplier.

2.02 TRANSFER SWITCHES

- A. Provide complete power transfer system consisting of all required equipment, conduit, boxes, wiring, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Applications:
 - 1. Utilize open transition transfer unless otherwise indicated or required.
- D. Construction Type: Only "contactor type" (open contact) transfer switches are acceptable. Do not use "breaker type" (enclosed contact) transfer switches.
- E. Automatic Transfer Switch:
 - 1. Transfer Switch Type: Automatic transfer switch.
 - 2. Transition Configuration: Open-transition (no neutral position).
 - 3. Voltage: 480/277.
 - 4. Ampere Rating: 1200.
 - 5. Neutral Configuration: Solid neutral (unswitched), except as indicated.
- F. Comply with NEMA ICS 10 Part 1, and list and label as complying with UL 1008 for the classification of the intended application (e.g. emergency, optional standby).
- G. Do not use double throw safety switches or other equipment not specifically designed for power transfer applications and listed as transfer switch equipment.
- H. Load Classification: Classified for total system load (any combination of motor, electric discharge lamp, resistive, and tungsten lamp loads with tungsten lamp loads not exceeding 30 percent of the continuous current rating) unless otherwise indicated or required.
- I. Switching Methods:
 - 1. Open Transition:
 - a. Provide break-before-make transfer without a neutral position that is not connected to either source, and with interlocks to prevent simultaneous connection of the load to both sources.
 - 2. Obtain control power for transfer operation from line side of source to which the load is to be transferred.
- J. Service Conditions: Provide transfer switches suitable for continuous operation at indicated ratings under the service conditions at the installed location.
- K. Enclosures:
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:

- a. Indoor Clean, Dry Locations: Type 12.
- 2. Finish: Manufacturer's standard unless otherwise indicated.
- L. Short Circuit Current Rating:
 - 1. Withstand and Closing Rating: Provide transfer switches, when protected by the supply side overcurrent protective devices to be installed, with listed withstand and closing rating not less than 65,000 rms symmetrical amperes.
- M. Automatic Transfer Switches:
 - 1. Description: Transfer switches with automatically initiated transfer between sources; electrically operated and mechanically held.
 - 2. Control Functions:
 - a. Automatic mode.
 - b. Test Mode: Simulates failure of primary/normal source.
 - c. Voltage and Frequency Sensing:
 - 1) Undervoltage sensing for each phase of primary/normal source; adjustable dropout/pickup settings.
 - 2) Undervoltage sensing for alternate/emergency source; adjustable dropout/pickup settings.
 - 3) Underfrequency sensing for alternate/emergency source; adjustable dropout/pickup settings.
 - d. Outputs:
 - 1) Contacts for engine start/shutdown (except where direct generator communication interface is provided).
 - 2) Auxiliary contacts; one set(s) for each switch position.
 - e. Adjustable Time Delays:
 - 1) Engine generator start time delay; delays engine start signal to override momentary primary/normal source failures.
 - 2) Transfer to alternate/emergency source time delay.
 - 3) Retransfer to primary/normal source time delay.
 - 4) Engine generator cooldown time delay; delays engine shutdown following retransfer to primary/normal source to permit generator to run unloaded for cooldown period.
 - f. In-Phase Monitor (Open Transition Transfer Switches): Monitors phase angle difference between sources for initiating in-phase transfer.
 - 1) Shall have ability to automatically override in-phase monitor and initiate transfer if not in-phase within 120 seconds.
 - g. Engine Exerciser: Provides programmable scheduled exercising of engine generator selectable with or without transfer to load; provides memory retention during power outage.
 - 3. Status Indications:
 - a. Connected to alternate/emergency source.
 - b. Connected to primary/normal source.
 - c. Alternate/emergency source available.
 - 4. Automatic Sequence of Operations:
 - a. Upon failure of primary/normal source for a programmable time period (engine generator start time delay), initiate starting of engine generator where applicable.
 - b. When alternate/emergency source is available, transfer load to alternate/emergency source after programmable time delay.
 - c. When primary/normal source has been restored, retransfer to primary/normal source after a programmable time delay. Bypass time delay if alternate/emergency source fails and primary/normal source is available.
 - d. Where applicable, initiate shutdown of engine generator after programmable engine cooldown time delay.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that the ratings and configurations of transfer switches are consistent with the indicated requirements.

- B. Verify that rough-ins for field connections are in the proper locations.
- C. Verify that mounting surfaces are ready to receive transfer switches.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Arrange equipment to provide minimum clearances and required maintenance access.
- D. Install transfer switches plumb and level.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Prepare and start system in accordance with manufacturer's instructions.
- C. Automatic Transfer Switches:
 - 1. Inspect and test in accordance with NETA ATS, except Section 4.
 - 2. Perform inspections and tests listed in NETA ATS, Section 7.22.3. The insulation-resistance tests listed as optional are not required.
- D. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

3.04 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate proper operation of transfer switches to Owner, and correct deficiencies or make adjustments as directed.

END OF SECTION

SECTION 26 4300
SURGE PROTECTIVE DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surge protective devices for service entrance locations.
- B. Surge protective devices for distribution locations.
- C. Surge protective devices for branch panelboard locations.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

1.03 ABBREVIATIONS AND ACRONYMS

- A. SPD: Surge Protective Device.

1.04 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate size and location of overcurrent device compatible with the actual surge protective device and location to be installed. Notify Engineer/Architect of any conflicts or deviations from Contract Documents to obtain direction prior to ordering equipment.

1.06 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include detailed component information, voltage, surge current ratings, repetitive surge current capacity, voltage protection rating (VPR) for all protection modes, maximum continuous operating voltage (MCOV), nominal discharge current (I-n), short circuit current rating (SCCR), connection means including any required external overcurrent protection, enclosure ratings, outline and support point dimensions, weight, service condition requirements, and installed features.
- C. Shop Drawings: Include wiring diagrams showing all factory and field connections with wire and circuit breaker/fuse sizes.

1.07 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.08 DELIVERY, STORAGE, AND PROTECTION

- A. Store in a clean, dry space in accordance with manufacturer's written instructions.

1.09 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.10 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Manufacturer's Warranty: Provide minimum five year warranty covering repair or replacement of surge protective devices showing evidence of failure due to defective materials or workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Field-installed, Externally Mounted - Current Technology; a company of ABB; Model #SL3-125-480-3Y-MDB-M4E-F; www.tnbpowersolutions.com.
- B. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SURGE PROTECTIVE DEVICES - GENERAL REQUIREMENTS

- A. Description: Factory-assembled surge protective devices (SPDs) for 60 Hz service; listed, classified, and labeled as suitable for the purpose intended; system voltage as indicated on the drawings.
- B. Unless otherwise indicated, provide field-installed, externally-mounted SPDs.
- C. List and label as complying with UL 1449, Type 1 when connected on line side of service disconnect overcurrent device and Type 1 or 2 when connected on load side of service disconnect overcurrent device.
- D. Protected Modes:
 - 1. Wye Systems: L-N, L-G, N-G, L-L.
- E. UL 1449 Voltage Protection Ratings (VPRs):
 - 1. 480Y/277V System Voltage: Not more than 1,500 V for L-N, L-G, and N-G modes and 2,000 V for L-L mode.
- F. UL 1449 Maximum Continuous Operating Voltage (MCOV): Not less than 115% of nominal system voltage.
- G. Enclosure Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - 1. Indoor clean, dry locations: Type 12.

2.03 SURGE PROTECTIVE DEVICES FOR DISTRIBUTION LOCATIONS

- A. Distribution locations include SPDs connected to distribution panelboards, motor control centers, and busway.
- B. Surge Protective Device:
 - 1. Protection Circuits: Field-replaceable modular.
 - 2. Surge Current Rating: Not less than 120 kA per mode/240 kA per phase.
 - 3. UL 1449 Nominal Discharge Current (I-n): 20 kA.
 - 4. UL 1449 Short Circuit Current Rating (SCCR): Not less than the available fault current at the installed location as indicated on the drawings.
 - 5. Diagnostics:
 - a. Protection Status Monitoring: Provide indicator lights to report the protection status for each phase.
 - b. Alarm Notification: Provide indicator light and audible alarm to report alarm condition. Provide button to manually silence audible alarm.
 - c. Remote Status Monitoring: Provide Ethernet/IP communication for remote annunciation of status.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the service voltage and configuration marked on the SPD are consistent with the service voltage and configuration at the location to be installed.
- C. Verify system grounding and bonding is in accordance with Section 26 0526, including bonding of neutral and ground for service entrance and separately derived systems where applicable. Do not energize SPD until deficiencies have been corrected.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).

- B. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- C. Install conductors between SPD and equipment terminations as short and straight as possible, not exceeding manufacturer's recommended maximum conductor length. Breaker locations may be reasonably rearranged in order to provide leads as short and straight as possible. Twist conductors together to reduce inductance.
- D. Do not energize SPD until bonding of neutral and ground for service entrance and separately derived systems is complete in accordance with Section 26 0526 where applicable. Replace SPDs damaged by improper or missing neutral-ground bond.

3.03 CLEANING

- A. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 5100
INTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior luminaires.
- B. Emergency lighting units.
- C. Exit signs.
- D. Ballasts and drivers.
- E. Lamps.

1.02 RELATED REQUIREMENTS

- A. Section 26 0529 - Hangers and Supports for Electrical Systems.
- B. Section 26 0533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts - Supplements; 2011.
- B. IES LM-63 - IESNA Standard File Format for Electronic Transfer of Photometric Data and Related Information; 2002 (Reaffirmed 2008).
- C. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; 2008.
- D. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; 2015, with Errata (2017).
- E. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; 2006.
- F. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.
- G. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2016.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 844 - Luminaires for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.
- K. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- L. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- M. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
 - 2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
 - 3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
 - 4. Notify Engineer/Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate dimensions and components for each fixture that is not a standard product of the manufacturer.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
 - 1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.
 - 2. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency in IES LM-63 standard format upon request.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings. Alternate light fixture data sheet shall be submitted to the Engineer for approval prior to bid. No exceptions.

2.02 LUMINAIRES

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Hazardous (Classified) Location Luminaires: Listed and labeled as complying with UL 844 for the classification of the installed location.
- H. LED Luminaires:
 - 1. Components: UL 8750 recognized or listed as applicable.
 - 2. Tested in accordance with IES LM-79 and IES LM-80.
 - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

2.03 EMERGENCY LIGHTING UNITS

- A. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
- B. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

- C. Battery:
 - 1. Size battery to supply all connected lamps, including emergency remote heads where indicated.
- D. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
- E. Provide low-voltage disconnect to prevent battery damage from deep discharge.

2.04 EXIT SIGNS

- A. Description: Internally illuminated exit signs with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
 - 1. Number of Faces: Single or double as indicated or as required for the installed location.
 - 2. Directional Arrows: As indicated or as required for the installed location.
- B. Self-Powered Exit Signs:
 - 1. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
 - 2. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
 - 3. Provide low-voltage disconnect to prevent battery damage from deep discharge.

2.05 BALLASTS AND DRIVERS

- A. Ballasts/Drivers - General Requirements:
 - 1. Electronic Ballasts/Drivers: Inrush currents not exceeding peak currents specified in NEMA 410.
- B. Dimmable LED Drivers:
 - 1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
 - 2. Control Compatibility: Fully compatible with the dimming controls to be installed.

2.06 LAMPS

- A. Manufacturers:
 - 1. GE Lighting: www.gelighting.com.
 - 2. Philips Lighting Co of NA: www.lighting.philips.com.
 - 3. Sylvania: www.sylvania.com
 - 4. Manufacturer Limitations: Where possible, provide lamps produced by a single manufacturer.
- B. Lamps - General Requirements:
 - 1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
 - 2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.
 - 3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
 - 4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the Engineer/Architect to be inconsistent in perceived color temperature.
- C. Lamp Types: As specified for each fixture.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.

- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- D. Provide required support and attachment in accordance with Section 26 0529.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Suspended Luminaires:
 - 1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
 - 2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
- G. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- H. Install accessories furnished with each luminaire.
- I. Bond products and metal accessories to branch circuit equipment grounding conductor.
- J. Emergency Lighting Units:
 - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
- K. Exit Signs:
 - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
- L. Install lamps in each luminaire.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Operate each luminaire after installation and connection to verify proper operation.
- D. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.
- E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Engineer/Architect.

3.04 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Engineer/Architect. Secure locking fittings in place.
- B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Engineer/Architect or authority having jurisdiction.
- C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Engineer/Architect or authority having jurisdiction.

3.05 CLEANING

- A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.06 CLOSEOUT ACTIVITIES

- A. Just prior to Substantial Completion, replace all lamps that have failed.

3.07 SCHEDULE - SEE DRAWINGS

END OF SECTION

SECTION 26 5600
EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Exterior luminaires.
- B. Ballasts.

1.02 RELATED REQUIREMENTS

- A. Section 26 0529 - Hangers and Supports for Electrical Systems.
- B. Section 26 0533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. AASHTO LTS - Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals; American Association of State Highway and Transportation Officials; 6th Edition, with 2015 Interim Revisions.
- B. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns; 2006.
- C. ANSI C82.1 - American National Standard for Lamp Ballast - Line Frequency Fluorescent Lamp Ballast; 2004.
- D. ANSI C82.4 - American National Standard for Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type); 2002.
- E. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts - Supplements; 2011.
- F. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; 2008.
- G. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; 2015, with Errata (2017).
- H. IES RP-8 - Roadway Lighting; 2014.
- I. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- J. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems; 2006.
- K. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- L. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- M. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Notify Engineer/Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
- B. Coordination: Furnish bolt templates and pole mounting accessories to installer of pole foundations.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
 - 1. LED Luminaires:

- a. Include estimated useful life, calculated based on IES LM-80 test data.
- D. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.
- B. Any deviation from what is called out in the Light Fixture Schedule requires prior approval from the Engineer.
 - 1. Provide Cut Sheets and Photometrics.
- C. Substitutions: See Section 01 6000 - Product Requirements.

2.02 LUMINAIRES

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. LED Luminaires:
 - 1. Components: UL 8750 recognized or listed as applicable.
 - 2. Tested in accordance with IES LM-79 and IES LM-80.
 - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

2.03 BALLASTS AND DRIVERS

- A. Dimmable LED Drivers:
 - 1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
 - 2. Control Compatibility: Fully compatible with the dimming controls to be installed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.

- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires in accordance with NECA/IESNA 501.
- D. Provide required support and attachment in accordance with Section 26 0529.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- G. Install accessories furnished with each luminaire.
- H. Bond products and metal accessories to branch circuit equipment grounding conductor.
- I. Provide concrete bases for lighting poles at locations indicated, in accordance with Section 03 3000.
- J. Install lamps in each luminaire.
- K. Bond luminaires, metal accessories, and metal poles to branch circuit equipment grounding conductor.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Perform field inspection, testing, and adjusting in accordance with Section 01 4000.
- D. Operate each luminaire after installation and connection to verify proper operation.
- E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Engineer/Architect.
- F. Measure illumination levels to verify conformance with performance requirements. Take measurements during night sky, without moon or with heavy overcast clouds effectively obscuring moon.

3.04 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Engineer/Architect. Secure locking fittings in place.
- B. Aim and adjust luminaires to provide illumination levels and distribution indicated on Drawings.

3.05 CLEANING

- A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.
- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosure.
- D. Clean photometric control surfaces as recommended by manufacturer.
- E. Clean finishes and touch up damage.

3.06 CLOSEOUT ACTIVITIES

3.07 PROTECTION

- A. Protect installed luminaires from subsequent construction operations.

3.08 SCHEDULE - SEE DRAWINGS

END OF SECTION

DIVISION 46: Water and Wastewater Equipment

SECTION 46 0103
STARTUP AND COMMISSIONING PROCEDURES

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 46 0106 - Operation and Maintenance Manual.

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures; except:
1. Make submittals on time schedule specified by Owner's representative.
 2. Submit draft submittals intended for the use of the Owner's representative, in preparing final documents, in editable electronic format, Microsoft Word 2010, or later edition, preferred.
 3. Allow for time required for review and approval.
- B. Summary Startup and Commissioning Schedule: Within 60 days after award of Contract, submit anticipated dates for construction, with start and duration of major testing activities; indicate activities on the critical path.
- C. Startup Plan and Forms.
- D. Pre-Functional Checklists.
- E. Functional Test Procedures and Forms.
- F. Completed Pre-Functional Checklists.
- G. Completed Startup Reports.
- H. Completed Functional Test Reports.

PART 2 PRODUCTS

2.01 DOCUMENTATION IDENTIFICATION SYSTEM

- A. Give each submitted form or report a unique identification; use the following scheme.
- B. Type of Document: Use the following prefixes:
1. Pre-Functional Checklist: PFC-.
 2. Startup Plan: SP-.
 3. Startup Report: SR-.
 4. Functional Test Procedure: FTP-.
 5. Functional Test Report: FTR-.
- C. For Unit Processes: Use the Unit Process specification section number (series 4600xx) and assign letters sequentially (A, B, C, etc) to indicate the commissioning activities relevant to the process as a whole.
- D. For Individual Components: Use the unique Plant ID number; see Section 46 0500.
- E. Test, Revision, or Submittal Number: Number each successive iteration sequentially, starting with 1.
- F. Example: FTP-460023-A.2 would be the Functional Test Procedure for the whole Memorial Pump Station, revision 2.
- G. Example: FTP-460023-001.1 would be the Functional Test Procedure for equipment item 1 in the Memorial Pump Station, probably a pump, first submittal.
- H. Example: PC-460023-001.2 would be the Pre-Functional Checklist for equipment item 1 in the Memorial Pump Station, probably a pump, revision 2.

PART 3 EXECUTION

3.01 STARTUP PLAN AND STARTUP

- A. Startup Plan: Prepare an overall startup plan covering all operating equipment and devices with forms for startup reports.
1. List all equipment by Plant ID and description.
 2. Include anticipated date and duration of startup and functional testing for each item.
 3. Cross-reference individual equipment Startup Plans, Startup Report forms, Pre-Functional Checklists, and Functional Test Procedures by identifying number.

4. If special equipment, personnel, or other conditions are necessary for startup or testing, describe them.
 5. Submit for approval and revise as directed.
- B. Updating Plan: Keep plan up to date as startup and testing progress.
- C. Equipment Startup Plans: Prepare a Startup Plan for each item of operating equipment and device.
1. Incorporate manufacturer's recommended startup procedures, checklists, etc.
 2. Reference Pre-Functional Checklist by identifying number.
 3. If Pre-Functional Checklist covers all startup activities, no separate equipment startup plan is necessary; cross-reference the Pre-Functional Checklist on overall Startup Plan with notation that no separate equipment startup plan is required.
- D. Operating Personnel Orientations: Prior to startup of any Unit Process, or modified portion of existing Unit Process, conduct an operating personnel orientation.
1. Timing: Not more than 2 weeks and not less than 1 week prior to startup so that personnel can review O&M Manual.
 2. Owner will designate personnel to attend; also require attendance by installers' and manufacturers' representatives.
 3. Handouts: Make minimum of 10 printed copies of relevant layouts and diagrams from O&M Manual.
 4. Review the sequence of startup activities, the Pre-Functional Checklists and startup forms, and explain the expected results.
 5. Review and discuss problems that might occur during startup, especially any not discussed in the O&M Manual because they would not be encountered in normal operation, and preparations made to correct them.
 6. Spend at least 1 hour in visual orientation on-site, pointing out all components of the process and answering questions.
- E. Execution: Execute startup of each item of operating equipment, device, and unit process; fill out relevant Startup Report form
1. Verify that startup procedures are correctly described in O&M Manual.
 2. Submit Pre-Functional Checklists and equipment startup reports together with overall Unit Process Startup Report.
 3. Submit completed Unit Process Startup Reports within two days of completion.
- F. Deficiencies: Correct deficiencies and restart, at no extra cost to Owner; if difficulty in correction would delay progress, report deficiency immediately.

3.02 PREFUNCTIONAL CHECKLISTS

- A. Draft Checklists: Prepare a Pre-Functional Checklist for each item of operating equipment, device, and unit process.
1. Submit for approval and revise as directed.
 2. No sampling of identical or near-identical items is allowed.
 3. These checklists do not replace manufacturers' recommended startup checklists, regardless of apparent redundancy.
- B. Forms: Include the following types of information:
1. Plant ID number.
 2. Manufacturer, model number, and relevant capacity information.
 3. Serial number of installed unit.
 4. List of inspections to be conducted to document proper installation; these will be primarily static inspections and procedures; for equipment and systems may include normal manufacturer's start-up checklist items and minor testing.
 5. Include field quality control inspections and tests specified in individual specification sections.
 6. Sensor and actuator calibration information.
 7. Status of O&M data submissions.
 8. Status of Startup Plan submissions.
 9. Status of Training Plan submissions.
 10. Certification by installing contractor that the unit is properly installed and ready for Startup

11. Spaces for witnessing, dates, and conditions.
- C. Execution: Fill out and submit Pre-Functional Checklists after completion of installation of each item of equipment.
 1. Each line item without deficiency is to be witnessed, initialed, and dated by the actual witness; checklists are not complete until all line items are initialed and dated complete without deficiencies.
 2. Checklists with incomplete items may be submitted for approval provided the Contractor attests that incomplete items do not preclude the performance of safe and reliable Functional Testing; re-submission of the Checklist is required upon completion of remaining items.
 3. Individual Checklists may contain line items that are the responsibility of more than one installer; assign responsibility to appropriate installers or subcontractors, with identification recorded on the form.
 4. If any Checklist line item is not relevant, record reasons on the form.
 5. Regardless of these reporting requirements, Contractor is responsible for correct startup and operation.
 6. Submit completed Checklists within two days of completion.
- D. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to Owner; if difficulty in correction would delay progress, report deficiency immediately.

3.03 FUNCTIONAL TESTS

- A. At least one Functional Test is required for each item of operating equipment, device, and unit process, unless sampling of multiple identical or near-identical units is allowed by the final test procedures.
 1. Some test procedures are included in the Contract Documents; where Functional Test procedures are not included in Contract Documents, propose test procedures appropriate to the equipment or process being tested.
- B. Functional Test Procedures: Prepare descriptions of functional tests, with forms for recording test conditions and results.
 1. Submit for approval and revise as directed.
 2. List steps to be taken to demonstrate performance, in order of occurrence.
 3. List test apparatus, if any.
 4. List performance criteria which if achieved demonstrate satisfactory performance.
- C. Functional Test Report Forms: Include the following types of information:
 1. Plant ID number, for equipment, or Unit Process identification.
 2. Manufacturer, model number, and relevant capacity information.
 3. Serial number of installed unit.
 4. Test apparatus calibration information.
 5. List of test steps, with spaces for results, witnessing, and dates.
 6. Final results.
- D. Execution: Perform Functional Tests and fill out and submit test report form after completion of test.
 1. Verify that operating functions and procedures are correctly and completely described in O&M Manual.
 2. Use the approved test report form.
 3. Submit completed test report form within two days of completion.
 4. If a deficiency is not corrected and re-tested immediately, document the deficiency and intentions regarding correction.
- E. Deficiencies: Correct deficiencies and re-test at no extra cost to Owner, including cost of Owner representative witnessing; if difficulty in correction of deficiency would delay progress, report deficiency immediately.
 1. Deficiencies are any condition in the installation or function of a component, piece of equipment or system that is not in compliance with Contract Documents or does not perform properly.
 2. Coordinate scheduling of re-tests with Owner's representative.
 3. Identical or Near-Identical Items: If 10 percent, or three, whichever is greater, of identical or near-identical items fail to perform due to material or manufacturing defect, all items will

be considered defective; provide a proposal for correction within 2 weeks after notification of defect, including provision for testing sample installations prior to replacement of all items.

- F. Deferred Functional Tests: Some tests may need to be performed later, after substantial completion, due to seasonal requirements or other conditions; performance of these tests remains the Contractor's responsibility regardless of timing.

3.04 TEST PROCEDURES - GENERAL

- A. Provide skilled technicians to execute starting of equipment and to execute the Functional Tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.
- B. Provide all necessary materials and system modifications required to produce the flows, pressures, temperatures, and conditions necessary to execute the test according to the specified conditions. At completion of the test, return all affected equipment and systems to their pre-test condition.
- C. Manual Testing: Use hand-held instruments, immediate control system readouts, or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation").
- D. Simulating Conditions: If necessary, artificially create the necessary condition for the purpose of testing the response of a sensor or process.
- E. Simulating Signals: Disconnect the sensor and use a signal generator to send an appropriate signal to amperage, resistance or pressure to the transducer and control system to simulate the sensor value.
- F. Indirect Indicators: Remote indicators of a response or condition, such as a reading from a control system screen reporting a valve to be 100 percent closed, are considered indirect indicators.

3.05 COMMISSIONING PLAN AND COMMISSIONING

- A. Commissioning Plan: Prepare an overall commissioning plan with forms for reports.
- B. Execution: Execute each commissioning activity; fill out relevant report form.
 - 1. Submit completed Reports within two days of completion.
- C. Deficiencies: Correct deficiencies found at no extra cost to Owner.

END OF SECTION

SECTION 46 0106
OPERATION AND MAINTENANCE MANUAL

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Section 46 0500 - Common Work Results For Water and Wastewater Equipment.
- C. Individual Product Sections: Additional requirements for operation and maintenance data.

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, and Section 46 0500 for submittal procedures.

PART 2 OPERATION AND MAINTENANCE MANUAL

2.01 DOCUMENT FORMATS

- A. Editable Document Format: Microsoft Word 2010 or later, Open Document Format (ODF), or Rich Text Format (RTF) ____.
- B. PDF Format: Adobe Reader version 7 or later; use for:
 - 1. Approved submittals, such as product data, shop drawings, O&M data; furnish PDF of approved copy, not original
 - 2. O&M documents prepared by manufacturers.
 - 3. Project record documents, as described in Section 01 7800 - Closeout Submittals and in individual Sections.
 - 4. Startup checklists and functional test reports.
 - 5. Other documents that will not need to be modified in the future.
- C. Drawings: Convert to PDF format, maintaining original document page size (i.e. do not reduce a large size drawing to 8-1/2 by 11, or any different size).

2.02 ORGANIZATION OF MANUAL

- A. The function of this manual is to make needed information quickly and easily found and understood. To increase effectiveness the following general principles should be observed:
 - 1. Generally, use less narrative and more diagrams, charts, and checklists.
 - 2. An operator looking for a specific piece of information should not have to read an essay to find it.
 - 3. Do not include information that is not specific to this plant.
 - 4. If both graphic and text are needed for the same subject, place the graphic above the text.
 - 5. If footnotes or legends are used, make them large enough to read easily and place above or to the left of the chart or table they refer to, so they are not overlooked.
 - 6. If a graphic will fit in a page of a normal browser window, insert it as a picture in the page; if very large, link to it as an external PDF file.
 - 7. Very large drawings and diagrams should not be used as a primary information source; if they are the only source of a particular item of information, consider snipping relevant portions to insert as pictures.
 - 8. Content management system software uses HTML editors in which tables are often difficult to format; charts and tables may be made as pictures if the original editable document is also furnished and linked to.

2.03 EQUIPMENT INFORMATION

- A. For each individual item of equipment, provide the following information; use a consistent format for all equipment, including order of presentation of information and starting each item on a new page.
- B. See individual product specification sections for additional requirements.
- C. Design Data: List design capacity and other operating parameters.
 - 1. Pumps: Include pump curve for the specific pump installed, shutoff head, discharge head, and suction head; identify impeller trim and motor horsepower.
 - 2. Startup Form: Recorded actual values of design parameters at startup.

3. Manufacturer's design data sheets may be linked to or referenced.
- D. Product Data: Project record copy of approved submittals.
 1. If no approved product data submittal exists, provide manufacturer's current data sheet marked to clearly identify specific products and components that were installed; delete or cross out inapplicable information.
- E. Shop Drawings: Project record copy of approved shop drawings.
- F. Wiring Diagrams: As installed.
- G. Operating Procedures:
 1. Describe start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
 2. Manufacturer's printed procedures may be used, provided they are in electronic form.
 3. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific equipment.
- H. Maintenance Requirements:
 1. Provide summary of necessary maintenance activities for this equipment in this particular plant, prepared from manufacturer data, with necessary frequency.
 2. Describe routine procedures for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
 3. Manufacturer's servicing and lubrication schedule, and list of lubricants required.
 4. Manufacturer's illustrations, assembly drawings, and diagrams required for maintenance.
 5. Manufacturer's printed procedures may be used, provided they are in electronic form.
 6. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific equipment.
- I. Tools: List of tools necessary for adjustment, operation, maintenance and disassembly; identify by manufacturer and model number any special tools that are specific to the equipment, not commonly encountered in repair shops, or only available from limited sources.
- J. Replaceable Parts and Consumable Supplies:
 1. Manufacturer's parts list with model numbers, prices, and edition date.
 2. List of parts that manufacturer recommends having on hand, with quantities.
 3. List of parts that require long lead time, with time estimates.
 4. Nearby Sources: Name, address, phone number.
- K. Equipment Startup Reports:
 1. Completed Pre-Functional Checklist.
 2. Completed Functional Test report.
- L. Additional Requirements: As specified in individual product specification sections.

2.04 PROTECTIVE FINISHES INFORMATION

- A. For each protective finish, provide the following information:
 1. Product data, with catalog number, size, composition, and color and texture designations.
 2. Information for ordering additional material.
 3. Manufacturer's recommended inspection schedule.
 4. Instructions for repair of damaged and deteriorated coatings, including surface preparation.
 5. Additional information as specified in individual product specification sections.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the maintenance of the specific products.

END OF SECTION

SECTION 46 0500

COMMON WORK RESULTS FOR WATER AND WASTEWATER EQUIPMENT

PART 1 GENERAL

1.01 APPLICABILITY

- A. Requirements of this section apply to other sections of Division 46.
- B. Some requirements of this section are specified only in this section; these apply to other sections of Division 46 whether specifically cross-referenced or not.
- C. Some requirements of this section amplify requirements of other sections of Division 46; these also apply to those sections unless a requirement of this section and another section cannot both be met; in that case, comply with the requirement of the other section.

1.02 RELATED REQUIREMENTS

- A. Section 05 1200 - Structural Steel Framing.

1.03 DEFINITIONS

- A. Buried: Equipment, piping, and structures are in contact with earth or which would be in contact with earth without the protection specified.
- B. Corrosive Atmosphere Zone: Where raw sewage runs in open channels; surfaces subject to corrosive atmosphere include floors, walls, ceilings, structural members, and inside and outside of equipment housings.
- C. Hazardous Atmosphere Zone: Chlorine gas storage and handling and spaces where explosion hazard exists.
- D. Indoor Dry Zone: Enclosed spaces not connecting to open liquid surfaces, not subject to water vapor emissions, and not anticipating more than occasional, accidental water-based liquid contact; the following are considered "Indoor, Dry":
 - 1. Administration areas, offices, laboratories.
 - 2. Mechanical rooms and utility tunnels meeting this definition.
 - 3. Electrical rooms.
- E. Outdoors: Exposed to the outdoor ambient environment, whether under cover or not.
- F. Splash Zone: Surfaces less than 12 inches above normal liquid level in process tanks and channels.
- G. Submerged Zone: Below the surface of the liquid or solids process stream.

1.04 REFERENCE STANDARDS

- A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings; 2015.
- B. ABMA STD 11 - Load Ratings and Fatigue Life for Roller Bearings; 2014.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- D. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2018).
- E. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2003 (Reapproved 2016).
- F. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- G. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- H. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2009 (Reapproved 2015).
- I. IEEE/ASTM SI 10 - American National Standard for Metric Practice; 2016, with Errata (2017).
- J. NACE No. 2 - Joint Surface Preparation Standard Near-White Metal Blast Cleaning; 1994 (Reaffirmed 2006).
- K. SSPC-SP 10 - Near-White Blast Cleaning; 2007.

PART 2 PRODUCTS

2.01 GENERAL EQUIPMENT REQUIREMENTS

- A. Unless otherwise indicated, provide products that are new and unused.
- B. Where components serve the same function and are the same size, provide identical units from same manufacturer.
- C. Provide components of a specific type by the same manufacturer.
- D. Operating Equipment: For equipment that is electrically, hydraulically, or pneumatically operated, or has moving parts or electronic components, provide products that:
 - 1. Are standard products of a manufacturer regularly engaged in manufacture of such products.
 - 2. Essentially duplicate items that have been in satisfactory use for at least 2 years.
 - 3. Is capable of operating in outdoor ambient temperature range anticipated at project site, unless located in a climate-controlled space or enclosure.
- E. Provide necessary accessories, fittings, interconnections, services, and adjustments required for complete and operable system.

2.02 EQUIPMENT WITH MOVING PARTS

- A. Protection from Moving Parts: Locate and guard belts, chains, pulleys, gears, projecting setscrews, keys, couplings, and other rotating and moving parts in accordance with OSHA requirements.
 - 1. Make guards removable or so arranged as to allow access for maintenance.
 - 2. A lockable housing without openings is considered a sufficient guard.
- B. Lubrication: Provide adequate means of lubrication for moving parts subject to wear.
 - 1. Unless otherwise indicated, provide lubrication by either grease or oil.
 - 2. Grease Lubrication: Provide grease fittings; if grease fitting is not easily accessible, provide grease tubing to a convenient location.
 - 3. Oil Lubrication: Provide oil reservoirs of liberal size with opening for filling, overflow opening at proper location to prevent overfilling, and drain opening at the lowest point; vent reservoirs to prevent pressure build-up.
 - 4. Provide equipment that is fully lubricated at Startup.
- C. Bearings: Provide bearings complying with ABMA STD 9 or ABMA STD 11 as applicable to type of bearing.
 - 1. Life Expectancy: Theoretical L-10 life expectancy.
 - 2. Relief Ports: Provide to prevent build-up of pressure that might damage bearings or seals.
- D. Locate drives, lubrication, and bearings that are accessible from walkways at or above ground level.

2.03 LANGUAGE AND UNITS OF MEASURE

- A. Language: Use English language for forms of identification and human-machine interfaces (HMIs).
- B. Units of Measure:
 - 1. Use the same units of measure in each device measuring or displaying the same characteristic.
 - 2. Metric Units of Measure: As defined in IEEE/ASTM SI 10, American National Standard for Metric Practice.

2.04 IDENTIFICATION OF EQUIPMENT, PIPING, AND ENCLOSURES

- A. Plant Item Identification Scheme (Plant ID): Identify each item of equipment, device, and enclosure using a unique alphanumeric identifier and use the same identifier in each submittal and other documentation.
- B. Plant Item Nameplates: For each item of equipment, device, and enclosure, provide a nameplate permanently secured in a prominent, easily readable location.
 - 1. Include Plant ID number and the generic name of the item.

- a. Enclosures: Include both enclosure ID and internal device ID; where a single enclosure contains more than one device, show both enclosure ID and device IDs on outside nameplate with separate nameplates inside identifying each device.
 - b. Motor Starters: Include both starter ID and name and ID of device controlled by starter.
- 2. Lettering: At least one inch high letters in color contrasting with background.
- 3. Nameplate Material: Engraved multicolor laminated plastic.
- 4. Attachment: Where exposed to weather or humid environment, use epoxy adhesive, other permanent adhesive, or screw attachment; other locations, permanent self-adhesive.
- C. Manufacturer Nameplates: For each valve, item of equipment, and device, provide a nameplate permanently secured in a conspicuous location.
 - 1. Nameplate Information: Manufacturer's name and address, type or style, model or serial number, and catalog number.
 - 2. Nameplate Material: Same as Plant Item nameplates, or stainless steel or other corrosion-resistant material; information cast integrally need not be repeated on nameplate; manufacturer's original nameplates may be used provided they are in an easily readable location.
- D. Piping Identification: Identify piping by its contents and flow direction every 20 feet of straight run.
 - 1. Provide additional identification at branch connections, inlets and outlets of equipment, upstream of valves, and within 3 feet of entrance to or exit from basins, foundation walls, and similar barriers.
 - 2. Identify contents by color coding and lettering in contrasting color.
 - 3. Lettering: At least 1 inch high; on horizontal piping, orient lettering horizontally; on vertical piping, orient lettering so it is readable when you tilt your head to the left.
 - 4. Identify flow by large arrows.
 - 5. For contents identification, use either painted stenciled lettering or self-adhesive plastic tape pre-printed with supplemental attachment by plastic tape banding around pipe; for small diameter piping use any method that will provide durable, easily readable identification.

2.05 PROTECTIVE FINISHES

- A. Surfaces related to unit processes are required to have a protective finish as specified, except that the following are not required to be separately finished unless otherwise specified:
 - 1. Stainless steel.
 - 2. Hot-dipped galvanized steel.
 - 3. Fiberglass.
 - 4. Aluminum, if not located in submerged, splash, or corrosive atmosphere zones.
 - 5. Ductile iron.
 - 6. PVC and CPVC.
 - 7. Concrete, unless submerged or in splash zone.
- B. Architectural and Structural Components: Finish exposed surfaces of the following using the specified finish, unless the material is not required to have a protective finish:
 - 1. Walls, ceilings, and exposed overhead structure in corrosive atmosphere zone, hazardous atmosphere zone, and ____.
 - 2. Walls in the splash zone.
 - 3. Inside of concrete basins and channels.
- C. Shop and Factory Finishes: Where finishing prior to delivery to project site is feasible, shop or factory-applied finishes are required, whether or not manufacturer's or fabricator's standard procedure; this requirement is non-negotiable, to achieve required corrosion resistance.
- D. Field Finishes: Field finishing is permitted for the following:
 - 1. Architectural and structural components.
 - 2. Inside of concrete basins and channels.
 - 3. Metallic piping, before installation of insulation.
 - 4. Piping identification.
 - 5. Finish painting of designated equipment in addition to specified factory/shop painting.

- E. Finishes:
 - 1. Apply coatings in accordance with coating manufacturer's recommendations and as specified.
 - 2. Measure thickness of coatings using a commercial film thickness gage.
 - 3. Test coatings with electric detector equipped with audible signal that operates when a flaw defect is detected, such as a 90-volt wet sponge type pinhole detector.
 - 4. Coating Repair: If welding is required after finishing or finish is otherwise damaged, prepare, re-coat, and test in the same manner as specified for original coating.
- F. Finish Applications:
 - 1. Buried: Coal tar coating; field or shop applied unless otherwise indicated.
 - 2. Corrosive Atmosphere Zone: Coal tar epoxy polyamide or epoxy polyamide coating.
 - 3. Hazardous Atmosphere Zone: Coal tar epoxy polyamide or epoxy polyamide coating.
 - 4. Splash and Submerged Zones - Concrete Surfaces: Chlorinated rubber coating.
 - 5. Splash and Submerged Zones - Not Concrete: Coal tar epoxy polyamide coating.
 - 6. Other Areas: Manufacturer's standard finish.
- G. Coal Tar Coating: Black, hot applied coal tar coating system.
 - 1. Preparation: Blasting in accordance with SSPC-SP 10/NACE No. 2, near white blast cleaning.
 - 2. Total Dry Film Thickness: ____ mils, minimum.
- H. Coal Tar Epoxy Polyamide Coating: High-build, black or dark red, VOC-compliant; shop or factory applied after fabrication.
 - 1. Preparation: Blasting in accordance with SSPC-SP 10/NACE No. 2, near white blast cleaning.
 - 2. Top Coats: Two coats.
 - 3. Total Dry Film Thickness: 16 mils, minimum.
 - 4. Maximum Time Between Coats: 72 hours.
- I. Epoxy Polyamide Coating: VOC-compliant; shop or factory applied after fabrication.
 - 1. Color: To be selected by Engineer/Architect from manufacturer's full color range.
 - 2. Preparation: Blasting in accordance with SSPC-SP 10/NACE No. 2, near white blast cleaning.
 - 3. Maximum Time Between Coats: 72 hours.
- J. Chlorinated Rubber Coating: Glossy.
 - 1. Color: To be selected by Engineer/Architect from manufacturer's full color range.
 - 2. Preparation: Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
 - 3. Top Coats: Two coats.
 - 4. Total Dry Film Thickness: ____ mils, minimum.
- K. Galvanizing: Hot-dipped zinc-alloy coating complying with ASTM A123/A123M or ASTM A153/A153M as applicable to item galvanized; electro-galvanized coating not acceptable; inspect for defects in factory; where repair is permitted by standard, use one of the methods specified in ASTM A780/A780M.
 - 1. Stainless steel may be substituted where galvanizing is specified.
- L. Galvanizing Repair Paint: ASTM A780/A780M.

2.06 METALS AND CONSTRUCTION MATERIALS USED IN EQUIPMENT

- A. Stainless Steel: Type 304, Type 304L, Type 316, or Type 316L, unless otherwise indicated.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M and as specified in Section 05 1200.
- C. Galvanized Steel Assemblies: Design to be field assembled using bolts without any welding.
- D. Malleable Iron: ASTM A47/A47M, grade No. 32510, minimum.
- E. Cast Iron: ASTM A48/A48M Class 30, minimum.

END OF SECTION

SECTION 46 0505
PIPING, VALVES, AND APPURTENANCES

PART 1 GENERAL

1.01 QUALITY ASSURANCE

- A. Install piping to meet requirements of local building code.
- B. Provide manufacturer's certificate that materials meet or exceed minimum requirements as specified.

1.02 RELATED REQUIREMENTS

- A. Division 00 - Procurement and Contracting Requirement.
- B. Division 01 - General Requirements
- C. SUDAS Section 4010.
- D. SUDAS Section 5020.
- E. SUDAS Section 6010.
- F. TenStates Color Schedule.
- G. Section 03 3000 - Cast-in-Place Concrete
- H. Section 46 0106 - Operation and Maintenance Manual: Operating and Maintenance Data.
- I. Section 46 0500 - Common Work Results for Water and Wastewater Equipment

1.03 SUBMITTALS

- A. Certificates: Submit manufacturer's certificates of conformance.
 - 1. Includes American Iron and Steel (AIS) certificates where applicable. See Division 00.
- B. Test Reports: Submit certified pressure test reports.
- C. Working drawing.
- D. Manufacturer's instructions.
- E. Itemized list of quantities.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. During loading, transporting, and unloading, exercise care to prevent damage to materials.
- B. Do not drop pipe or fittings.
- C. Store materials on site in enclosures or under protective coverings.
- D. Assure that materials are kept clean and dry.
- E. Do not store materials directly on ground.

PART 2 PRODUCTS

2.01 GENERAL

- A. All process piping shall be as indicated on plan sheets.

2.02 DUCTILE IRON PIPE

- A. Underground joints shall be mechanical per AWWA C111, Class 50.
- B. Exposed joints shall be flanged per AWWA C115 Class 250.
- C. Underground piping shall be coated on the outside with cement mortar per item G below.
- D. Underground fittings shall be mechanical joint AWWA C110 Class 250 with lugs where tie rods are used. Provide restrained joints (tie rods or MJ retaining glands) on all underground piping within 10 feet of structure foundations and 90 degree bends.
- E. Provide either AWWA C115 flanged joints with red rubber full face gasket or cast iron grooved end fittings for all exposed piping. Joints shall conform to the requirements of AWWA C111. Gaskets shall be lubricated as recommended by the manufacturer.
- F. Interior of all ductile iron pipe and fittings shall be lined with cement mortar in accordance with AWWA C104 with thickness:
 - 1. 3"-12": 1/16 inch

2. 14"-24": 3/32 inch
 3. 30"-54": 1/8 inch
- G. All exposed ductile iron not otherwise noted for painting shall be furnished with an outside bituminous coating at least 1 mil in thickness and shall receive one (1) coat (1/32" thick) of Cold-Applied Coal Tar Paint.

2.03 VALVES

- A. Check Valves:
1. Design: AWWA C508.
 2. Manufacturers:
 - a. Dezurik
 - b. Clow Valve Company
 - c. Or Engineer Approved Equal.
 3. Check valves shall close and prevent reverse flow while minimizing the effect of surge and water hammer.
 4. Valves shall open when inlet pressure exceeds downstream pressure by ¼ to ½ psi. Valve shall maintain positive drop tight shutoff until inlet pressure exceeds downstream pressure.
 5. Swing check valves shall be ValMatic Swing Flex or approved equal. Valves shall include steel and nylon reinforced Buna-N disc with integral "O" ring type seal, epoxy interior coating and 100% flow area.
 6. Valves shall be constructed with cast iron or ductile iron body.
- B. Plug Valves:
1. Design: AWWA C517.
 2. Manufacturers:
 - a. Dezurik
 - b. Clow Valve Company
 - c. Or Engineer Approved Equal.
 3. Type: Eccentric.
 4. Material: Cast Iron.
 5. Rating: 175 PSIG at 140 degrees F.
 6. ASME Class: 150 in accordance with ASME B16.34.
 7. Body: Non-lubricated type; cast iron; drip-tight shutoff with pressure from either direction.
 8. Plugs: Cast iron, with rectangular ports
 9. Ports: Full bore.
 10. Lining: Coated with butadiene acrylonitrile.
 11. Seats: Nickel.
 12. Stem Bearings: Self-lubricating stainless steel.
 13. Stem Seals: Multiple V-rings.
 14. End Connections:
 - a. Flanged as per ASME B16.1.
 15. Manual Operator for Valves 8-inches and larger: totally enclosed, geared; with hand wheel, 2-inch nut, or chain wheel.
- C. Combination Air Valve : Combined air and vacuum valve and air release valve.
1. Function: Automatically exhaust air during filling of a piping system and allow air to re-enter during draining or when vacuum occurs; automatically exhaust entrained air that accumulates in piping system.
 2. Rating: 150 psig working pressure.
 3. Body: Cast iron standard elongated body and cover.
 4. End Connections:
 - a. Sizes 1/2 through 3 inches: Threaded inlet and outlet, ASME B1.20.1 (ASME B1.20.2M) threading.
 - b. Sizes 4 inches and Larger: Flanged, ASME B16.5 Class 150.
 5. Provide blow off valve, quick disconnect couplings, and minimum 6 feet of hose to permit back flushing after installation without dismantling valve.

2.04 MODULAR WALL SEAL AND WALL SLEVES

- A. Provide in locations as shown in plans.

- B. Pipe to floor/wall penetration closures shall be "Link-Seal" Modular Seal by Pipeline Seal and Insulator, Inc. or approved equal.
- C. Seals shall be modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall sleeve or core bit drilled concrete.
- D. Seal shall provide an absolutely water-tight seal between the pipe and wall sleeve or core bit drilled concrete with a minimum pressure rating of 15 psi.
- E. Wall sleeves shall be Link-Seal or equal manufactured from heavy wall welded or seamless steel pipe. A full circle continuously welded water stop plate shall provide positive water sealing on the sleeve OD and shall anchor the sleeve to prevent thrust movement.
- F. Contractor shall utilize the manufacturer's recommendations to determine the required sleeve dimensions and size and number of modular seals required at each location.
- G. Coordinate wall and floor sleeves with materials called out on plan sheets.

2.05 SUPPORTS AND HANGERS

- A. Horizontal Piping Hangers and Supports:
 - 1. Except as otherwise indicated, provide factory fabricated horizontal piping hangers and supports complying with MSS SP-58 of one of the following MSS types listed, selected by Installer to suit horizontal piping systems in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for copper piping systems.
 - 2. Adjustable Steel Clevis Hangers: MSS Type 1.
 - 3. Steel Pipe Clamps: MSS Type 4.

PART 3 EXECUTION

3.01 PIPE INSTALLATION

- A. Underground pipe shall be installed as specified in the current edition of the Urban Standard Specifications for Public Improvements (SUDAS).
- B. Examine pipe and fittings before installation and assure no defective materials are incorporated.
- C. Cut pipe in neat and workmanlike manner without damage to pipe.
- D. All field welding shall be performed by certified welding operators in accordance with the procedures recommended in the latest revision of the Code for Pressure Piping, ANSI B31.1.
- E. Solvent welded joints (on pipe 6" in diameter or smaller) shall be constructed in a method recommended by the pipe manufacturer and approved by the Engineer. No pipe or fittings shall be joined when the temperature is below 40° or above 90° F unless the method is specifically approved by the pipe manufacturer.
- F. All pipes shall be round and straight and of required size. Sizes shown on drawings are nominal pipe sizes and not outside diameters.
- G. Cutting and reaming shall be performed as per manufacturer's recommendations.
- H. Run pipes substantially as indicated on the Drawings.
 - 1. Carefully layout and schedule pipe runs to avoid unnecessary interferences with other work.
 - 2. Coordinate layout with other trades so condensation from piping and appurtenances will not fall on equipment which could be water damaged.
 - 3. Contractor shall make minor changes in pipe locations where space conflicts occur at no additional cost to the owner.
- I. Run pipes with proper grade to provide for easy draining.
 - 1. Install pipes in group runs where applicable.
 - 2. Install in a neat and orderly manner to the satisfaction of the Engineer.
- J. Lines required to be enclosed in ceiling, chaseways or similar spaces shall be installed to permit such enclosure as intended.
- K. Properly support, guide, anchor, sway brace, and connect all piping.

- L. Provide protection and insulation where required.
- M. Install piping with ample provisions for expansion and contraction to prevent damage to same and to the structure.
 - 1. Use piping offsets, changes in direction, expansion loops, and/or suitable expansion joints.
 - 2. Use suitable anchors and guides for deflection, expansion and contraction of such offsets, loops and expansion joints.
- N. Mitered fittings will not be permitted in welded lines.
 - 1. Connections shall be made with welding tees.
 - 2. The use of weldolets will be permitted in lieu of welding tees in welded lines provided they are installed in prefabricated assemblies and the pipe interior is cleaned of slag.
 - 3. Field installation of weldolets will be permitted where the branch piping is one-half the size of the main piping or less.
- O. Pipe caps in welded lines may be fabricated from flat steel plate, cut round and inserted into the pipe a sufficient depth to permit a fillet weld equal to the plate thickness (the plate thickness shall be twice the pipe wall thickness for pipe sizes 12 inches or less).
- P. The pipe ends in all tees, laterals and reducers shall be carefully prepared to provide for proper weld penetrations in accordance with ASA Standards.
- Q. Long radius, reducing type, butt welding elbows, in size 2-1/2 inch and larger, shall be used at pump and equipment connections wherever a change in pipe size and a 90° change in direction are involved.
- R. Butt welding tees, forged steel socket welding tees or forged steel welding outlet fittings shall be used for making branch connections in welding pipe systems.
- S. Pipe ends and other pipe joints which are to be welded shall be carefully prepared to provide for proper weld penetration and all welding shall be performed by certified welding operators and in accordance with procedures recommended in the latest revision of the Code for Pressure Piping ASA B31.1.

3.02 PIPE CONNECTIONS

- A. Furnish and install unions or mating flanges at all connections to each piece of equipment, conveniently located to facilitate quick and easy disconnecting of equipment for replacement, cleaning or general maintenance.
 - 1. Flanged or union connections shall be used on both sides of control valves, pressure reducing valves, meters, tanks, pumps, etc.
 - 2. Unions or flanges shall be of the same material or finish as the piping systems in which they are installed.
- B. Dielectric unions or flanges shall be installed in water lines where copper or brass piping is connected to ferrous material such as cast iron or steel pipe, steel tanks, steel water heater, etc.
 - 1. Dielectric unions 2 inch size and smaller shall be steel body and nut with insulating gasket and copper connector, 250 psi rating at 190° F.
 - 2. For 2-1/2 inch size and larger, the union shall be flanges, cast iron with insulated gasket and copper connector, 175 psi rating at 190° F.

3.03 VALVE INSTALLATION

- A. Provide chainwheel operator on valves located more than seven (7) feet above floor level.
- B. Install according to manufacturer's recommendations.
- C. Check valves for proper operation and smooth action. Adjust controls of automatic valves as required.

3.04 PIPE HANGERS, SUPPORTS, AND ANCHORS

- A. Provide supports as shown and detailed on the drawings and specified herein and/or as required to adequately support the piping system.
 - 1. All support components shall conform to manufacturer's Standardization Society Specification SP-58.
 - 2. Supports shall be located near or at changes in piping direction and at concentrated loads.

3. Supports shall provide vertical adjustment to maintain pitch required for proper drainage and shall allow for expansion and contraction of the piping.
 4. Supports shall bear directly on piping.
 5. Supports shall be stainless steel.
- B. Where groups of three or more pipes occur, they may be supported with trapezed hangers using two (2) hangers as specified with a capped pipe cross member.
- C. Horizontal steel and ductile iron piping shall be supported as follows:

Pipe Size	Rod Diameter	Maximum Spacing
Up to 1-1/4 inch	3/8 inch	8 feet
1-1/2 to 2 inch	1/2 inch	8 feet
2-1/2 to 3-1/2 inch	1/2 inch	10 feet
4 to 5 inch	5/8 inch	15 feet
6 inch	3/4 inch	17 feet
8 inch to 12 inch	7/8 inch	22 feet
12 inch to 18 inch	1-1/4 inch	24 feet
20 inch to 24 inch	1-1/2 inch	27 feet

- D. Pipe hangers for cold water piping shall be large enough to encompass the insulation, where insulation is required, using a metal shield so the vapor barrier jacket will not be broken.

3.05 PAINTING

- A. See Section 09 9600 Coating Systems for Wastewater Treatment Facilities and TenStates Color Schedule.

Sanitary Sewer	Dark Gray	Sanitary
Raw Water	Olive Green	Raw Water
Finished Water	Dark Blue	Finished Water

3.06 TESTING AND DISINFECTION

- A. Pipe interior, fittings, valves, and equipment shall be protected against contamination during delivery, storage and installation.
- B. New lines and equipment shall be flushed thoroughly prior to disinfection until all traces of construction materials and soil or foreign matter have been removed.
- C. All pressure pipelines shall be tested with water and proven watertight under a hydrostatic pressure of 150 psi for two (2) hours.
- D. All gravity lines shall be tested with water and proven watertight under a hydrostatic pressure of 50 psi for two (2) hours.
- E. No loss of pressure during the test period, after isolation of the test section, will be allowed.
- F. Any pipe section not meeting these test requirements shall be repaired and retested until the test requirements are met.
- G. Isolate control panel and other equipment which may be damaged by test pressure prior to the test.
- H. Install test caps, plugs, or other fittings as appropriate on open-ended lines as required to pressure test each line.
- I. Flush thoroughly after pressure testing and, if applicable, backfilling.
- J. Disinfect by injecting a solution of sodium hypochlorite or calcium hypochlorite and water at a slow rate.
 1. Conform to AWWA C651.
 2. Retain solution in lines for 24 hours.
 3. Minimum residual after 24 hours shall be 20 parts per million.
- K. Thoroughly flush all lines until residual chlorine at any point is not over one (1) part per million.
- L. After final flushing, and before the piping system is placed in service, two (2) consecutive samples collected twenty four (24) hours apart, shall be collected from the end of the line and tested for bacteriologic quality and shall show the absence of coli form organisms.

- M. If the initial disinfection fails to produce satisfactory samples, disinfection shall be repeated until satisfactory samples have been obtained.

END OF SECTION

SECTION 46 0526
WASTEWATER TREATMENT PUMPS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pump application schedule.
- B. Pumps for the following lift station components:
 - 1. Average Flow Wet Well.

1.02 RELATED REQUIREMENTS

- A. Division 00 - Procurement and Contracting Requirements
- B. Division 01 - General Requirements
- C. Section 03 3000 - Cast-in-Place Concrete: Concrete for bases.
- D. Section 46 0103 - Startup and Commissioning Procedures.
- E. Section 46 0106 - Operation and Maintenance Manual: Operating and Maintenance Data.
- F. Section 46 0505 - Piping, Valves, and Appurtenances.

1.03 REFERENCE STANDARDS

- A. American Iron & Steel Institute (AISI)
- B. American Society for Testing and Materials (ASTM)
- C. Factory Mutual (FM)
- D. Hydraulic Institute Standards for Centrifugal, Rotary, and Recip Pumps (HI).
- E. National Fire Protection Agency (NFPA).
- F. International Standards Organization (ISO) - ISO-9001.
- G. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings; 2015.
- H. ABMA STD 11 - Load Ratings and Fatigue Life for Roller Bearings; 2014.
- I. NEMA MG 1 - Motors and Generators; 2016.
- J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Division 00 for submittal procedure.
- B. Product Data: Manufacturer's descriptive and technical data on each item of equipment, including performance charts and curves, catalog cuts, and installation instructions.
 - 1. Submit pump characteristic curves showing:
 - a. Capacity in gallons per minute.
 - b. Net positive suction head (NPSH).
 - c. Head.
 - d. Efficiency.
 - e. Pumping horsepower from zero to 110 percent of design capacity.
- C. Shop Drawings: Show layout and anchorage of equipment and appurtenances.
 - 1. Show relationship to other parts of work including clearances for maintenance and operation.
 - 2. Include complete wiring and schematic diagrams.
 - 3. Include any other details necessary to demonstrate that system has been coordinated and will properly function as a unit.
- D. Field Quality Control Reports.
- E. Operating and Maintenance Data: Provide six (6) copies of manufacturer's maintenance and operation instructions.
- F. Maintenance Materials:
 - 1. Spare Parts: Furnish the following spare parts for each pump and any additional parts recommended by manufacturer to keep on hand.

- a. 2 sets - all gaskets
- b. 2 sets - all bearings
- c. 1 set - mechanical seals
- d. 2 sets - discharge connection sealing devices
- 2. One set of special tools, calibration devices, and instruments required for operation, calibration, and maintenance.
- 3. Spare parts shall be stored in accordance with these provisions:
 - a. Spare parts shall be tagged by project equipment number and identified by part number, equipment manufacturer, and subassembly component (if appropriate).
 - b. Spare parts subject to deterioration, such as ferrous metal items and electrical components, shall be properly protected by lubricants or desiccants and encapsulated in hermetically sealed plastic wrapping.
 - c. Spare parts with individual weights less than 50 pounds and dimensions less than 2 feet wide, or 18 inches high, or 3 feet in length shall be stored in a wooden box with a hinged wooden cover and locking hasp. Hinges shall be strap type. The box shall be painted and identified with stenciled lettering stating the name of the equipment, equipment numbers, and the words "spare parts." A neatly typed inventory of spare parts shall be taped to the underside of the cover.
- G. Manufacturer/Vendor warranty.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. During loading, transporting, and unloading, exercise care to prevent damage to materials.
- B. Store materials on site in enclosures or under protective coverings.
- C. Assure that materials are kept clean and dry.
- D. Do not store materials directly on ground.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacture, assembly, and field performance of pumps, with minimum three years of documented experience.

1.07 WARRANTY

- A. See Division 00 - Procurement and Contracting Requirements for additional warranty requirements.
- B. The pump manufacturer shall warrant the units (pumps, motors, panels, and guide system) against defects in materials and workmanship for a period of five (5) years, under normal use, operation, and service in accordance with a published pump warranty, from the date of initial startup. This warranty shall be delivered, in writing, to the Owner and shall include, as a minimum, 100 percent full payment coverage by Manufacturer/Vendor for all parts and all labor during the warranty period.
- C. Pump manufacturer warranties shall be in published form, and shall apply to all similar units. A copy of each warranty shall be provided to the Owner at startup.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Centrifugal Pumps, Non-Submersible (Non-Self-Priming):
 - 1. Basis of Design Product
 - a. Flygt
 - 1) Model: NT3202.095-615LT
 - 2. Or Engineer Pre-Approved equal required during bidding process.

2.02 PUMP APPLICATIONS

- A. **Average Flow Wet Well - Pump No. 1 & 2: Centrifugal type (non-submersible, non-self-priming):**
 - 1. Pump Location: Memorial Lift Station.
 - 2. Pump Installation: Vertical - dry
 - 3. Pump Service: Raw sewage.
 - 4. Design Operating Point: 3,760 gallons per minute flow, 42.2 feet head

5. The design point must be within the Preferred Operating Range (POR) as defined by the Hydraulic Institute to be acceptable.
6. Maximum Break Horsepower (MBH) anywhere along the curve cannot exceed 50 HP, which includes the runout condition.
7. Maximum Operating Speed: 1170 rpm.
8. Pump Discharge Size: 10" minimum
9. Motor Type: Explosion Proof, Totally non-overloading.
10. Electrical Characteristics: 460 volts ac, 3 phase, 60 Hz.
11. Size: Within rated load driving pump at specified rpm.

2.03 MATERIALS

- A. Pump Case: Cast Iron, ASTM A48, Class 35B.
- B. Motor Housing: Cast Iron, ASTM A48, Class 35B.
- C. Impeller: Cast Iron, ASTM A48, Class 35B.
- D. Intermediate Housing (Backplate): Cast Iron, ASTM A48, Class 35B.
- E. 90 Degree Suction Bend: Cast Iron, ASTM A48, Class 35B with service Hatch
- F. Pump/Motor Shaft: Chrome Steel, ASTM A276 with replaceable ASTM A276 Type 420T shaft protection sleeve.
- G. Shaft Sleeve: Stainless Steel, ASTM A276 Type 420T.
- H. Wear Ring, Case: Cast Iron, ASTM A48, minimum 200 Brinell.
- I. Wear Ring, Impeller (enclosed impellers only): Stainless Steel, AISI329, 350 Brinell.
- J. O-Rings: Nitrile Rubber (NBR).
- K. Fasteners (including impeller fastener): Stainless Steel, ASTM A276 Type 316Ti.
- L. Lower Seal Faces: Silicon Carbide/Silicon Carbide.
- M. Upper Seal Faces: Silicon Carbide stationary/Carbon rotating.
- N. Oil-all uses (seal lubrication, etc): Ecologically safe, paraffin or mineral base.
- O. Base/Mounting Plate: Stainless Steel, ASTM A276, Type 316 with drilled flange/ring custom drilled (see drawings).
- P. Power/Control Cable Jacket: Chloroprene with non-wicking fillers.
- Q. Pump Stand: Precast concrete capable of withstanding weight and torque of pump. Consult pump manufacturer for specifications.

2.04 PUMPS - GENERAL REQUIREMENTS

- A. Pumps: Complete pumping systems, including motor and drive, manual operator, automatic actuators where indicated, piping, valves, conduit and wiring, supporting structures, electrical and process controls, overload protection, and alarms; capable of continuous operation without overheating and without excessive vibration, noise, or power consumption.
 1. Cast Iron Pump Casings: Constructed of uniform quality and free from blow holes, porosity, hard spots, shrinkage defects, cracks, and other injurious defects.
 2. Impellers (Except for Rotors): Cast iron.
 3. Finishes: Factory finish pumps and motors with manufacturer's standard primer and two coats of paint.
 4. Exterior Surfaces of Casings in Contact with Sewage: Field applied sewage resistant coal tar epoxy coating.
 5. Major Components: Furnish major components (pump case, impeller, intermediate housing, motor housing) of cast material as specified with smooth surfaces devoid of blow holes and other irregularities. Pump case design shall incorporate a centerline discharge for stability when mounted on the base elbow.
 6. Provide pumps capable of handling raw unscreened wastewater. Final connection shall insure zero leakage between pump and discharge connection flange. All exposed cast iron and ferrous surfaces shall be cleaned of dirt and grease, sandblasted to near white finish, and coated with an anti-corrosion reaction primer. The pump shall then be coated with two-component thick coat paint, with an epoxy resin base, having a minimum 83% solids

by volume. This coating shall be non-toxic and approved for both wastewater and water applications.

- B. Identification: Show the manufacturer's name, address, catalogue or model number, pump capacity, pump head, speed of rotation, and direction of rotation, cast into the body of the pump.
- C. Pressure Gauges:
 - 1. Provide standard pressure gauges on discharge side of pumps.

2.05 CENTRIFUGAL PUMPS

- A. Centrifugal Pumps:
 - 1. Solids Handling Pumps: Where indicated to pump sewage, provide non-clogging centrifugal type designed to pump solids up to 3 inches in diameter, with no internal interstices that can catch solids and stringy materials.
- B. Pump Casing: Cast iron, with smooth volute passages, and tapped and plugged holes for venting and draining pump.
 - 1. Cast Iron, ASTM A48, Class 35B.
 - 2. Volute shall have a centerline discharge
 - 3. The single piece pump casing shall be made of suitable thickness to allow for long pump life and to safely withstand the pressure of shut off head.
 - 4. The discharge nozzle shall be provided with integrally cast flange.
 - 5. Critical mating surfaces where water tight sealing is required shall be machined and fitted with O-rings. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact for four sides without the requirement of a specific torque limit. Rectangular cross-sectioned gaskets requiring specific torque limits to achieve compression shall not be considered as adequate or equal. No secondary sealing compounds, elliptical O-rings, grease, or other devices shall be used.
 - 6. Capable of withstanding pressures 50 percent greater than maximum operating pressure.
- C. Impeller: Cast iron, with smooth passages to prevent clogging and pass stringy or fibrous materials.
 - 1. Cast Iron, ASTM A48, Class 35B.
 - 2. Provide non-clog type impeller, capable of passing at minimum a 3" spherical solid per Ten States Standards.
 - 3. Single Vane Type.
 - 4. Statically, dynamically, and hydraulically balanced within operating range and to first critical speed at 150 percent of maximum operating speed.
 - 5. Securely keyed to shaft with locking arrangement whereby impeller cannot be loosened by torque from either forward or reverse direction.
- D. Wearing Rings: Steel or cast iron, renewable, on both impeller and casing, with wearing surfaces normal to axis of rotation.
 - 1. Wear Ring, Case: Cast Iron, ASTM A48, minimum 200 Brinell
 - 2. Wear Ring, Impeller: Hard Metal
 - 3. Designed for ease of maintenance.
 - 4. Secured to prevent rotation.
- E. Pump Shaft: Stainless or high grade alloy steel; adequate size and strength to transmit full driver horsepower with liberal safety factor.
 - 1. Pump/Motor Shaft: Carbon Steel, ASTM A276 with replaceable ASTM A276 Type 420 shaft protection sleeve. If a sleeve is not used, machine the entire pump/motor shaft of ASTM A276 Type 420 Stainless Steel.
 - 2. Provide common pump/motor shaft of sufficient size to transmit full driver output with a maximum deflection of 0.002 inches measured at the lower mechanical seal.
 - 3. Machine the shaft of carbon steel (for maximum strength and motor efficiency) and isolate the shaft from the pumped media with a replaceable Type 420 stainless steel sleeve under the lower mechanical seal. Do not use carbon steel as shaft material without a stainless steel sleeve.
 - 4. Joint between shaft and sleeve sealed to prevent leakage.

- F. Mechanical Shaft Seals: Single, with each seal interface held in contact by its own spring system, supplemented by external liquid pressure; constructed to be readily removable from shaft.
1. Primary Seal Faces: Silicon Carbide/Silicon Carbide
 2. Secondary Seal Faces: Silicon Carbide stationary/Carbon rotating
 3. Provide two totally independent mechanical shaft seals, installed in tandem, each with its own independent single spring system acting in a common direction.
 4. The sealing shall not depend on the direction of rotation. The primary, impeller-side seal shall operate in a large flooded chamber formed by the cast recesses in the impeller and backplate. The impeller-side seal shall be of bellows type mechanical seal. The primary and secondary seal faces shall operate in a generously proportioned lubricant chamber that hydrodynamically lubricates the seal faces to allow for extended periods of dry-running operation without the need for external seal lubrication or cooling systems. The lubrication chamber liquid shall be an environmentally friendly and nontoxic.
 5. The seal face material of the primary seal shall be Silicon Carbide versus Silicon Carbide (SiC/SiC) for excellent hardness and chemical resistance across the entire "pH" Range. The secondary seal shall be of Carbon versus Silicon Carbide (Carbon/SiC) for best Emergency Running properties. The seal faces must be of a solid material capable of being re-lapped. The seals shall require neither routine maintenance nor adjustment, but capable of being easily inspected and replaced. Mechanical seal metal parts shall be of CrNiMo-stainless steel.
 6. Seals shall be non-proprietary in design, and shall be available from another vendor in addition to the pump manufacturer.
 7. Do not provide seals with the following characteristics: conventional double mechanical seals with single or multiple springs acting in opposed direction; cartridge-type mechanical seals; seals incorporating coolant circulating impellers, seals with face materials other than those specified.
- G. Bearings: Ball or roller type designed to handle all thrust loads in either direction.
1. Life Expectancy: B10 life of 100,000 hours minimum.
 - a. Furnish upper and lower bearings, single row (preferred) or double rows as needed to provide desired life expectancy.
 2. Provide sealed/shielded (permanently lubricated) bearings. If open-type (non-shielded) bearings are used, provide re-lubrication ports with positive anti-leak plugs for periodic addition of lubrication from external to the pump.
- H. Supports and Bases:
1. Concrete base to be precast and provided by contractor. Contractor to coordinate with pump manufacturer for dimensions.
- I. Motor:
1. Motor Housing: Cast Iron, ASTM A48, Class 35B
 2. Intermediate Housing (Backplate): Cast Iron, ASTM A48, Class 35B
 3. Provide a motor which is squirrel cage, induction in design, housed in a completely watertight and air filled chamber, with a min 1.15 service factor. The motor housing shall be both air filled and watertight. Motor protection shall be at minimum IP 68. The motor shall be adequately sized and rated for continuous operation at a maximum fluid temperature of 104° F (40° C).
 4. The motor stator shall be wound using Class H monomer-free polyester resin insulation resulting in an overall motor rating of 311 Degrees F (155 degrees C), Class F insulation. The stator windings shall be trickle impregnated resulting in a winding fill factor of at least 95%. The use of a multiple step "dip and bake" type stator insulation method shall not be acceptable. The rotor bars and short circuit rings shall be made of aluminum.
 5. The motor and pump set complete shall be designed and manufactured by the same company.
 6. Provide motors which are explosion proof to CSA, NEC FM Class I Division 1 Groups C&D hazardous locations as defined by the National Electric Code.
- J. Accessories:
1. Temperature Protection

- a. Furnish temperature monitoring devices in motor windings for use in conjunction with and supplemental to external motor overload protection. Arrange controls to shut down pump should any of the monitors detect high temperature and automatically reset once motor temperature returns to normal. Set temperature monitors at levels recommended by pump manufacturer.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install as indicated and in accordance with manufacturer's instructions.
- B. Prior to applying electrical power to any motor driven equipment, rotate drive train by hand to demonstrate free operation of all mechanical parts.
- C. Provide factory-trained personnel to check installation and initial operation.

3.02 MANUFACTURER/VENDOR SERVICES

- A. After the installation and prior to startup, the Manufacturer, through its authorized and qualified representative, shall inspect the equipment to make sure that it is installed per Manufacturer's recommendations and ready to be placed into operation. Upon correction of any condition found to be unsatisfactory, the Manufacturer's representative shall certify the proper installation of the equipment. See Section 3.01 of this specification.
- B. Manufacturer's authorized and qualified representative, upon certifying satisfactory installation, shall witness the equipment being placed into operation and take such observations and measurements deemed necessary to ensure the equipment supplied is functioning as designed.
- C. Manufacturer's authorized and qualified representative shall provide a minimum of one visit of two hours, excluding travel time, for on-site instruction to the Owner's personnel in operation and maintenance of the pump. This training shall occur after the acceptance by the Owner's project representative of the Operations and Maintenance Manuals.
- D. The activities required in this section shall be performed by factory-trained service technician of the manufacturer. Services by sales representatives are not acceptable.

3.03 FIELD QUALITY CONTROL - PRIOR TO STARTUP

- A. Demonstrate proper operation of each pump, motor driver, actuator (if any), and controls; that each is mechanically, electrically, and structurally sound; meets specified operating characteristics; and has no leaks in seals or piping.
- B. Correct deficiencies and re-test.

3.04 TEST AND ADJUST

- A. Furnish services of a competent manufacturer's representative to check equipment, place it into operation, and instruct Owner in operation and maintenance.
- B. Tests shall be performed in accordance with the Test Code for Centrifugal Pumps per the Standards of the Hydraulic Institute, Grade 1B. Tests shall be performed on the actual assembled pumps to be supplied. Tests shall cover a range from shut-off to at minimum 20% beyond specified design capacity. Conduct test per above specification on all supplied pumps, generating a curve showing actual flow, head, BHP and hydraulic efficiency.
- C. Follow 46 0103 Startup and Commissioning Procedure.

3.05 CLEANING

- A. Clean oil and dirt from unit and touch up any scratches to paint finish.
- B. Remove debris and waste materials resulting from installation.

3.06 FIELD QUALITY CONTROL - AFTER STARTUP

- A. Demonstrate proper operation in conjunction with process control system demonstration.
- B. Equipment manufacturer shall cooperate with Engineer and System Integrator in terms of scheduling and execution of start-up activities.

3.07 OPERATION AND MAINTENANCE MANUALS

- A. Manufacturer shall provide Owner's Operation and Maintenance (O&M) manuals containing the approved bill of materials with components literature, materials of construction, routine maintenance activities, lubrication requirements, and troubleshooting guidelines. Manual shall be provided in three hard copies and three copies of a CD version in electronic format (PDF). Hard copies shall be in 3-ring binders with table of contents and section tabs.

3.08 CLOSEOUT ACTIVITIES

- A. See Division 00 - Procurement and Contracting Requirements for closeout requirements.
- B. Training: Train Owner's personnel on operation, adjustment, and maintenance of system.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of two (2) hours of training.
 - 3. Instructor: Manufacturer's authorized representative.
 - 4. Location: At project site.

END OF SECTION

DETAILS

Project Construction Sign

White Background

Project Title

Sponsor/Developer

Official(s) or Sponsor Address

Architect or Engineer

(second line)

Contractor

(second line)

Project Financed by:

Community Development Block Grant
Iowa Economic Development Authority

Kim Reynolds, Governor

Sign Dimensions: 1200mm x 2400mm (approx. 4'x8'x3/4")
Plywood Panel (APA Rated A-B Grade-Exterior)

Black
Lettering



Black



Pantone 7540
(CMYK: 0/0/0/72)

Pantone 390
(CMYK: 22/0/100/8)

Pantone 7540
(CMYK: 0/0/0/72)

Black
Lettering

ATTACHMENTS

EXPERTISE

Architecture

Engineering

Environmental

Planning

WORK

Agriculture

Commercial

Education

Energy

Food + Industrial

Government + Cultural

Healthcare

Housing

Mining

Public Works

Sports + Recreation

Transportation



Mankato, MN
Minneapolis/St. Paul, MN
Des Moines, IA
Storm Lake, IA
Waterloo, IA
Green Bay, WI
La Crosse, WI
Sioux Falls, SD

ISGInc.com

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City of Storm Lake

Memorial Lift Station Improvements

October 2020—Project No. 19-22797

ISG

Architecture
Engineering
Environmental
Planning

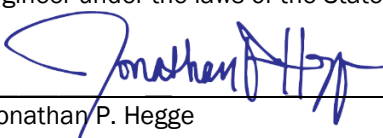
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CITY OF STORM LAKE

620 Erie Street
Storm Lake, IA 50588
Buena Vista County

CERTIFICATIONS PAGE
FOR
MEMORIAL LIFT STATION IMPROVEMENTS
CITY OF STORM LAKE
STORM LAKE, IA
JUNE 2020
PROJECT NO. 19-22797

	I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Iowa.  _____ Walter C. Eshenaur 10/02/2020 Date License Number: 25518 My License Renewal Date is 12/31/2020 Pages or sheets covered by this seal: <u>Specification Division 00, 01, and 46</u>
---	--

	I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Iowa.  _____ Jonathan P. Hegge 10/02/2020 Date License Number: 25782 My License Renewal Date is 12/31/2021 Pages or sheets covered by this seal: <u>Specification Division 00, 01, 22, and 23</u>
---	--



I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Iowa.

Michael D. Nelson

Michael D. Nelson

10/02/2020

Date

License Number: 20425

My License Renewal Date is 12/31/2020

Pages or sheets covered by this seal: Specification Division 00, 01, and 26



I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Iowa.

Bradley W. Penar

Bradley W. Penar

10/02/2020

Date

License Number: 19508

My License Renewal Date is 12/31/2020

Pages or sheets covered by this seal: Specification Division 00, 01, 03, 04, 05, and 06



I hereby certify that the portion of this technical submission described below was prepared by me or under my direct supervision and responsible charge. I am a duly licensed architect under the laws of the state of Iowa.

Alyssa F. Campbell

Alyssa F. Campbell

10/02/2020

Date

License Number: 06595

My License Renewal Date is 6/30/2020

Pages or sheets covered by this seal: Specification Division 00, 01, 03, 04, 05, 06, 07, 08, and 09

ISG

1725 N LAKE AVE
STORM LAKE, IA 50588

END OF CERTIFICATION PAGE

**PROJECT MANUAL
FOR
MEMORIAL LIFT STATION IMPROVEMENTS
CITY OF STORM LAKE
STORM LAKE, IA
OCTOBER 2020
PROJECT NO. 19-22797**

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NOTE: Applicable portions of the Statewide Urban Design and Specifications (SUDAS), 2020 Edition, with all latest revisions and the Recommended Standards for Wastewater Facilities (10 States Standards), 2014 Edition shall apply to this project.

Where there may be a variation between the plans, procurement and contracting requirements, specifications, and the referenced SUDAS and 10 States Standards, the order of procedure shall be:

1. Detailed Plans
2. Quantity and Estimate Reference
3. Procurement and Contracting Requirements, and Specifications
4. Recommended Standards for Wastewater Facilities (10 States Standards), 2014
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NOTICE OF PUBLIC HEARING

NOTICE OF PUBLIC HEARING ON PROPOSED PLANS AND SPECIFICATIONS, FORM OF
CONTRACT AND ESTIMATE OF COST FOR THE CONSTRUCTION OF MEMORIAL LIFT
STATION IMPROVEMENTS FOR THE CITY OF STORM LAKE, IOWA

Notice is hereby given that the City Council of Storm Lake, Iowa, will meet at City Hall, 620 Erie Street, Storm Lake, Iowa on the **19th day of October, 2020, at 5:00 p.m.**, at which time and place a hearing will be held on the proposed plans and specifications, form of contract and estimate of cost for Memorial Lift Station Improvements, Storm Lake, Iowa in and for said City. Any interested person may appear at said hearing and file objections to the proposed plans, specifications, form of contract and estimated costs for said improvements.

The general description of types of construction and their limits for which bids will be received shall be as follows:

Memorial Lift Station Improvements

Lift station improvements which generally include replacement of the existing 60HP dry pit centrifugal pumps, valves, and related piping; replacement of the electrical MCC, variable frequency drives, controls, lighting and related work; replacement and relocation of HVAC ventilation and heating system; structural rehabilitation, roof replacement, and access modifications.

The general project location is as follows: 299 Memorial Road, Storm Lake, IA 50588.

Plans and specifications governing the construction of the proposed improvements have been prepared by the Engineer. These plans and specifications, and the proceedings of the City referring to and defining said improvements, are hereby made a part of this Notice and the proposed contract by reference, and the proposed contract shall be executed to comply therewith.

Published upon order of the City of Storm Lake, Iowa.

CITY OF STORM LAKE, IOWA

BY /s/ Mike Porsch
Mayor

ATTEST:

BY /s/ Keri Navratil
City Manager

NOTICE TO BIDDERS

FOR THE CONSTRUCTION OF MEMORIAL LIFT STATION IMPROVEMENTS FOR THE CITY OF STORM LAKE, IOWA

Sealed bids will be received by the City Manager of Storm Lake, Iowa at City Hall, 620 Erie Street, Storm Lake, Iowa before **2:00 p.m.** on the **19th day of November, 2020**, for the construction of the Memorial Lift Station Improvements in and for the City of Storm Lake, Iowa. At the above time and place all bids received by the City will be opened and publicly read with the results being reported to the Storm Lake City Council at their meeting on **December 7th, 2020, at 5:00 p.m.**, at City Hall, 620 Erie Street, Storm Lake, Iowa, at which time and place the Council may take action on the proposals submitted or at such time as may then be fixed.

A **mandatory pre-bid conference** for the Memorial Lift Station Improvements project will be held at **10:00 a.m., CDST on November 10th, 2020** at the Project Site. Representatives of Owner and Engineer will be present to discuss the Project. Engineer will transmit to all prospective Bidders of record such Addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective. **YOUR COMPANY MUST BE REPRESENTED AT THE PRE-BID MEETING OR YOUR BID WILL BE CONSIDERED NON-RESPONSIVE.**

The general description of types of construction and their limits for which bids will be received shall be as follows:

Memorial Lift Station Improvements

Lift station improvements which generally include replacement of the existing 60HP dry pit centrifugal pumps, valves, and related piping; replacement of the electrical MCC, variable frequency drives, controls, lighting and related work; replacement and relocation of HVAC ventilation and heating system; structural rehabilitation, roof replacement, and access modifications.

The general project location is as follows: 299 Memorial Road, Storm Lake, IA 50588.

A more detailed description of the kinds and approximate quantities of materials and types of construction for which bids will be received are set forth in the Bid Form included in the specifications prepared by I+S Group, Inc. (ISG) of Storm Lake, Iowa, which, together with the proposed form of contract, have heretofore been approved by the City, and are now on file for public examination in the office of the City Manager, and are by this reference made part hereof as though fully set out and incorporated herein.

All proposals shall be made on official proposal forms furnished by the Engineer, and must be enclosed in a separate sealed envelope and plainly identified and addressed to the City of Storm Lake, Iowa.

Each proposal shall be accompanied by a cashier's check or certified check drawn on a state-chartered or federally chartered bank, or a certified share draft drawn on a state-chartered or federally chartered credit union, or a bidder's bond with corporate surety satisfactory to the City in an amount equal to Ten percent (10%) of the total amount of the proposal. If bid bond is submitted, it must be in the form provided in these specifications. Said check or share draft may be cashed, or the bid bond forfeited as liquidated damages in the event the successful bidder fails or refuses to enter into a contract within ten (10) days of issuance of a Notice of Award and post bond satisfactory to the City insuring the faithful fulfillment of the contract and maintenance of said improvements as required by law. The bid bond should be executed by a corporation authorized to contract as a surety in the State of Iowa, and must not contain any conditions either in the body or as an endorsement thereon.

The successful bidder will be required to furnish a corporate surety bond in an amount equal to one hundred per cent (100%) of the contract price, said bond to be issued by a responsible surety approved by the City, and shall guarantee the faithful performance of the contract and the terms and conditions therein contained, the payment for materials used in the project and the maintenance of said improvements in good repair for not less than one (1) year from the time of acceptance of said improvements by the City.

The City reserves the right to defer acceptance of any proposal for a period not to exceed sixty (60) calendar days from the date of receipt of bids. The City reserves the right to reject any or all bids and to waive informalities.

Payment of the cost of said project will be made from such cash funds of the City as may be legally used for said purpose at the discretion of the City, including but not limited to, the net revenues of the Water Department, the proceeds from the sale of Revenue or General Obligation Bonds, and/or the proceeds from the sale of warrants, as authorized by Section 384.57 of the Code of Iowa, made payable from any or all of the above-mentioned sources.

The Contractor will be paid ninety-five per cent (95%) of the Engineer's estimate of the value of acceptable work completed at the end of the preceding month. Final payment will be made not less than thirty-one (31) days after completion of the work and acceptance by the City, subject to the conditions and in accordance with the provisions of Chapter 573 of the Code of Iowa.

No such final payment will be due until the Contractor certifies to the City that the materials, labor, and services involved in the final estimate have been paid for in accordance with the requirements stated in the specifications. The City of Storm Lake is exempt from paying Sales and Use Tax and will supply Contractor with an "Iowa Sales Tax Exemption Certificate" and an authorization letter to allow the Contractor to buy equipment and material for the project tax free.

The work on this project shall commence within ten (10) days after receipt by the contractor of a written notice to proceed. The work shall be substantially completed by **November 26th, 2021**, subject to any changes in the contract period as provided for in these specifications.

Liquidated damages in the amount of **\$500** per calendar day will be assessed for each day that the work shall remain uncompleted after the **above referenced completion date** with due allowance for extensions of the contract period due to conditions beyond control of the Contractor.

By virtue of statutory authority, a preference will be given to products and provisions grown and coal produced within the State of Iowa.

In accordance with Iowa statutes, a resident bidder shall be allowed a preference as against a nonresident bidder from a state or foreign country if that state or foreign country gives or requires any preference to bidders from that state or foreign country, including but not limited to any preference to bidders, the imposition of any type of labor force preference, or any other form of preferential treatment to bidders or laborers from that state or foreign country. The preference allowed shall be equal to the preference given or required by the state or foreign country in which the nonresident bidder is a resident. In the instance of a resident labor force preference, a nonresident bidder shall apply the same resident labor force preference to a public improvement in this state as would be required in the construction of a public improvement by the state or foreign country in which the nonresident bidder is a resident.

Failure to submit a fully completed Bidder Status Form with the bid may result in the bid being deemed nonresponsive and rejected.

Plans and specifications governing the construction of the proposed improvements have been prepared by the Engineer. These plans and specifications, and the proceedings of the City referring to and defining said improvements, are hereby made a part of this Notice and the proposed contract by reference, and the proposed contract shall be executed to comply therewith.

Copies of said plans and specifications and form of contract are now on file in the office of the City Manager, for examination by bidders. Copies may be obtained from ISG, 1725 North Lake Avenue, Storm Lake, IA 50588, (712) 732-7745 upon deposit of one hundred dollars (\$100.00) which shall be refunded upon return of the plans and specifications within fourteen days after award of the project. If the plans and specifications are not returned within fourteen days after award of the project and in a reusable condition, the deposit shall be forfeited. Plans and specifications may also be obtained by download from the ISG website at www.is-grp.com.

Any bidder or equipment supplier whose firm or affiliate is listed in the GSA publication "List of Parties Excluded from Federal Procurement and Non-procurement Programs" will be prohibited from the bidding process. Anyone submitting a bid who is listed in this publication will be determined to be a non-responsive bidder in accordance with 40 CFR Part 31.

Section 3 clause

All section 3 covered contracts shall include the following clause (referred to as the section 3 clause):

A. The work to be performed under this contract is subject to the requirements of section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (section 3). The purpose of section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

B. The parties to this contract agree to comply with HUD's regulations in 24 CFR part 135, which implement section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 135 regulations.

C. The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.

D. The contractor agrees to include this section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 135. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 135.

E. The contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR part 135.

F. Noncompliance with HUD's regulations in 24 CFR part 135 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD assisted contracts.

G. With respect to work performed in connection with section 3 covered Indian housing assistance, section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450e) also applies to the work to be performed under this contract. Section 7(b) requires that to the greatest extent feasible (i) preference and opportunities for training and employment shall be given to Indians, and (ii) preference in the award of contracts and subcontracts shall be given to Indian organizations and Indian-owned Economic Enterprises. Parties to this contract that are subject to the provisions of section 3 and section 7(b) agree to comply with section 3 to the maximum extent feasible, but not in derogation of compliance with section 7(b).

Published upon order of the City of Storm Lake, Iowa.

CITY OF STORM LAKE, IOWA

BY /s/ Mike Porsch
Mayor

ATTEST:

BY /s/ Keri Navratil
City Manager

INSTRUCTIONS TO BIDDERS

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ARTICLE 1 – DEFINED TERMS

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
- A. *Issuing Office* – The office from which the Bidding Documents are to be issued and the bidding procedures are to be administered as outlined in the Advertisement for Bids for Construction Contracts.

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

- 2.01 Complete sets of the Bidding Documents may be obtained from the Issuing Office in the number and format stated in the advertisement or invitation to bid. The deposit will be refunded to each document holder of record who returns a complete set of Bidding Documents in good condition within 14 days after award of the project.
- 2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 2.03 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not authorize or confer a license for any other use.

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

- 3.01 To demonstrate Bidder's qualifications to perform the Work, after submitting its Bid and within five (5) days of Owner's request, Bidder shall submit (a) written evidence establishing its qualifications such as financial data, previous experience, and present commitments, and (b) the following additional information:
- A. Evidence of Bidder's authority to do business in the state where the Project is located.
- B. Bidder's state or other contractor license number, if applicable.
- C. Subcontractor and Supplier qualification information; coordinate with provisions of Article 12 of these Instructions, "Subcontractors, Suppliers, and Others."
- D. Other required information regarding qualifications
- 3.02 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.
- 3.03 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.
- 3.04 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

ARTICLE 4 – SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

- 4.01 *Site and Other Areas*
- A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any

additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.

4.02 *Existing Site Conditions*

A. Subsurface and Physical Conditions; Hazardous Environmental Conditions

1. The Supplementary Conditions identify:

- a. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site.
- b. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
- c. reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.
- d. Technical Data contained in such reports and drawings.

2. Owner will make copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the General Conditions will apply.

B. Underground Facilities: Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site are set forth in the Contract Documents and are based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.

C. Adequacy of Data: Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 5.03, 5.04, and 5.05 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 5.06 of the General Conditions.

4.03 *Site Visit and Testing by Bidders*

A. Bidder shall conduct the required Site visit during normal working hours, and shall not disturb any ongoing operations at the Site.

B. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.

- C. On request, and to the extent Owner has control over the Site, and schedule permitting, the Owner will provide Bidder access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site.
- D. Bidder shall comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.
- E. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

4.04 *Owner's Safety Program*

- A. Site visits and work at the Site may be governed by an Owner safety program. As the General Conditions indicate, if an Owner safety program exists, it will be noted in the Supplementary Conditions.

4.05 *Other Work at the Site*

- A. Reference is made to Article 8 of the Supplementary Conditions for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 5 – BIDDER'S REPRESENTATIONS

5.01 It is the responsibility of each Bidder before submitting a Bid to:

- A. examine and carefully study the Bidding Documents, and any data and reference items identified in the Bidding Documents;
- B. visit the Site, conduct a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfy itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. become familiar with and satisfy itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work;
- D. carefully study all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings;
- E. consider the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations

obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs;

- F. agree, based on the information and observations referred to in the preceding paragraph, that at the time of submitting its Bid no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
- G. become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;
- H. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder;
- I. determine that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work; and
- J. agree that the submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 6 – PRE-BID CONFERENCE

- 6.01 A pre-Bid conference will be held at the time and location stated in the Notice to Bidders. Representatives of Owner and Engineer will be present to discuss the Project. **Bidders are required to attend and participate in the conference.** Engineer will transmit to all prospective Bidders of record such Addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

ARTICLE 7 – INTERPRETATIONS AND ADDENDA

- 7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all parties recorded as having received the Bidding Documents. Questions received less than seven days prior to the date for opening of Bids may not be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.
- 7.02 Addenda may be issued to clarify, correct, supplement, or change the Bidding Documents.

ARTICLE 8 – BID SECURITY

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of 10% percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a certified check, bank money order, or a Bid bond (on the form included in

the Bidding Documents) issued by a surety meeting the requirements of Paragraphs 6.01 and 6.02 of the General Conditions.

- 8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract Documents, furnished the required contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall be Owner's exclusive remedy if Bidder defaults.
- 8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Contract or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.
- 8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within seven days after the Bid opening.

ARTICLE 9 – CONTRACT TIMES

- 9.01 The number of days within which, or the dates by which, the Work is to be substantially completed and ready for final payment are set forth in the Agreement.

ARTICLE 10 – LIQUIDATED DAMAGES

- 10.01 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 11 – SUBSTITUTE AND "OR-EQUAL" ITEMS

- 11.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, and those "or-equal" or substitute materials and equipment subsequently approved by Engineer prior to the submittal of Bids and identified by Addendum. No item of material or equipment will be considered by Engineer as an "or-equal" or substitute unless written request for approval has been submitted by Bidder and has been received by Engineer at least 15 days prior to the date for receipt of Bids. Each such request shall comply with the requirements of Paragraphs 7.04 and 7.05 of the General Conditions. The burden of proof of the merit of the proposed item is upon Bidder. Engineer's decision of approval or disapproval of a proposed item will be final. If Engineer approves any such proposed item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner.
- 11.02 All prices that Bidder sets forth in its Bid shall be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of "or-equal" or substitution requests are made at Bidder's sole risk.

ARTICLE 12 – SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 12.01 A Bidder shall be prepared to retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of the Work if required by the Bidding Documents (most commonly in the Specifications) to do so. If a prospective Bidder objects to retaining any such Subcontractor, Supplier, or other individual or entity, and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.
- 12.02 Subsequent to the submittal of the Bid, Owner may not require the Successful Bidder or Contractor to retain any Subcontractor, Supplier, or other individual or entity against which Contractor has reasonable objection.
- 12.03 The apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of the Subcontractors or Suppliers proposed for the Work.
- If requested by Owner, such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, or other individual or entity. If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder shall submit a substitute, Bidder's Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.
- 12.04 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, or other individuals or entities. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.06 of the General Conditions.

ARTICLE 13 – PREPARATION OF BID

- 13.01 The Bid Form is included with the Bidding Documents.
- A. All blanks on the Bid Form shall be completed in ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form. A Bid price shall be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.
- B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words "No Bid" or "Not Applicable."
- 13.02 A Bid by a corporation shall be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation shall be shown.
- 13.03 A Bid by a limited liability company shall be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.
- 13.04 A Bid by an individual shall show the Bidder's name and official address.

- 13.05 A Bid by a joint venture shall be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be shown.
- 13.06 All names shall be printed in ink below the signatures.
- 13.07 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 13.08 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.
- 13.09 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder's state contractor license number, if any, shall also be shown on the Bid Form.

ARTICLE 14 – BASIS OF BID

14.01 *Unit Price*

- A. Bidders shall submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form.
- B. The "Bid Price" (sometimes referred to as the extended price) for each unit price Bid item will be the product of the "Estimated Quantity" (which Owner or its representative has set forth in the Bid Form) for the item and the corresponding "Bid Unit Price" offered by the Bidder. The total of all unit price Bid items will be the sum of these "Bid Prices"; such total will be used by Owner for Bid comparison purposes. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of the General Conditions.
- C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

14.02 *Allowances*

- A. For cash allowances the Bid price shall include such amounts as the Bidder deems proper for Contractor's overhead, costs, profit, and other expenses on account of cash allowances, if any, named in the Contract Documents, in accordance with Paragraph 13.02.B of the General Conditions.

ARTICLE 15 – SUBMITTAL OF BID

- 15.01 With each copy of the Bidding Documents, a Bidder is furnished one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 7 of the Bid Form.
- 15.02 A Bid shall be received no later than the date and time prescribed and at the place indicated in the advertisement or invitation to bid and shall be enclosed in a plainly marked package with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with

the notation "BID ENCLOSED." A mailed Bid shall be addressed to **City of Storm Lake, 620 Erie Street, Storm Lake, IA 50588.**

- 15.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

ARTICLE 16 – MODIFICATION AND WITHDRAWAL OF BID

- 16.01 A Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 16.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 16.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 16.03 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, that Bidder will be disqualified from further bidding on the Work.

ARTICLE 17 – OPENING OF BIDS

- 17.01 Bids will be opened at the time and place indicated in the advertisement or invitation to bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 18 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 18.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 19 – EVALUATION OF BIDS AND AWARD OF CONTRACT

- 19.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible. If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, then the Owner will reject the Bid as nonresponsive; provided that Owner also reserves the right to waive all minor informalities not involving price, time, or changes in the Work.
- 19.02 If Owner awards the contract for the Work, such award shall be to the responsible Bidder submitting the lowest responsive Bid.
- 19.03 Evaluation of Bids
- A. In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.

- B. For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.
- 19.04 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.
- 19.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

ARTICLE 20 – BONDS AND INSURANCE

- 20.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the Agreement (executed by Successful Bidder) to Owner, it shall be accompanied by required bonds and insurance documentation.

ARTICLE 21 – SIGNING OF AGREEMENT

- 21.01 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 15 days thereafter, Successful Bidder shall execute and deliver the required number of counterparts of the Agreement (and any bonds and insurance documentation required to be delivered by the Contract Documents) to Owner. Within ten days thereafter, Owner shall deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 22 – SALES AND USE TAXES

- 22.01 Owner is exempt from Iowa state sales and use taxes on materials and equipment to be incorporated in the Work. Said taxes shall not be included in the Bid. Refer to Paragraph SC-7.09 of the Supplementary Conditions for additional information.

ARTICLE 23 – CONTRACTS TO BE ASSIGNED (NOT USED)

BID FORM

MEMORIAL LIFT STATION IMPROVEMENTS

Storm Lake, Iowa

Project No. 19-22797

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ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

***City of Storm Lake
Attn: Keri Navratil, City Manager
620 Erie Street
Storm lake, IA 50588***

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

<u>Addendum No.</u>	<u>Addendum, Date</u>
_____	_____
_____	_____
_____	_____
_____	_____

B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and

observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.

- F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.
- J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
 - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;
 - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 - 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and

4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5 – BASIS OF BID

- 5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

BID ITEM NO.	DESCRIPTION	TOTAL AMOUNT
1	ENTIRE WORK	
TOTAL BID		\$ _____ (NUMERICAL VALUE)
\$ _____ _____		
		(WRITTEN VALUE)

- 5.02 Bidder acknowledges that (1) each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor’s overhead and profit for each separately identified item, and (2) estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.
- 5.03 Contract will be awarded to the lowest responsible bidder.

ARTICLE 6 – TIME OF COMPLETION

- 6.01 Bidder agrees that the Work will be substantially complete on or before November 26th, 2021, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before December 31st, 2021.
- 6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 – ATTACHMENTS TO THIS BID

- 7.01 The following documents are submitted with and made a condition of this Bid:
- A. Required Bid Security;
 - B. Intent to Comply with Section 3 Requirements Form;
 - C. SRF Required Front-End Specifications;
 - D. Required Bidder Status Form;
 - E. DUNS Number, Tax ID Number, and Iowa Contractor’s License Number

ARTICLE 8 – DEFINED TERMS

- 8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 9 – BID SUBMITTAL

BIDDER: *[Indicate correct name of bidding entity]*

By:

[Signature]

[Printed name]

(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:

[Signature]

[Printed name]

Title:

Submittal Date:

Address for giving notices:

Telephone Number:

Fax Number:

Contact Name and e-mail address:

Bidder's License No.:

BID BOND

Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable.

BIDDER (*Name and Address*):

SURETY (*Name, and Address of Principal Place of Business*):

OWNER (*Name and Address*):

BID

Bid Due Date:

Description (*Project Name— Include Location*):

BOND

Bond Number:

Date:

Penal sum

\$

(Words)

(Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

BIDDER

SURETY

(Seal)

(Seal)

Bidder's Name and Corporate Seal

Surety's Name and Corporate Seal

By:

Signature

By:

Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest:

Signature

Attest:

Signature

Title

Title

Note: Addresses are to be used for giving any required notice.

Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
 - 3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
 - 3.2 All Bids are rejected by Owner, or
 - 3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after the Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

Bidder Status Form

To be completed by all bidders

Part A

Please answer "Yes" or "No" for each of the following:

☐ Yes ☐ No

My company is authorized to transact business in Iowa.
(To help you determine if your company is authorized, please review the worksheet on the next page).

☐ Yes ☐ No

My company has an office to transact business in Iowa.

☐ Yes ☐ No

My company's office in Iowa is suitable for more than receiving mail, telephone calls, and e-mail.

☐ Yes ☐ No

My company has been conducting business in Iowa for at least 3 years prior to the first request for bids on this project.

☐ Yes ☐ No

My company is not a subsidiary of another business entity or my company is a subsidiary of another business entity that would qualify as a resident bidder in Iowa.

If you answered "Yes" for each question above, your company qualifies as a resident bidder. Please complete Parts B and D of this form.

If you answered "No" to one or more questions above, your company is a nonresident bidder. Please complete Parts C and D of this form.

To be completed by resident bidders

Part B

My company has maintained offices in Iowa during the past 3 years at the following addresses:

Dates: _____ / _____ / _____ to _____ / _____ / _____

Address: _____

City, State, Zip: _____

Dates: _____ / _____ / _____ to _____ / _____ / _____

Address: _____

City, State, Zip: _____

Dates: _____ / _____ / _____ to _____ / _____ / _____

Address: _____

City, State, Zip: _____

You may attach additional sheet(s) if needed.

To be completed by non-resident bidders

Part C

1. Name of home state or foreign country reported to the Iowa Secretary of State:

2. Does your company's home state or foreign country offer preferences to bidders who are residents?

☐ Yes ☐ No

3. If you answered "Yes" to question 2, identify each preference offered by your company's home state or foreign country and the appropriate legal citation.

You may attach additional sheet(s) if needed.

To be completed by all bidders

Part D

I certify that the statements made on this document are true and complete to the best of my knowledge and I know that my failure to provide accurate and truthful information may be a reason to reject my bid.

Firm Name:

Signature:

Date:

Worksheet: Authorization to Transact Business

This worksheet may be used to help complete Part A of the Resident Bidder Status form. If at least one of the following describes your business, you are authorized to transact business in Iowa.

- ☐ Yes ☐ No My business is currently registered as a contractor with the Iowa Division of Labor.
- ☐ Yes ☐ No My business is a sole proprietorship and I am an Iowa resident for Iowa income tax purposes.
- ☐ Yes ☐ No My business is a general partnership or joint venture. More than 50 percent of the general partners or joint venture parties are residents of Iowa for Iowa income tax purposes.
- ☐ Yes ☐ No My business is an active corporation with the Iowa Secretary of State and has paid all fees required by the Secretary of State, has filed its most recent biennial report, and has not filed articles of dissolution.
- ☐ Yes ☐ No My business is a corporation whose articles of incorporation are filed in a state other than Iowa, the corporation has received a certificate of authority from the Iowa secretary of state, has filed its most recent biennial report with the secretary of state, and has neither received a certificate of withdrawal from the secretary of state nor had its authority revoked.
- ☐ Yes ☐ No My business is a limited liability partnership which has filed a statement of qualification in this state and the statement has not been canceled.
- ☐ Yes ☐ No My business is a limited liability partnership which has filed a statement of qualification in a state other than Iowa, has filed a statement of foreign qualification in Iowa and a statement of cancellation has not been filed.
- ☐ Yes ☐ No My business is a limited partnership or limited liability limited partnership which has filed a certificate of limited partnership in this state, and has not filed a statement of termination.
- ☐ Yes ☐ No My business is a limited partnership or a limited liability limited partnership whose certificate of limited partnership is filed in a state other than Iowa, the limited partnership or limited liability limited partnership has received notification from the Iowa secretary of state that the application for certificate of authority has been approved and no notice of cancellation has been filed by the limited partnership or the limited liability limited partnership.
- ☐ Yes ☐ No My business is a limited liability company whose certificate of organization is filed in Iowa and has not filed a statement of termination.
- ☐ Yes ☐ No My business is a limited liability company whose certificate of organization is filed in a state other than Iowa, has received a certificate of authority to transact business in Iowa and the certificate has not been revoked or canceled.

INTENT TO COMPLY WITH SECTION 3 REQUIREMENTS

(To be provided with procurement documents and returned with all submitted bids)

Section 3 of the Housing and Urban Development Act of 1968 [12 U.S.C. 1701u and 24 CFR Part 135] is HUD's legislative directive for providing preference to low-income residents of the local community (regardless of race or gender), and the businesses that substantially employ these persons, for new employment, training and contracting opportunities resulting from HUD-funded projects. The regulations seek to ensure that low- and very low-income persons, and the businesses that employ these individuals, are notified about the expenditure of HUD funds in their community and encouraged to seek opportunities, if created.

A Section 3 resident is defined as a public housing resident or someone with a household income that is less than 80% of the area median income.

A Section 3 business is defined as a business that is:

51% owned by Section 3 residents

Whose permanent, full-time staff is comprised of at least 30% Section 3 residents**

Has committed 25% of the dollar amount of its subcontracts to Section 3 businesses

Note: If your business meets the definition of a Section 3 business, you may register as a Section 3 Business through HUD's website here:

<https://portalapps.hud.gov/Sec3BusReg/BRegistry/RegisterBusiness>

Businesses who self-certify that they meet one of the regulatory definitions of a Section 3 business will be included in a searchable online database. The database can be used by agencies that receive HUD funds, developers, contractors, and others to facilitate the award of covered construction and non-construction contracts to Section 3 businesses.

Please complete the following:

1. If awarded a contract for this CDBG funded project, do you anticipate hiring new employees to complete the project? (Hiring would be specific to this project)
☐ Yes ☐ No If yes, please estimate the number of employees to be hired: _____
2. Is your business a Section 3 Business? ☐ Yes ☐ No
3. Is the bidder willing to consider hiring Section 3 residents for future employment opportunities that are a direct result of this CDBG funded project?
☐ Yes ☐ No
4. Is the bidder willing to consider subcontracting with Section 3 Businesses for this project?
☐ Yes ☐ No

I understand that this contracting opportunity is subject to HUD Section 3 requirements (24 CFR Part 135). I have read and understand the Section 3 requirements as generally described above and presented in the Section 3 contract language included in the procurement documents for this project. If awarded a contract, the business commits to following Section 3 requirements, as they apply to this project. If awarded a contract for this project, the business agrees to provide reports to (insert City/County) on Section 3 efforts and accomplishments.

Name of Contractor/Subcontractor

Address

Print Name

Title

Signature

Date



SRF Required Front-End Specifications

This packet includes the special requirements that apply only to projects subject to “American Iron and Steel” requirements enacted by Congress on January 17, 2014. Please consult with the DNR Project Manager to determine if the AIS requirements apply. If not, Attachment 9 may be removed.

- Attachment 1: Certification of Non-Segregated Facilities Form
(to be completed and signed by Prime Contractor and submitted with the bid)
- Attachment 2: Statement in Advertisement for Bids on Debarment and Suspension/Certification Regarding Debarment and Suspension Form *(to be completed and signed by Prime Contractor and submitted with the bid)*
- Attachment 3: Disadvantaged Business Enterprise Certification Form *(to be completed and signed by Prime Contractor and submitted with the bid)*
- Attachment 4: DBE Program Subcontractor Performance Form *(to be completed and signed by Prime and DBE Subcontractor for each subcontract and submitted with the bid)*
- Attachment 5: DBE Program Subcontractor Utilization Form *(to be completed and signed by Prime Contractor and submitted with the bid)*
- Attachment 6: DBE Program Subcontractor Participation Form *(for voluntary use of DBEs)*
- Attachment 7: Other Federal Requirements Language
- A. Standard Equal Employment Opportunity Specifications
 - B. Federal Labor Standards Provisions (including Davis-Bacon prevailing wage rates)
 - C. Preservation of Open Competition and Government Neutrality
 - D. Historical and Archeological Finds
 - E. Prohibitions on Procurement from Violating Facilities
- Attachment 8: Right of Entry and Records Retention
- Attachment 9: Use of American Iron and Steel

Please note: The Davis Bacon wage determination received from the Iowa Finance Authority must also be included in the front-end specifications.

Attachment 1
SRF Required Front-End Specifications
(This form must be completed and signed by Prime Contractor and submitted with the bid.)

U.S. Environmental Protection Agency
Certification of Non-Segregated Facilities

(Applicable to contracts, subcontracts, and agreements with applicants who are themselves performing Federally assisted construction contracts, exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause.)

By the submission of this bid, the bidder, offeror, applicant, or subcontractor certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. He certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The bidder, offeror, applicant, or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity clause in this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. He further agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause; that he will retain such certifications in his files; and that he will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods):

**NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR
CERTIFICATIONS OF NON-SEGREGATED FACILITIES**

A Certification of Non-segregated Facilities, as required by the May 9, 1967, order (33 F.R. 7808, May 28, 1968) on Elimination of Segregated Facilities, by the Secretary of Labor, must be submitted prior to the award of a subcontract exceeding \$10,000 which is not exempt from the provisions of the Equal Opportunity clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

Signature

Date

Name and Title of Signer (Please Type)

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

EPA-7 5720-4.2

Attachment 2
SRF Required Front-End Specifications

(This form must be completed and signed by the Prime Contractor and submitted with the bid.)

Debarments and Suspensions

Any bidder or equipment supplier whose firm or affiliate is listed in on the U.S. General Services Administration Excluded Parties List System web site at <https://www.sam.gov/SAM/> will be prohibited from the bidding process. Anyone submitting a bid who is listed on this web site will be determined to be a non-responsive bidder in accordance with 40 CFR Part 31.

United States Environmental Protection Agency Washington, DC 20460

**Certification Regarding Debarment, Suspension, and
Other Responsibility Matters**

The prospective participant certifies to the best of its knowledge and belief that it and the principals:

- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- (b) Have not within a three year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction: violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
- (c) Are not presently indicted for otherwise criminally or civilly charged by a government entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (1) (b) of this certification; and
- (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated or cause or default.

I understand that a false statement on this certification may be ground for rejection of this proposal or termination of the award. In addition, under 18 U SC Sec. 10 01, a false statement may result in a fine of up to \$10,000 or imprisonment for up to 5 years, or both.

Typed Name & Title of Authorized Representative

Signature of Authorized Representative

Date

☐ I am unable to certify to the above statements. My explanation is attached.

EPA Form 5700-49 (11-88)

Attachment 3
SRF Required Front-End Specifications
(This form must be completed and signed by Prime Contractor and submitted with the bid.)

Disadvantaged Business Enterprise (DBE) Solicitation

It is EPA's policy that recipients of EPA financial assistance through the State Revolving Fund programs award a "fair share" of subagreements to small, minority and women-owned businesses, collectively known as Disadvantaged Business Enterprises (DBEs). Iowa's Fair Share goals are:

	Minority-Owned Business Enterprise (MBE) Goal	Women-Owned Business Enterprise (WBE) Goal
Construction	1.7%	2.2%
Supplies	0.6%	5.6%
Services	2.5%	11.3%
Goods/Equipment	2.5%	10.4%
Average	1.8%	7.4%

Only work performed by certified DBEs can be counted toward the goals. In Iowa, DBEs must be certified through the Iowa Department of Transportation (IDOT). Information on certification requirements and a list of certified DBEs is on the IDOT website at http://www.iowadot.gov/contracts/contracts_eoaa.htm.

Prime contractors' DBE requirements for SRF projects include:

- Taking affirmative steps for DBE participation
- Documenting the efforts and the proposed utilization of certified DBEs

PROJECT INFORMATION

SRF Applicant:	
Bidder:	
Address:	
Contact Person:	
Signature:	
Phone Number:	
E-Mail Address:	
Check if Prime Contractor is: ☐ Minority-Owned ☐ Women-Owned	

GOOD FAITH EFFORTS CHECKLIST

Please complete the checklist to determine if you have complied with the requirement to make good faith efforts to ensure that certified DBEs have the opportunity to compete for procurements funded by EPA financial assistance funds. Bidders/offerers must make good faith efforts prior to submission of bids/proposals.

1. Did you ensure that DBEs are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities? ☐ Yes ☐ No
2. Did you make information on forthcoming opportunities available to DBEs and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process? This includes, whenever possible, posting solicitation for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date. ☐ Yes ☐ No
3. Did you consider in the contracting process whether firms competing for large contracts could subcontract with DBEs? This will include dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by DBEs in the competitive process. ☐ Yes ☐ No
4. Did you encourage contracting with a consortium of DBEs when a contract is too large for one of these firms to handle individually? ☐ Yes ☐ No
5. Did you use the services of the Small Business Administration and the Minority Business Development Agency of the Department of Commerce to identify potential subcontractors? ☐ Yes ☐ No
6. List the potential DBE subcontractors that were contacted. Only list those that are certified through the Iowa Department of Transportation.

Name	How Contacted (e.g. letter, phone call, fax, e-mail)	Response (e.g. did not respond, not interested, not competitive)

PROPOSED UTILIZATION OF DBE SUBCONTRACTORS

Please include Attachments 4 and 5 to document the proposed utilization of certified DBE subcontractors.

CONTRACT ADMINISTRATION PROVISIONS

Several contract provisions are required to prevent unfair practices that adversely affect DBEs. These include:

1. Prime Contractor must pay its Subcontractor for satisfactory performance no more than 30 days from the Prime Contractor's receipt of payment from the SRF loan recipient.
2. Prime Contractor must notify the SRF loan recipient in writing prior to termination of a DBE subcontractor for convenience.
3. Prime Contractor must employ the six Good Faith Efforts to solicit a replacement subcontractor if a DBE subcontractor fails to complete work under a subcontract for any reason.

Attachment 4
SRF Required Front-End Specifications
*(This form must be completed and signed by Prime and DBE Subcontractor
for each subcontract and submitted with the bid.)*

OMB Control No: 2090-0030
Approved 8/13/2013
Approval Expires 8/31/2015

**United States Environmental Protection Agency Disadvantaged Business Enterprise Program
DBE Subcontractor Performance Form**

This form is intended to capture the DBE¹ subcontractor's² description of work to be performed and the price of the work submitted to the prime contractor. An EPA Financial Assistance Agreement recipient must require its prime contractor to have its DBE subcontractors complete this form and include all completed forms in the prime contractor's bid or proposal package.

Subcontractor Name		Project Name	
Bid/Proposal No.		Assistance Agreement ID No. (if known)	Point of Contact
Address			
Telephone No.		Email Address	
Prime Contractor Name		Issuing/Funding Entity	
Contract Item Number	Description of Work Submitted to the Prime Contractor Involving Construction, Services, Equipment or Supplies		Price of Work Submitted to the Prime Contractor
DBE Certified by ___ DOT ___ SBA ___ Other: _____		Meets/exceeds EPA certification standards? ___ YES ___ NO ___ Unknown	

¹A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certification as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

²Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

**United States Environmental Protection Agency Disadvantaged Business Enterprise Program
DBE Subcontractor Performance Form**

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware of that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

Prime Contractor Signature	Print Name
Title	Date

Subcontractor Signature	Print Name
Title	Date

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

Attachment 5
SRF Required Front-End Specifications
(This form must be completed and signed by Prime Contractor and submitted with the bid if utilizing DBE subcontractors.)

OMB Control No: 2090-0030
Approved 8/13/2013
Approval Expires 8/31/2015

**United States Environmental Protection Agency Disadvantaged Business Enterprise Program
DBE Subcontractor Utilization Form**

This form is intended to capture the prime contractor's actual and/or intended use of identified certified DBE¹ subcontractors² and the estimated dollar amount of each subcontract. An EPA Financial Assistance Agreement Recipient must require its prime contractors to complete this form and include it in the bid or proposal package. Prime contractors should also maintain a copy of this form on file.

Prime Contractor Name		Project Name	
Bid/Proposal No.		Assistance Agreement ID No. (if known)	Point of Contact
Address			
Telephone No.		Email Address	
Issuing/Funding Entity			
I have identified potential DBE certified subcontractors _____ YES _____ NO			
If yes, please complete the table below. If no, please explain:			
Subcontractor Name/Company Name	Company Address/Phone/Email	Estimated Dollar Amount	Currently DBE Certified?

Continue on back if needed

¹A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certification as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

²Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

**United States Environmental Protection Agency Disadvantaged Business Enterprise Program
DBE Subcontractor Utilization Form**

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware of that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

Prime Contractor Signature	Print Name
Title	Date

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

Attachment 6
SRF Required Front-End Specifications
(This form is not required for bidding. It is for the voluntary use of DBE Subcontractors.)

OMB Control No: 2090-0030
Approved 8/13/2013
Approval Expires 8/31/2015

United States Environmental Protection Agency Disadvantaged Business Enterprise Program
DBE Subcontractor Participation Form

An EPA Financial Assistance Agreement Recipient must require its prime contractors to provide this form to its DBE subcontractors. This form gives a DBE¹ subcontractor² the opportunity to describe work received and/or report any concerns regarding the EPA-funded project (e.g. in areas such as termination by prime contractor, late payments, etc.). The DBE subcontractor can, as an option, complete and submit this form to the EPA DBE Coordinator at any time during the project period of performance.

Subcontractor Name		Project Name	
Bid/Proposal No.		Assistance Agreement ID No. (if known)	Point of Contact
Address			
Telephone No.		Email Address	
Prime Contractor Name		Issuing/Funding Entity	
Contract Item Number	Description of Work Received from the Prime Contractor Involving Construction, Services, Equipment or Supplies		Amount Received by Prime Contractor

¹A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certification as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

²Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

**United States Environmental Protection Agency Disadvantaged Business Enterprise Program
DBE Subcontractor Participation Form**

Please use the space below to report any concerns regarding the above EPA-funded project:

Subcontractor Signature	Print Name
Title	Date

EPA FORM 6100-2 (DBE Subcontractor Participation Form)
Return to: Regional Coordinator, Small Business Utilization, U.S. Environmental Protection Agency, Region 7, 11201
Renner Blvd., Lenexa, KS 66219

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

Attachment 7
SRF Required Front-End Specifications

Other Federal Requirements Language

A. Standard Federal Equal Employment Opportunity Construction Contract Specifications (Executive Order 11246)

1. As used in these specifications:
 - a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;
 - b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;
 - c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
 - d. "Minority" includes:
 - (i) Black (all persons having origin in any of the Black African racial groups not of Hispanic origin);
 - (ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
 - (iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Sub-continent, or the Pacific Islands); and
 - (iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).
2. Whenever the Contractor, or any Subcontractor at any tier subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.
3. If the Contractor is participating (pursuant to 41 CFR 6-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.
4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employee in the covered area. Covered construction contractors performing construction work in geographical areas where they do not have a

Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

- a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor employees are assigned to work. The Contractor, where possible will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
- b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available and maintain a record of the organizations' responses.
- c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the Contractor may have taken.
- d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's effort, to meet its obligations.
- e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The

Contractor shall provide notice of these programs to the source complied under 7b above.

f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and test to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's workforce.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

1. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

10. The Contractor shall not use the goals and timetable or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps at least as extensive as those standards prescribed in paragraph 7 of these specifications so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

Federal Register, Vol. 43, No. 68 - Friday, April 7, 1978 (Corrected May 5, 1978).

Effective Date: May 8, 1978

Federal Register, Vol. 45, No. 194. Paragraph 4, revised October 3, 1980

Effective Date: September 30, 1980

APPENDICES A and B-80

Notice of Requirement for Affirmative Action To Ensure Equal Employment Opportunity (Executive Order 11246)

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Specifications" set forth herein.
2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:
(See Appendix B-80 and Appendix A Below)

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and non-federally involved construction.

The Contractor's compliance with the Executive Order and in the regulations in 41 CFR Part 60—4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60—4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60—4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor, employer Identification number of the subcontractor, estimated dollar amount of the subcontract, and the geographical area in which the subcontract is to be performed.

4. As used in this Notice, and in the contract resulting from this solicitation, the “covered area” is (State of Iowa).

APPENDIX A

The following goals and timetables for female utilization shall be included in all Federal and federally assisted construction contracts and subcontracts in excess of \$10,000. The goals are applicable to the contractor’s aggregate on-site construction workforce whether or not part of that workforce is performing work on a Federal or federally assisted construction contract or subcontract.

Area covered: Goals for Women apply nationwide.

Timetable Goals (percent)

From Apr. 1, 1978 until March 31, 19793.1

From Apr. 1, 1979 until March 31, 19805.0

From Apr. 1, 1980 until March 31, 19816.9

Published, Federal Register May 5, 1978

APPENDIX B-80

Until further notice, the following goals for minority utilization in each construction craft and trade shall be included in all Federal or federally assisted construction contracts and subcontracts in excess of \$10,000 to be performed in the respective geographical areas. The goals are applicable to each nonexempt contractor’s total onsite construction workforce, regardless of whether or not part of that workforce is performing work in a Federal, federally assisted or nonfederally related project, contract or subcontract. Construction contractors which are participating in an approved Hometown Plan (see 41 CFR 60—4.5) are required to comply with the goals of the Hometown Plan with regard to construction work they perform in the area covered by the Hometown Plan. With regard to all their other covered construction work, such contractors are required to comply with the applicable SMSA of EA goal contained in this appendix B-80.

Economic Areas

State: Iowa Goal %

096 Dubuque IA:

SMSA Counties:

2200 Dubuque, IA 0.6

IA Dubuque

Non-SMSA

Counties 0.5

IA Allamakee, IA Clayton, IA Delaware, IA, Jackson IA, Winneshiek

099 Davenport Rock Island Moline, IA-IL:

SMSA Counties:

1960 Davenport Rock Island Moline, IA-IL 4.6

IL Henry, IL Rock Island Moline, IA Scott

Non-SMA

Counties 3.4

IL Carroll, IL Hancock, IL Henderson, IL ,Mercer, IL Whiteside, IA Clinton, IA Des Moines, IA Henry, IA Lee, IA Louisa, IA, Muscatine, MO Clark

100 Cedar Rapids, IA:

SMSA Counties:

1360 Cedar Rapids, IA 1.7

IA Linn

Non-SMSA Counties 1.5

IA Benton, IA Cedar, IA Iowa, IA Johnson, IA, Jones, IA, Washington

101 Waterloo, IA:

SMSA Counties:

8920 Waterloo-Cedar Falls, IA 4.7

IA Black Hawk

Non-SMSA Counties 2.0

IA Bremer, IA Buchanan, IA Butler, IA Cerro Gordo, IA Chickasaw, IA Fayette, IA Floyd, IA Franklin, IA Grundy, IA Hancock, IA Hardin, IA Howard, IA Mitchell, IA Winnebago, IA Worth

102 Fort Dodge, IA:

Non-SMSA Counties 0.4

IA Buena Vista, IA Calhoun, IA Carroll, IA Clay, IA Dickinson, IA Emmet, IA Greene, IA Hamilton, IA Humboldt, IA Kossuth, IA Palo Alto, IA Pocahontas, IA Sac, IA Webster, IA Wright

103 Sioux City, IA:

SMSA Counties:

7720 Sioux City, IA-NE 1.9

IA Woodbury, NE Dakota

Non-SMSA Counties	1.2
IA Cherokee, IA Crawford, IA Ida, IA Monona, IA O'Brien, IA Plymouth, IA Sioux, NE Antelope, NE Cedar, NE Cuming, NE Dixon, NE Knox, NE Madison, NE Pierce, NE Stanton, NE Thurston, NE Wayne, SD Bon Homme, SD Clay, SD Union, SD Yankton	
104 Des Moines, IA:	
SMSA Counties:	
2120 Des Moines, IA	4.5
IA Polk, IA Warren	
Non SMSA Counties:	2.4
IA Adair, IA Appanoose, IA Boone, IA Clarke, IA Dallas, IA Davis, IA Decatur, IA Guthrie, IA Jasper, IA Jefferson, IA Keokuk, IA Lucas, IA Madison, IA Mahaska, IA Marion, IA Marshall, IA Monroe, IA Poweshiek, IA Ringgold, IA Story, IA Tama, IA Union, IA Van Buren, IA Wapello, IA Wayne	
143 Omaha, NE:	
SMSA Counties:	
5920 Omaha, NE-IA	7.6
IA Pottawattamie, NE Douglas, NE Sarpy	
Non-SMSA Counties	5.3
IA Adams, IA Audubon, IA Cass, IA Fremont, IA Harrison, IA Mills, IA Montgomery, IA Page, IA Shelby, IA Taylor, NE Burt, NE Cass, NE Colfax, NE Dodge, NE Platte, NE Saunders, NE Washington	

Published, Federal Register October 3, 1980

B. Federal Labor Standards Provisions (including Davis-Bacon prevailing wage rates)

Applicability

The Project or Program to which the construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

(1) Minimum wages. (i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill,

except as provided in Sec. 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) Withholding. The EPA shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the EPA may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records. (i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency). The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the (write in name of appropriate federal agency) if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit them to the applicant, sponsor, or owner, as the case may be, for transmission to the (write in name of agency), the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its

own records, without weekly submission to the sponsoring government agency (or the applicant, sponsor, or owner).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under Sec. 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under Sec. 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees--(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's

hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the (write in the name of the Federal agency) may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility. (i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

(b) Contract Work Hours and Safety Standards Act. The Agency Head shall cause or require the contracting officer to insert the following clauses set forth in paragraphs (b)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by Sec. 5.5(a) or 4.6 of part 4 of this title. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The loan recipient shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (b)(1) through (4) of this section and also a clause requiring the

subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (4) of this section.

(c) In addition to the clauses contained in paragraph (b), in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in Sec. 5.1, the Agency Head shall cause or require the contracting officer to insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Agency Head shall cause or require the contracting officer to insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the EPA and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

C. Preservation of Open Competition and Government Neutrality Towards Government Contractors' Labor Relations on Federal and Federally Funded Construction Projects (Executive Order 13202, as amended by Executive Order 13208)

Executive Order 13202, signed February 17, 2001 and amended April 4, 2001, requires all executive agencies that issue grants to ensure Government neutrality toward contractors' labor relations. This applies to recipients of SRF assistance. The Executive Order prohibits discrimination against contractors and their employees in construction contracts based upon labor affiliation or lack thereof.

SRF assistance recipients and any construction managers acting on their behalf must ensure that bidding specifications, project agreements, and other controlling documents do not require, prohibit, or otherwise discriminate, with respect to labor affiliation or lack thereof.

D. Historical and Archeological Finds

If, during the course of construction, evidence of deposits of historical or archeological interest is found, the contractor shall cease operations affecting the find. The owner shall then notify the State Revolving Fund Environmental Review Specialist, who shall in turn notify the State Historic Preservation Office. The SRF shall consult with the SHPO and other interested parties to determine the proper course of action regarding the discovery. No further disturbance of the deposits shall ensue until the SRF Environmental Review Specialist determines that the project activities in that area may proceed. Compensation to the contractor, if any, for lost time or changes in construction to avoid the find, shall be determined in accordance with changed conditions or change order provisions of the specifications.

Authority for this derives from the National Historic Preservation Act (16 U.S.C. §§ 470 *et seq.*) and 36 CFR Part 800. If human remains are discovered then state law also applies IC 263B.

E. Prohibitions on Procurement from Violating Facilities (Section 306, Clean Air Act; Section 508, Clean Water Act; Executive Order 11738)

Both the Clean Water Act and the Clean Air Act prohibit federal agencies from extending assistance by way of loans or contracts to persons who have been convicted of violations of either law. Executive Order 11738 was issued to coordinate enforcement by the U.S. Environmental Protection Agency, which shall designate facilities which have given rise to a conviction for an offense under the criminal provisions of the Clean Air Act and the Clean Water Act.

The Executive Order also prohibits agencies from extending assistance to facilities that are not in compliance with either Act.

SRF assistance recipients may not procure goods, services, or materials from suppliers listed by the EPA as violators.

The Excluded Parties Listing System is located at <http://epls.arnet.gov>.

**Attachment 8
SRF Required Front-End Specifications**

Right of Entry and Records Retention

The recipient shall provide access at all times for the Department of Natural Resources, the Iowa Finance Authority, the state auditor, and the U.S. EPA Office of the Inspector General to all project records and documents for inspection and audit purposes for a period of three years after the date of last loan payment. The same access to the project site(s) shall be provided for inspection purposes.

92.8 (2).6.e. State inspections. Personnel of the department shall have the right to examine all construction aspects of the project, including materials and equipment delivered and stored on site for use on the project.

Attachment 9 SRF Required Front-End Specifications

“American Iron and Steel” Requirements

H.R. 3547, the “Consolidated Appropriations Act, 2014,” enacted January 17, 2014 by the U.S. Congress, includes “American Iron and Steel” provisions that require Clean Water and Drinking Water State Revolving Fund assistance recipients of these funds to use iron and steel produced in the United States.

H.R. 3547 includes the following language in Division G, Title IV, under the heading, “Use of American Iron and Steel”:

Sec. 436. (a)(1) None of the funds made available by a State water pollution control revolving fund as authorized by title VI of the Federal Water Pollution Control Act (33 U.S.C. 1381 et seq.) or made available by a drinking water treatment revolving loan fund as authorized by section 1452 of the Safe Drinking Water Act (42 U.S.C. 300j-12) shall be used for a project for the construction, alteration, maintenance, or repair of a public water system or treatment works unless all of the iron and steel products used in the project are produced in the United States.

(2) In this section, the term “iron and steel products” means the following products made primarily of iron and steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials.

(b) Subsection (a) shall not apply in any case or category of cases in which the Administrator of the Environmental Protection Agency (in this section referred to as the “Administrator”) find that—

- (1) applying subsection (a) would be inconsistent with the public interest;
- (2) iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quantity; or
- (3) inclusion of iron and steel products produced in the United States will increase the cost of the overall project by more than 25 percent.

(c) If the Administrator receives a request for a waiver under this section, the Administrator shall make available to the public on an informal basis a copy of the request and information available to the Administrator concerning the request, and shall allow for informal public input on the request for at least 15 days prior to making a finding based on the request. The Administrator shall make the request and accompanying information available by electronic means, including on the official public Internet Web site of the Environmental Protection Agency.

The final guidance and any published waivers are found at:

http://water.epa.gov/grants_funding/aisrequirement.cfm. In particular the contractor should pay attention to the guidance for documentation of compliance. There is also a waiver for incidental items; in order to qualify for this waiver the total materials and costs for the project must be tracked and incidental items identified.

Sample “American Iron and Steel” Contract Language

In order to fulfill the requirements, the assistance recipient must in good faith design the project and solicit bids for construction with U.S.-made iron and steel. The following information will be included in any contracts resulting from this request for bids:

The Contractor acknowledges to and for the benefit of the City of _____ (“Purchaser”) and the State of Iowa (the “State”) that it understands the goods and services under this Agreement are being funded with monies made available by the Clean Water State Revolving Fund and/or Drinking Water State Revolving Fund and such law contains provisions commonly known as “American Iron and Steel;” that requires all of the iron and steel products used in the project to be produced in the United States (“American Iron and Steel Requirement”) including iron and steel products provided by the Contactor pursuant to this Agreement.

The Contractor hereby represents and warrants to and for the benefit of the Purchaser and the State that (a) the Contractor has reviewed and understands the American Iron and Steel Requirement, (b) all of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is approved, and (c) the Contractor will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by the Purchaser or the State.

Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Purchaser or State to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney’s fees) incurred by the Purchaser or State resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State or any damages owed to the State by the Purchaser). While the Contractor has no direct contractual privity with the State, as a lender to the Purchaser for the funding of its project, the Purchaser and the Contractor agree that the State is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the State.

Sample Certifications

As indicated in the contract language, it will be the responsibility of the Contractor to obtain certifications that the products and materials used in the project are U.S.-made. EPA recommends the use of a step certification process for documenting compliance with AIS requirements, similar to one used by the Federal Highway Administration. Step certification creates a paper trail which documents the location of the manufacturing process involved with the production of steel and iron materials. Each handler (supplier, fabricator, manufacturer, processor, coater, etc.) of the iron and steel products certifies that their step in the process was domestically performed.

The following information is provided as a sample letter of step certification for AIS compliance. Documentation must be provided on company letterhead. In this example, there may be multiple letters from different manufacturers if one manufacturer did not perform all of the steps.

Date

Company Name
Company Address
City, State Zip

Subject: American Iron and Steel Step Certification for Project (XXXXXXXXXX)

I, (company representative), certify that the (melting, bending, coating, galvanizing, cutting, etc.) process for (manufacturing or fabricating) the following products and/or materials shipped or provided for the subject project is in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. XXXX

2. XXXX

3. XXXX

Such process took place at the following location:

If any of the above compliance statements change while providing material to this project we will immediately notify the prime contractor and the engineer.

Signed by company representative

Alternatively, the final manufacturer that delivers the iron or steel product to the worksite, vendor, or contractor, may provide a certification asserting that all manufacturing processes occurred in the U.S. and providing detailed information on the steps involved.

The following is a template for this type of final certification.



Template American Iron and Steel Certification Letter



On Manufacturer's Letterhead

IRON & STEEL, INC.
1959 Steel Drive
Ironville, OH 12345

MATERIAL CERTIFICATION

April 30, 2015

RE: Job Name: Waterprojectville, Iowa – 2015 State Revolving Fund Water
Infrastructure Project
SRF Project Number: CS1920999 01

References the SRF Project

I certify that the processes for manufacturing or fabricating the following products and/or materials provided for the subject project took place at the following U.S. locations:

Quantity	Description	Manufacturing Processes	Location Where Processes Occurred
3 count	AB123456 4" Gate Valve	Melting, poured, machined	Ironville, OH
60 count	XY654321 Reinforced Concrete Manhole	Melted, rolled, fabricated	Steel City, IA
60 count	XZ123456 Manhole Cover	Melted, cast, finished	Stainless, MS
1200 linear feet	AB654321 4" Ductile Iron Water Pipe	Melted, rolled, finished	Pipetown, CA

I further certify that the products and/or materials are in full compliance with the American Iron and Steel requirements as mandated in the U.S. Environmental Protection Agency's State Revolving Fund programs. If any of the above compliance statements change while providing material to this project we will immediately notify the supplier, prime contractor, consulting engineer, or project owner.

Specifies the
Products and
Quantities

On behalf of IRON & STEEL, INC.,

Signature of
Manufacturer's
Representative

Jane Smith
Jane Smith
Product Quality Manager

Specifies the
Manufacturing
Processes and
the U.S.
Locations
Where They
Were
Performed

Covered and Non-Covered Items

The EPA issued a waiver for de minimus incidental components of eligible water and wastewater infrastructure projects. Funds used for such de minimus incidental components cumulatively may comprise no more than a total of 5% of the total cost of the materials used in and incorporated into a project. The cost of an individual incidental item may not exceed 1% of the total cost of the materials used in and incorporated into a project.

De minimus incidental items include miscellaneous, generally low-cost components that are essential for, but incidental to, the construction and are incorporated into the physical structure of the project. For many of these incidental components, the country of manufacture and the availability of alternatives are not readily or reasonably identifiable prior to procurement in the normal course of business. For others, the country of manufacture may be known but the miscellaneous character in conjunction with the low cost, individually and (in total) as typically procured in bulk, mark them as properly incidental.

Examples of incidental components could include small washers, screws, fasteners (i.e., nuts and bolts), miscellaneous wire, corner bead, ancillary tube, etc. Examples of items that are clearly not incidental include significant process fittings (i.e., tees, elbows, flanges, and brackets), distribution system fittings and valves, force main valves, pipes, treatment and storage tanks, large structural supports, etc.

Assistance recipients should in consultation with their contractors determine the items to be covered by this waiver, must retain relevant documentation (i.e. invoices) as to those items, and must summarize in reports to the State of Iowa the types and/or categories of items to which this waiver is applied, the total cost of incidental components for each type or category, and the calculations by which they determined the total cost of materials used in and incorporated into the project.

The successful bidder will fill out the materials spreadsheet (shown below) and submit it to the assistance recipient to indicate covered and non-covered items proposed to be procured for the project.

American Iron and Steel Materials Spreadsheet – to be Submitted by Successful Bidder							
Iowa Department of Natural Resources - May 2014							
Based on EPA Memorandum (4/15/2014): De Minimus Waiver of Section 436 of P.L. 113-76, Consolidated Appropriation Acts (CAA), 2014							
Project:	Choose an item.						
Bidder:	Lined/unlined pipes or fittings		Date:				
	Manhole covers						
	Municipal castings						
* Covered Products	Pipes clamps or restraints	pipes or fittings; manhole covers; municipal castings; pipe clamps and restraints; valves; structural steel; hydrants, construction materials.					
tanks; flange	Valves						
	Structural steel						
** Incidental	Hydrants	Generally low-cost items, often procured in bulk, such as washers, screws, fasteners, small amounts of wire, etc.					
	Tanks						
	Flanges						
	Reinforced precast concrete						
	Construction materials	Description of Other Products if Not Included in Covered Products	Bid Amount Covered Products	Bid Amount Incidentals	Documentation Will be Obtained	Item is Incidental and will be Claimed under de Minimus Waiver**	
1	Choose an item.						
2	Choose an item.						
3	Choose an item.						
4	Choose an item.						
5	Choose an item.						
6	Choose an item.						
7	Choose an item.						
8	Choose an item.						
9	Choose an item.						
10	Choose an item.						

At the end of construction, the contractor will submit a final list showing covered and non-covered items.

American Iron and Steel Materials Spreadsheet with de Minimus Items							
Iowa Department of Natural Resources - May 2014							
Based on EPA Memorandum (4/15/2014): De Minimus Waiver of Section 436 of P.L. 113-76, Consolidated Appropriation Acts (CAA), 2014							
Project:				Submitted By:			
Contractor:				Final De Minimus List			
Date:							
Total Materials Cost:		Total Amount Covered Under de Minimus Waiver		Percent (must be 5% or less of total materials cost)			
* Covered Products include: Lined or unlined pipes or fittings; manhole covers; municipal castings; pipe clamps and restraints; valves; structural steel; hydrants, tanks; flanges; reinforced precast concrete; construction materials. ** Incidental items are miscellaneous, generally low-cost items, often procured in bulk, such as washers, screws, fasteners, small amounts of wire, etc.							
	Covered Products*	Description if Not Included in Covered Products	Date Purchased	Dollar Amount Covered Products	Dollar Amount Incidentals	Documentation Received	Incidental**
1	Choose an item.						
2	Choose an item.						
3	Choose an item.						
4	Choose an item.						
5	Choose an item.						
6	Choose an item.						

These documents are available on-line at http://www.iowasrf.com/about_srf/use-of-american-iron-and-steel/.

"General Decision Number: IA20200003 01/03/2020

Superseded General Decision Number: IA20190003

State: Iowa

Construction Type: Heavy Sewer/Water Treating Plant

Counties: Iowa Statewide.

EXCEPT SCOTT COUNTY

SEWER AND WATER TREATMENT PLANTS ONLY

Note: Under Executive Order (EO) 13658, an hourly minimum wage of \$10.80 for calendar year 2020 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.80 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2020. If this contract is covered by the EO and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must pay workers in that classification at least the wage rate determined through the conformance process set forth in 29 CFR 5.5(a)(1)(ii) (or the EO minimum wage rate, if it is higher than the conformed wage rate). The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/03/2020

* SUIA2002-004 12/01/2014

	Rates	Fringes
Carpenters (ALL OF THE STATE OF IOWA, except the named cities and counties listed below:)	\$ 27.26	13.68
Carpenters (BURLINGTON AND KEOKUK)	\$ 29.53	17.49
Carpenters (CLINTON COUNTY, City of Clinton)	\$ 29.53	17.49
Carpenters (CLINTON, DUBUQUE, JOHNSON, LOUISA, MUSCATNE, DES MOINES, CEDAR and LEE COUNTIES, Except any of the		

previously named cities).....\$ 25.45	15.49
Carpenters (COUNCIL BLUFFS).....\$ 33.33	13.68
Carpenters (DUBUQUE COUNTY (City of Dubuque)).....\$ 29.53	17.49
Carpenters (FORT MADISON).....\$ 29.53	17.49
Carpenters (IOWA CITY).....\$ 29.53	17.49
Carpenters (LINN COUNTY).....\$ 33.58	17.49
Carpenters (MUSCATINE COUNTY, City of Muscatine).....\$ 27.97	18.50
Carpenters (POLK COUNTY).....\$ 37.53	13.54
Carpenters (SIOUX CITY).....\$ 33.33	13.68
Carpenters (WATERLOO/CEDAR FALLS).....\$ 29.53	17.49
Cement mason (ALL OF THE STATE OF IOWA, except for the named cities and couties listed below:).....\$ 27.40	11.05
Cement mason (BURLINGTON AND KEOKUK).....\$ 36.89	11.05
Cement mason (CLINTON COUNTY, City of Clinton).....\$ 36.89	11.05
Cement mason (CLINTON, DUBUQUE, JOHNSON, LOUISA, MUSCATINE, DES MOINES, CEDAR and LEE COUNTIES, Except any of the previously named cities).....\$ 31.53	11.05
Cement mason (COUNCIL BLUFFS)....\$ 33.55	11.05
Cement mason (DUBUQUE COUNTY (City of Dubuque)).....\$ 36.98	11.05
Cement mason (FORT MADISON).....\$ 35.45	11.05
Cement mason (IOWA CITY).....\$ 36.89	11.05
Cement mason (LINN COUNTY).....\$ 36.89	11.05
Cement mason (MUSCATINE COUNTY).....\$ 36.89	11.05
Cement mason (POLK COUNTY).....\$ 36.89	11.05
Cement mason (SIOUX CITY).....\$ 34.17	11.05
Cement mason (WATERLOO/CEDAR FALLS).....\$ 31.68	11.05

IRONWORKER (ALL OF THE STATE
OF IOWA, except for the named
cities or counties listed

below:)\$ 23.75	16.37
IRONWORKER (BURLINGTON AND KEOKUK)\$ 28.58	16.37
IRONWORKER (CLINTON COUNTY, City of Clinton)\$ 35.04	16.37
IRONWORKER (CLINTON, DUBUQUE, JOHNSON, LOUISA, MUSCATINE, DES MOINES, CEDAR and LEE COUNTIES, Except any of the previously named cities)\$ 23.75	16.37
IRONWORKER (COUNCIL BLUFFS)\$ 24.15	16.37
IRONWORKER (DUBUQUE COUNTY (City of Dubuque))\$ 27.53	16.37
IRONWORKER (FORT MADISON)\$ 28.58	16.37
IRONWORKER (IOWA CITY)\$ 27.53	16.37
IRONWORKER (LINN COUNTY)\$ 27.53	16.37
IRONWORKER (MUSCATINE COUNTY)\$ 35.04	16.37
IRONWORKER (POLK COUNTY)\$ 27.37	16.37
IRONWORKER (SIOUX CITY)\$ 18.57	16.37
IRONWORKER (WATERLOO/CEDAR FALLS)\$ 27.53	16.37
LABORERS (ALL OF THE STATE OF IOWA, except for the named cities and counties listed below:)\$ 25.14	9.38
LABORERS (BURLINGTON AND KEOKUK)\$ 30.11	9.38
LABORERS (CLINTON COUNTY, City of Clinton)\$ 29.52	9.38
LABORERS (CLINTON, DUUQUE, JOHNSON, LOUISA, MUSCATINE, DES MOINES, CEDAR and LEE COUNTIES, Except any of the previously named cities)\$ 26.89	9.38
LABORERS (COUNCIL BLUFFS)\$ 26.89	9.38
LABORERS (DUBUQUE COUNTY (City of Dubuque))\$ 26.89	9.38
LABORERS (FORT MADISON)\$ 30.11	9.38
LABORERS (IOWA CITY)\$ 28.35	9.38
LABORERS (LINN COUNTY)\$ 30.87	9.38
LABORERS (MUSCATINE COUNTY (City of Muscatine))\$ 30.35	9.38

LABORERS (POLK COUNTY).....	\$ 30.77	9.38
LABORERS (SIOUX CITY).....	\$ 26.89	9.38
LABORERS (WATERLOO/CEDAR FALLS).....	\$ 26.89	9.38

OPERATOR: Power Equipment
(POLK, WARREN, DALLAS, STORY
& JASPER COUNTIES)

SEWER

Class A.....	\$ 36.00	14.55
Class B.....	\$ 34.30	14.55
Class C.....	\$ 31.91	14.55

WATER

Class A.....	\$ 35.73	14.55
Class B.....	\$ 34.03	14.55
Class C.....	\$ 31.65	14.55

Power Equipment Operator (ALL
OF THE STATE OF IOWA, except
for the named cities and
counties listed below:)

Class A.....	\$ 35.73	14.55
Class B.....	\$ 34.03	14.55
Class C.....	\$ 31.65	14.55

Power Equipment Operator
(BURLINGTON AND KEOKUK)

Class A.....	\$ 34.50	31.85
Class B.....	\$ 31.85	31.85

Power Equipment Operator
(CLINTON COUNTY, City of
Clinton)

Class A.....	\$ 34.50	31.85
Class B.....	\$ 31.85	31.85

Power Equipment Operator
(CLINTON, LOUISA, MUSCATINE,
DES MOINES, CEDAR and LEE
COUNTIES, Except any of the
previously named cities)

Class A.....	\$ 34.50	31.85
Class B.....	\$ 31.85	31.85

Power Equipment Operator
(COUNCIL BLUFFS)

SEWER

Class A.....	\$ 36.00	14.55
Class B.....	\$ 34.30	14.55
Class C.....	\$ 31.91	14.55

WATER

Class A.....	\$ 35.73	14.55
Class B.....	\$ 34.03	14.55
Class C.....	\$ 31.65	14.55

Power Equipment Operator
(DUBUQUE COUNTY (Including
City of Dubuque) and JOHNSON
COUNTY)

SEWER

Class A.....	\$ 36.00	14.55
Class B.....	\$ 34.30	14.55
Class C.....	\$ 31.91	14.55

WATER		
Class A.....	\$ 35.73	14.55
Class B.....	\$ 34.03	14.55
Class C.....	\$ 31.65	14.55
Power Equipment Operator (FORT MADISON)		
Class A.....	\$ 34.50	31.85
Class B.....	\$ 31.85	31.85
Power Equipment Operator (IOWA CITY)		
SEWER		
Class A.....	\$ 36.00	14.55
Class B.....	\$ 34.30	14.55
Class C.....	\$ 31.91	14.55
WATER		
Class A.....	\$ 35.73	14.55
Class B.....	\$ 34.03	14.55
Class C.....	\$ 31.65	14.55
Power Equipment Operator (LINN COUNTY)		
SEWER		
Class A.....	\$ 36.00	14.55
Class B.....	\$ 34.30	14.55
Class C.....	\$ 31.91	14.55
WATER		
Class A.....	\$ 35.73	14.55
Class B.....	\$ 34.03	14.55
Class C.....	\$ 31.91	14.55
Power Equipment Operator (MUSCATINE COUNTY)		
Class A.....	\$ 34.50	31.85
Class B.....	\$ 31.85	31.85
Power Equipment Operator (SIOUX CITY)		
SEWER		
Class A.....	\$ 36.00	14.55
Class B.....	\$ 34.30	14.55
Class C.....	\$ 31.91	14.55
WATER		
Class A.....	\$ 35.73	14.55
Class B.....	\$ 34.03	14.55
Class C.....	\$ 31.91	14.55
Power Equipment Operator (WATERLOO/CEDAR FALLS)		
SEWER		
Class A.....	\$ 36.00	14.55
Class B.....	\$ 34.30	14.55
Class C.....	\$ 31.91	14.55
WATER		
Class A.....	\$ 35.73	14.55
Class B.....	\$ 34.03	14.55
Class C.....	\$ 31.91	14.55
Truck drivers (ALL OF THE STATE OF IOWA, except for the named cities and counties listed below:)		
.....	\$ 21.66	10.50
Truck drivers (BURLINGTON AND		

KEOKUK).....\$ 24.59	10.50
Truck drivers (CLINTON COUNTY, City of Clinton).....\$ 25.03	10.50
Truck drivers (CLINTON, DUBUQUE, JOHNSON, LOUISA, MUSCATINE, DES MOINES, CEDAR and LEE COUNTIES, Except any of the previously named cities).....\$ 22.76	10.50
Truck drivers (COUNCIL BLUFFS)...\$ 25.68	10.50
Truck drivers (DUBUQUE COUNTY (City of Dubuque)).....\$ 24.06	10.50
Truck drivers (FORT MADISON).....\$ 24.59	10.50
Truck drivers (IOWA CITY).....\$ 26.34	10.50
Truck drivers (LINN COUNTY).....\$ 27.10	10.50
Truck drivers (MUSCATINE COUNTY).....\$ 24.59	10.50
Truck drivers (POLK COUNTY).....\$ 25.68	10.50
Truck drivers (SIOUX CITY).....\$ 23.28	10.50
Truck drivers (WATERLOO/CEDAR FALLS).....\$ 24.21	10.50

POWER EQUIPMENT OPERATOR CLASSIFICATIONS

CLASS A: Asphalt laydown machine, Asphalt Plant Operator, Asphalt heater-planer unit, Backhoe, Bulldozer, Central Mix Plant, Concrete Pump, Crawler Tractor Pulling Scraper, Dredge Engineer, Dredge Leverman, Front-end Loader (over 2 yds), Group Equipment Greaser (unsupervised), Horizontal boring machine, Master Mechanic, Milling Machine, Motor Patrol, Portland Concrete Paver, Power Shovel, Crane & Dragline, Pushcat, Scraper (10 yards & over or finish), Self-propelled Elevation Grader or Similar Machine, Sideboom Tractor, Subgrader (or equivalent), Tow Push Boat or Work Boat, Trenching Machine (Cleveland 80 or similar capacity).

CLASS B: Asphalt Distributor, Asphalt Finish Roller, Asphalt Screed, Belt Loader or Similar Machine, Bullfloat, Churn or Rotary Drill, Concrete Widening Machine, Concrete Curbing Machine, Conveyor, Crawler Tractor - Pulling ripper, Disc, Sheepsfoot or Roller, Deckhand/Oiler, Finishing Machine (on concrete), Flex-plane, forklift, Form Grader, Front-end Loader (under 2 yards), Group greaser (supervised), Haiss loader or similar, Mechanic-welder, Offroad articulated hauler, Paving breaker pumps (over 3""), Screening & wash plant, Skid loader, Spreader Operator, Self-propell Roller (other than asphalt), Self-propelled vibrating compactor, shoulder machine, Trenching Machine (other than above), Water wagon on compaction.

CLASS C: Asphalt Roller (other than finish), Boiler, Boom & Winch Truck, Compressor, Concrete Spreader, Belt Placer, Farm Type or Utility Tractor with attachments (under 50

hp), Group Greaser Light plant, Mechanical Broom, Mechanical Heater, Oiler, Pile Hammer Power Unit, Pump (Other than Dredge), Pumps (3" and under), Pumps on well points & deep wells for dewatering, Safety Boat, Truck Crane combination Driver Oiler, Welding Machine.

FOOTNOTE:

IRONWORKERS: (Setting of all structural steel and reinforcing steel installation)

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number,

005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the

Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

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Applicability

The Project or Program to which the construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

A. 1. (i) Minimum Wages. All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible, place where it can be easily seen by the workers.

(ii) (a) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe

benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(b) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB control number 1215- 0140.)

(c) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1215- 0140.)

(d) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii)(b) or (c) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

2. Withholding. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any

other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work, all or part of the wages required by the contract, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or subcontractor to the respective employees to whom they are due. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

3. (i) Payrolls and basic records. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section I(b)(2)(B) of the Davis-bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5 (a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section I(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1215-0140 and 1215-0017.)

(ii) (a) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i). This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the

Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, DC 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. (Approved by the Office of Management and Budget under OMB Control Number 1215-0149.)

(b) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be maintained under 29 CFR 5.5 (a)(3)(i) and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(c) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph A.3.(ii)(b).

(d) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under subparagraph A.3.(i) available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and Trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where

appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage

determination for the work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under 29 CFR Part 5 shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR Part 3 which are incorporated by reference in this contract

6. Subcontracts. The contractor or subcontractor will insert in any subcontracts the clauses contained in subparagraphs 1 through 11 of this paragraph A and such other clauses as HUD or its designee may by appropriate instructions require, and a copy of the applicable prevailing wage decision, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this paragraph.

7. Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.

10. (i) Certification of Eligibility. By entering into this contract the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001. Additionally, U.S. Criminal Code, Section 1 01 0, Title 18, U.S.C., "Federal Housing Administration transactions", provides in part: "Whoever, for the purpose of ... influencing in any way the action of such Administration ... makes, utters or publishes any statement knowing the same to be false... shall be fined

not more than \$5,000 or imprisoned not more than two years, or both.”

11. Complaints, Proceedings, or Testimony by

Employees. No laborer or mechanic to whom the wage, salary, or other labor standards provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

B. Contract Work Hours and Safety Standards Act. The provisions of this paragraph B are applicable only where the amount of the prime contract exceeds \$100,000. As used in this paragraph, the terms “laborers” and “mechanics” include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in subparagraph (1) of this paragraph, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph (1) of this paragraph, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by the clause set forth in sub paragraph (1) of this paragraph.

(3) Withholding for unpaid wages and liquidated damages. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contract, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act which is held by the same prime contractor such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph (2) of this paragraph.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subpaagraph (1) through (4) of this paragraph and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in subparagraphs (1) through (4) of this paragraph.

C. Health and Safety. The provisions of this paragraph C are applicable only where the amount of the prime contract exceeds \$100,000.

(1) No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

(2) The Contractor shall comply with all regulations issued by the secretary of Labor pursuant to Title 29 Part 1926 and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act, 40 USC 3701 et seq.

(3) The Contractor shall include the provisions of this paragraph in every subcontract so that such provisions will be binding on each subcontractor. The Contractor shall take such action with respect to any subcontract as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

THE FOLLOWING SHOULD BE INCLUDED IN ALL CDBG PROJECT SPECIFICATIONS AND CONTRACTS:

A. Executive Orders 11246 and 11375.

The Contractor will comply with all provisions of Executive Orders 11246 and 11375. During the performance of this Contract, the Contractor agrees as follows:

- 1) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, transfer, recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.
- 2) The Contractor will, in all solicitations or advertisement for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.
- 3) The Contractor will send to each labor union or representative of workers with which they have a collective bargaining agreement or other Contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the Contractor's commitments under Section 202 of Executive Order No. 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- 4) The Contractor will comply with all provisions of Executive Order No. 11246 of September 24, 1965, and of the rules, regulations, and relevant order of the Secretary of Labor.
- 5) The Contractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to their books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- 6) In the event of the Contractor's noncompliance with the nondiscrimination clauses of this Contract or with any such rules, regulations or orders, this Contract may be canceled, terminated or suspended in whole or in part and the Contractor may be declared ineligible for further government Contracts in accordance with procedures authorized in Executive Order No. 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
- 7) The Contractor will include the provision of Paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions including sanctions for noncompliance; provided, however, that in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the Contractor

may request the United States to enter into such litigation to protect the interests of the United States.

B. Title VI of the Civil Rights Act of 1964 and Iowa Civil Right Act of 1965.

This act provides that no person shall be excluded from participation, denied benefits, or subjected to discrimination on the basis of race, color, or national origin under any program or activity receiving federal financial assistance. Iowa Civil Right Act mirrors the Federal Civil Rights Act.

C. Federal Executive Order 11063, as amended by Executive Order 12259 Equal Opportunity Housing

D. Section 109 of Title I of the Housing and Community Development Act.

This act provides that no person shall be excluded from participation, including employment, denied program benefits, or subjected to discrimination on the basis of race, color, physical or mental disabilities, national origin, sex, handicap, religion or religious affiliation, or age under any program or activity funded in whole or in part under Title I of this act.

E. Section 3 of the Housing and Urban Development Act of 1965 (as amended).

A. The work to be performed under this contract is subject to the requirements of section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (section 3). The purpose of section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

B. The parties to this contract agree to comply with HUD's regulations in 24 CFR part 135, which implement section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 135 regulations.

C. The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The notice shall describe the section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.

D. The contractor agrees to include this section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 135. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 135.

E. The contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligations under 24 CFR part 135.

F. Noncompliance with HUD's regulations in 24 CFR part 135 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD assisted contracts.

G. With respect to work performed in connection with section 3 covered Indian housing assistance, section 7(b) of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450e) also applies to the work to be performed under this contract. Section 7(b) requires that to the greatest extent feasible (i) preference and opportunities for training and employment shall be given to Indians, and (ii) preference in the award of contracts and subcontracts shall be given to Indian organizations and Indian-owned Economic Enterprises. Parties to this contract that are subject to the provisions of section 3 and section 7(b) agree to comply with section 3 to the maximum extent feasible, but not in derogation of compliance with section 7(b).

F. The Americans with Disabilities Act (P.L. 101-336, 42 U.S.C. 12101-12213).

This act guarantees equal opportunity for individuals with disabilities in public accommodations, employment, transportation, state and local government services and telecommunications.

G. Access to and Maintenance of Records. The Contractor must maintain all required records for five years after final payments are made and all other pending matters are closed. At any time during normal business hours and as frequently as is deemed necessary, the Contractor shall make available and furnish all information and reports required, and will permit access to books, records, and accounts by the Owner, Department of Housing and Urban Development, the Secretary of Labor, the Iowa Economic Development Authority or their authorized representatives, for purposes of investigation to ascertain compliance.

H. Termination. The Owner and/or the Contractor shall have the right to terminate this Contract at any time by giving at least ten (10) days notice in writing. The notice shall specify the effective date of such termination. Upon cancellation, the Owner will be responsible only for those costs incurred by the Contractor to the date of termination. In the event of termination, all finished or unfinished documents, data, studies, surveys, drawings, maps, models, photographs and reports prepared by the Contractor under this Contract shall, at the option of the City, become its property and the Contractor shall be entitled to receive just and equitable compensation for any work satisfactorily completed hereunder.

I. Awarding Agency Reporting Requirements. The Contractor must provide information as necessary and as requested by the Iowa Economic Development Authority for the purpose of fulfilling all reporting requirements related to the CDBG program.

J. Energy Efficiency. Mandatory standards and policies relating to energy efficiency which are contained in the State energy conservation plan issued in compliance with the Energy Policy and Conservation Act.

Pub. L 94-163, 89 Stat. 871

K. All Contracts in Excess of \$100,000.

In addition to the preceding provisions, Contracts in excess of \$100,000 shall require compliance with the following laws and regulations:

- Section 306 of the Clean Air Acts [42 U.S.C. 1857 (h)].
- Section 508 of the Clean Water Act [33 U.S.C. 1368].
- Executive Order 11738.
- EPA Regulations - 40 CFR, Part 15.

In accordance with the Clean Air and Water Act, the Contractor agrees as follows:

- 1) The Contractor will certify that any facility to be utilized in the performance of any nonexempt contract or subcontract is not listed on the List of Violating Facilities issued by the Environmental Protection Agency pursuant to 40 CFR 15.20.

- 2) The Contractor agrees to comply with all the requirements of Section 114 of the Clean Air Act, as amended, (42 U.S.C. 1857c-8) and Section 308 of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1318) relating to inspection, monitoring, entry, reports, and information, as well as all other requirements specified in said Section 114 and Section 308, and all regulations and guidelines issued thereunder.
- 3) The Contractor agrees that as a condition for the award of a Contract, prompt notice will be given of any notification received from the Director, Office of Federal Activities, Environmental Protection Agency, indicating that a facility utilized or to be utilized for the Contract is under consideration to be listed on the Environmental Protection Agency List of Violating Facilities.
- 4) The Contractor agrees that it will include or cause to be included the criteria and requirements in Paragraphs (1) through (4) of this section in every nonexempt subcontract and require every subcontractor to take such action as the Government may direct as a means of enforcing such provisions.

L. All Contracts in Excess of \$2,000.

In addition to the preceding provisions, all construction contracts in excess of \$2,000 must include the Federal Labor Standards Provisions:

- Davis-Bacon and Related Acts
- Contract Work Hours and Safety Standard Act
- Copeland Anti-kickback Act

NOTICE OF AWARD

Date of Issuance:

Owner:

Owner's Contract No.:

Engineer:

Engineer's Project No.:

Project:

Contract Name:

Bidder:

Bidder's Address:

TO BIDDER:

You are notified that Owner has accepted your Bid dated [] for the above Contract, and that you are the Successful Bidder and are awarded a Contract for:

The Contract Price of the awarded Contract is: \$ [] *[note if subject to unit prices, or cost-plus]*

[] unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents accompanies this Notice of Award, or has been transmitted or made available to Bidder electronically. *[revise if multiple copies accompany the Notice of Award]*

☐ a set of the Drawings will be delivered separately from the other Contract Documents.

You must comply with the following conditions precedent within 15 days of the date of receipt of this Notice of Award:

1. Deliver to Owner [] counterparts of the Agreement, fully executed by Bidder.
2. Deliver with the executed Agreement(s) the Contract security *[e.g., performance and payment bonds]* and insurance documentation as specified in the Instructions to Bidders and General Conditions, Articles 2 and 6.
3. Other conditions precedent (if any):

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within ten days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

Owner:

Authorized Signature

By:

Title:

Copy: Engineer

THIS AGREEMENT is by and between The City of Storm Lake (“Owner”) and
 (“Contractor”).

EJCDC® C-520, Agreement Between Owner and Contractor for Construction Contract (Stipulated Price).
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and American Society of Civil Engineers. All rights reserved. Page 1 of 7

and Milestones not achieved within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. Substantial Completion: Contractor shall pay Owner \$500 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 4.02.A above for Substantial Completion until the Work is substantially complete.
2. Completion of Remaining Work: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$500 for each day that expires after such time until the Work is completed and ready for final payment.
3. Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive and will not be imposed concurrently.

4.04 *Special Damages*

- A. In addition to the amount provided for liquidated damages, Contractor shall reimburse Owner (1) for any fines or penalties imposed on Owner as a direct result of the Contractor's failure to attain Substantial Completion according to the Contract Times, and (2) for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Substantial Completion (as duly adjusted pursuant to the Contract), until the Work is substantially complete.
- B. After Contractor achieves Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times, Contractor shall reimburse Owner for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Work to be completed and ready for final payment (as duly adjusted pursuant to the Contract), until the Work is completed and ready for final payment.

ARTICLE 5 – CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents the amounts that follow, subject to adjustment under the Contract:

- A. For all Unit Price Work, an amount equal to the sum of the extended prices (established for each separately identified item of Unit Price Work by multiplying the unit price times the actual quantity of that item):

The extended prices for Unit Price Work set forth as of the Effective Date of the Contract are based on estimated quantities. As provided in Paragraph 13.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer.

ARTICLE 6 – PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

- A. Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment on or about the 20th day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.
 - 1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract
 - a. Ninety-five percent (95%) of Work completed (with the balance being retainage). If the Work has been 50 percent completed as determined by Engineer, and if the character and progress of the Work have been satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage; and
 - b. Ninety-five percent (95%) of cost of materials and equipment not incorporated in the Work (with the balance being retainage).
- B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to Ninety-five percent (95%) percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less two hundred percent (200%) of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work in accordance with Paragraph 15.06 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 15.06.

ARTICLE 7 – INTEREST

- 7.01 All amounts not paid when due shall bear interest at the rate of 10% percent per annum.

ARTICLE 8 – CONTRACTOR’S REPRESENTATIONS

- 8.01 In order to induce Owner to enter into this Contract, Contractor makes the following representations:
- A. Contractor has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.
 - B. Contractor has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 - C. Contractor is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
 - D. Contractor has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.
 - E. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor’s safety precautions and programs.
 - F. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
 - G. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.
 - H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
 - I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
 - J. Contractor’s entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

ARTICLE 9 – CONTRACT DOCUMENTS

9.01 *Contents*

- A. The Contract Documents consist of the following:

1. This Agreement (pages 1 to 7, inclusive).
 2. CDBG Required Contract Language (pages 1 to 4, inclusive).
 3. Performance bond (pages 1 to 3, inclusive).
 4. Payment bond (pages 1 to 3, inclusive).
 5. General Conditions (pages 1 to 65, inclusive; not attached but incorporated by reference and provided in the Project Manual).
 6. Supplementary Conditions (pages 1 to 10, inclusive; not attached but incorporated by reference and provided in the Project Manual).
 7. Specifications as listed in the table of contents of the Project Manual (not attached but incorporated by reference).
 8. Drawings (not attached but incorporated by reference) consisting of sheets with each sheet bearing the following general title: Memorial Lift Station Improvements
 9. Addenda (numbers to , inclusive; not attached but incorporated by reference and provided in the Project Manual).
 10. Exhibits to this Agreement (enumerated as follows):
 - a. Contractor's Bid (pages to , inclusive).
 11. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
 - a. Notice to Proceed.
 - b. Work Change Directives.
 - c. Change Orders.
- B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in the General Conditions.

ARTICLE 10 – MISCELLANEOUS

10.01 Terms

- A. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

10.02 Assignment of Contract

- A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 *Successors and Assigns*

- A. Owner and Contractor each binds itself, its successors, assigns, and legal representatives to the other party hereto, its successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 *Severability*

- A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.05 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.05:
1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process or in the Contract execution;
 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

This Agreement will be effective on _____ (which is the Effective Date of the Contract).

OWNER:

CONTRACTOR:

By: _____

By: _____

Title: _____

Title: _____

(If Contractor is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest: _____

Attest: _____

Title: _____

Address for giving notices:

Title: _____

Address for giving notices:

License No.: _____

(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)

NOTICE TO PROCEED

Owner:	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer:	Engineer's Project No.:
Project:	Contract Name:
	Effective Date of Contract:

TO CONTRACTOR:

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on [REDACTED], 20[REDACTED]. *[see Paragraph 4.01 of the General Conditions]*

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work shall be done at the Site prior to such date. In accordance with the Agreement, [the date of Substantial Completion is _____], and the date of readiness for final payment is _____].

Before starting any Work at the Site, Contractor must comply with the following:
[Note any access limitations, security procedures, or other restrictions]

Owner:

Authorized Signature

By:

Title:

Date Issued:

Copy: Engineer

PERFORMANCE BOND

CONTRACTOR *(name and address):*

SURETY *(name and address of principal place of business):*

OWNER *(name and address):*

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location):*

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract):*

Amount:

Modifications to this Bond Form: ☒ None ☐ See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal

Surety's Name and Corporate Seal

By: _____
Signature

By: _____
Signature *(attach power of attorney)*

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after:

3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence,

to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

7.2 additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

7.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

14. Definitions

14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims

for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

16. Modifications to this Bond are as follows:

PAYMENT BOND

CONTRACTOR *(name and address):*

SURETY *(name and address of principal place of business):*

OWNER *(name and address):*

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location):*

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract):*

Amount:

Modifications to this Bond Form: ☒ None ☐ See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

(seal)

Contractor's Name and Corporate Seal

(seal)

Surety's Name and Corporate Seal

By: _____

Signature

By: _____

Signature *(attach power of attorney)*

Print Name

Print Name

Title

Title

Attest: _____

Signature

Attest: _____

Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond shall arise after the following:
 - 5.1 Claimants who do not have a direct contract with the Contractor,
 - 5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
 - 5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).
 - 5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
 - 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 - 7.2 Pay or arrange for payment of any undisputed amounts.
 - 7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. Definitions

16.1 **Claim:** A written statement by the Claimant including at a minimum:

1. The name of the Claimant;
2. The name of the person for whom the labor was done, or materials or equipment furnished;
3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
4. A brief description of the labor, materials, or equipment furnished;
5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
7. The total amount of previous payments received by the Claimant; and

8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4 **Owner Default:** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

18. Modifications to this Bond are as follows:

Contractor's Application for Payment No. _____

Application Period:		Application Date:
To (Owner):	From (Contractor):	Via (Engineer):
Project:	Contract:	
Owner's Contract No.:	Contractor's Project No.:	Engineer's Project No.:

Application For Payment

Change Order Summary

Approved Change Orders			1. ORIGINAL CONTRACT PRICE..... \$
Number	Additions	Deductions	2. Net change by Change Orders..... \$
			3. Current Contract Price (Line 1 ± 2)..... \$
			4. TOTAL COMPLETED AND STORED TO DATE
			(Column F total on Progress Estimates)..... \$
			5. RETAINAGE:
			a. 95% X _____ Work Completed..... \$
			b. 95% X _____ Stored Material..... \$
			c. Total Retainage (Line 5.a + Line 5.b)..... \$
			6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5.c)..... \$
			7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)..... \$
			8. AMOUNT DUE THIS APPLICATION..... \$
			9. BALANCE TO FINISH, PLUS RETAINAGE
			(Column G total on Progress Estimates + Line 5.c above)..... \$
TOTALS			
NET CHANGE BY			
CHANGE ORDERS			

Contractor's Certification

The undersigned Contractor certifies, to the best of its knowledge, the following:

(1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;

(2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all Liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such Liens, security interest, or encumbrances); and

(3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

Contractor Signature

By:	Date:
-----	-------

Payment of: \$ _____
(Line 8 or other - attach explanation of the other amount)

is recommended by: _____
(Engineer) (Date)

Payment of: \$ _____
(Line 8 or other - attach explanation of the other amount)

is approved by: _____
(Owner) (Date)

Approved by: _____
Funding or Financing Entity (if applicable) (Date)

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner:	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer:	Engineer's Project No.:
Project:	Contract Name:

This [preliminary] [final] Certificate of Substantial Completion applies to:

☐ All Work ☐ The following specified portions of the Work:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work shall be as provided in the Contract, except as amended as follows: *[Note: Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.]*

Amendments to Owner's responsibilities: ☐ None
☐ As follows

Amendments to Contractor's responsibilities: ☐ None
☐ As follows:

The following documents are attached to and made a part of this Certificate: *[punch list; others]*

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract.

EXECUTED BY ENGINEER:	RECEIVED:	RECEIVED:
By: _____ (Authorized signature)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

NOTICE OF ACCEPTABILITY OF WORK

PROJECT:

OWNER:

CONTRACTOR:

OWNER'S CONSTRUCTION CONTRACT IDENTIFICATION:

EFFECTIVE DATE OF THE CONSTRUCTION CONTRACT:

ENGINEER:

NOTICE DATE:

To: _____
Owner

And To: _____
Contractor

From: _____
Engineer

The Engineer hereby gives notice to the above Owner and Contractor that Engineer has recommended final payment of Contractor, and that the Work furnished and performed by Contractor under the above Construction Contract is acceptable, expressly subject to the provisions of the related Contract Documents, the Agreement between Owner and Engineer for Professional Services dated _____, and the following terms and conditions of this Notice:

CONDITIONS OF NOTICE OF ACCEPTABILITY OF WORK

The Notice of Acceptability of Work ("Notice") is expressly made subject to the following terms and conditions to which all those who receive said Notice and rely thereon agree:

1. This Notice is given with the skill and care ordinarily used by members of the engineering profession practicing under similar conditions at the same time and in the same locality.
2. This Notice reflects and is an expression of the Engineer's professional opinion.
3. This Notice is given as to the best of Engineer's knowledge, information, and belief as of the Notice Date.

4. This Notice is based entirely on and expressly limited by the scope of services Engineer has been employed by Owner to perform or furnish during construction of the Project (including observation of the Contractor's work) under Engineer's Agreement with Owner, and applies only to facts that are within Engineer's knowledge or could reasonably have been ascertained by Engineer as a result of carrying out the responsibilities specifically assigned to Engineer under such Agreement.
5. This Notice is not a guarantee or warranty of Contractor's performance under the Construction Contract, an acceptance of Work that is not in accordance with the related Contract Documents, including but not limited to defective Work discovered after final inspection, nor an assumption of responsibility for any failure of Contractor to furnish and perform the Work thereunder in accordance with the Construction Contract Documents, or to otherwise comply with the Construction Contract Documents or the terms of any special guarantees specified therein.
6. This Notice does not relieve Contractor of any surviving obligations under the Construction Contract, and is subject to Owner's reservations of rights with respect to completion and final payment.

7.

By: _____

Title: _____

Dated: _____

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by



Issued and Published Jointly by



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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer

has declined to address. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. (“CERCLA”); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5501 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. (“RCRA”); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
12. *Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.
13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents. .
15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
17. *Cost of the Work*—See Paragraph 13.01 for definition.
18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
20. *Engineer*—The individual or entity named as such in the Agreement.
21. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.
23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
25. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work.
26. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
27. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
28. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
29. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
30. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.
31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or "RPR" includes any assistants or field staff of Resident Project Representative.
33. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals and the performance of related construction activities.
35. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
36. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

37. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands furnished by Owner which are designated for the use of Contractor.
38. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
39. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
40. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
43. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.
45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
46. *Unit Price Work*—Work to be paid for on the basis of unit prices.
47. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and

equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

48. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 *Terminology*

- A. The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:*
1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. *Day:*
1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:*
1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).
- E. *Furnish, Install, Perform, Provide:*
1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

- A. *Bonds*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.
- C. *Evidence of Owner’s Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise specifically required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.
- B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or

computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

3.02 *Reference Standards*

- A. Standards Specifications, Codes, Laws and Regulations
 - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 - 2. No provision of any such standard specification, manual, reference standard, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

- A. *Reporting Discrepancies:*
 - 1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict,

error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.
- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer is unable to provide a decision or

interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to such date.

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.
 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 2. abnormal weather conditions;
 3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
 4. acts of war or terrorism.
- D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.
- E. Paragraph 8.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

- F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.
- G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

- 1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
- 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute

resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading of Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
 - 1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and
 - 3. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
 - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 - 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site either:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or
 2. is of such a nature as to require a change in the Drawings or Specifications; or
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Possible Price and Times Adjustments:*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,

- c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise; or
 - b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 5.04.A.
3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
 1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and
 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
 - c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 - d. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after

becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

- C. *Engineer's Review:* Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Possible Price and Times Adjustments:*
 - 1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and
 - d. Contractor gave the notice required in Paragraph 5.05.B.
 - 2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
 - 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

- A. *Reports and Drawings*: The Supplementary Conditions identify:
1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
 2. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in

question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.
- H. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.
- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.H shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.
- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.
- E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is

maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

- D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- E. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- F. If either party does not purchase or maintain all of the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
- G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.
- H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.
- I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.
- J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

- A. *Workers' Compensation:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
 - 2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).
 - 3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).

4. Foreign voluntary worker compensation (if applicable).
- B. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:
1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
 2. claims for damages insured by reasonably available personal injury liability coverage.
 3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- C. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage:
 - a. Such insurance shall be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
 2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Broad form property damage coverage.
 4. Severability of interest.
 5. Underground, explosion, and collapse coverage.
 6. Personal injury coverage.
 7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
 8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- D. *Automobile liability:* Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.
- E. *Umbrella or excess liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.
- F. *Contractor's pollution liability insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result

of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.

- G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.
- H. *Contractor's professional liability insurance*: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.
- I. *General provisions*: The policies of insurance required by this Paragraph 6.03 shall:
 - 1. include at least the specific coverages provided in this Article.
 - 2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.
 - 3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.
 - 4. remain in effect at least until final payment (and longer if expressly required in this Article) and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract Documents.
 - 5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.
- J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.
- B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

6.05 *Property Insurance*

- A. *Builder's Risk:* Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
 - 1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."
 - 2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.
 - 3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
 - 4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).

5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
 6. extend to cover damage or loss to insured property while in transit.
 7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
 8. allow for the waiver of the insurer's subrogation rights, as set forth below.
 9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
 10. not include a co-insurance clause.
 11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
 12. include performance/hot testing and start-up.
 13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.
- B. *Notice of Cancellation or Change:* All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.
- C. *Deductibles:* The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
- D. *Partial Occupancy or Use by Owner:* If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
- E. *Additional Insurance:* If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.
- F. *Insurance of Other Property:* If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

- A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for:
 - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.
- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the

policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and

guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.04 "Or Equals"

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment, or items from other proposed suppliers under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) it has a proven record of performance and availability of responsive service; and
 - 4) it is not objectionable to Owner.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense:* Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal", which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.

- D. *Effect of Engineer's Determination:* Neither approval nor denial of an "or-equal" request shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. *Treatment as a Substitution Request:* If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 Substitutes

- A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent possible such requests shall be made before commencement of related construction at the Site.
 - 1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of material or equipment from anyone other than Contractor.
 - 2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.
 - 3. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - a. shall certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design,
 - 2) be similar in substance to that specified, and
 - 3) be suited to the same use as that specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times,
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from that specified, and

- 2) available engineering, sales, maintenance, repair, and replacement services.
- d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- E. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination:* If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.
- B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.

- E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.
- F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.
- H. On a monthly basis Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.
- J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
- K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
- L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.
- N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.

O. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor
2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

7.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.08 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work

7.09 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.10 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Owner or Contractor may give notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.12 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
 - C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
 - D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
 - E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
 - F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
 - G. Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.13 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or

exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements:*

1. Before submitting a Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.
3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.

- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

- a. Contractor shall submit the number of copies required in the Specifications.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to

provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.

2. *Samples:*

- a. Contractor shall submit the number of Samples required in the Specifications.
- b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.

3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Other Submittals:* Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.
3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
4. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order.
5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.

8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.
2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 1. observations by Engineer;
 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. use or occupancy of the Work or any part thereof by Owner;
 5. any review and approval of a Shop Drawing or Sample submittal;
 6. the issuance of a notice of acceptability by Engineer;
 7. any inspection, test, or approval by others; or
 8. any correction of defective Work by Owner.

- D. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract shall govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 - 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.
- B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, and other submittals prepared by such professional. Shop

Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any utility work at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.
- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. an itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. the extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

- A. If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment shall take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract. When applicable, any such equitable adjustment in Contract Price shall be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.
- C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Contractor.

- D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents shall be that of the former Engineer.

9.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 *Lands and Easements; Reports, Tests, and Drawings*

- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during

or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

- A. Engineer has the authority to reject Work in accordance with Article 14.

10.05 *Shop Drawings, Change Orders and Payments*

- A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.
- B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.
- C. Engineer's authority as to Change Orders is set forth in Article 11.
- D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.07 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.08 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 15.06.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs (if any) of which Engineer has been informed.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
 - 1. *Change Orders:*
 - a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.
 - b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.
 - 2. *Work Change Directives:* A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an

adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

3. *Field Orders*: Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.03 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.

11.04 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:
 1. where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); or
 2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or
 3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on

the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).

- C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.01.C.2.a and 11.01.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;
 - d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
 - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

- A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under

the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.

1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.
 2. *Engineer's Action:* Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.
 3. *Binding Decision:* Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. *Resolution of Certain Change Proposals:* If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
1. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and
 4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.

- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12 – CLAIMS

12.01 *Claims*

- A. *Claims Process:* The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:
 - 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 - 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and
 - 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.
- B. *Submittal of Claim:* The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.
- C. *Review and Resolution:* The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation:*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim

submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
 1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or
 2. To determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:
 1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable

thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with

Paragraph 6.05), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

C. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
- 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
- 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee:* When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.

E. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

13.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

- B. *Cash Allowances*: Contractor agrees that:
 - 1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 - 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

13.03 *Unit Price Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of the following paragraph.
- E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:
 - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;
 - 2. there is no corresponding adjustment with respect to any other item of Work; and
 - 3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 14 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
 - 1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 - 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 - 3. by manufacturers of equipment furnished under the Contract Documents;
 - 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 - 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests shall be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to

cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work shall be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require special inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
 - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 - 2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will

include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 Progress Payments

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments:*
1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
 2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
 3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.
- C. *Review of Applications:*
1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
 2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

- a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
- a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
- a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
- a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

- e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due:*

- 1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner:*

- 1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
 - b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. the Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. the Contract Price has been reduced by Change Orders;
 - i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
 - j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - l. there are other items entitling Owner to a set off against the amount recommended.
- 2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount

remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 15.01.C.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than seven days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which shall fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.
 - 2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 - 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.05 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

- A. *Application for Payment:*
 - 1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of

inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.
 - d. a list of all disputes that Contractor believes are unsettled; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.

D. *Payment Becomes Due:* Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation,

including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.
- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such other adjacent areas;
 - 2. correct such defective Work;
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

- E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
 - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and
 - 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses,

and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for

expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this Article:
 - 1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and
 - 2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this Article, Owner or Contractor may:
 - 1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or
 - 2. agree with the other party to submit the dispute to another dispute resolution process; or
 - 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
 - 1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or
 - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

18.07 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SUPPLEMENTARY CONDITIONS

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I. SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC® C-700 (2013 Edition). All provisions that are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

ARTICLE 2 – PRELIMINARY MATTERS

SC-2.02 Copies of Documents

SC-2.02.A. Amend the first sentence of Paragraph 2.02.A. to read as follows:

Owner shall furnish to Contractor [3] copies of the Contract Documents (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional copies will be furnished upon request at the cost of reproduction.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

SC-5.03 Subsurface and Physical Conditions

SC-5.03 Add the following new paragraphs immediately after Paragraph 5.03.B:

- A.** No reports of explorations or tests of subsurface conditions at or adjacent to the Site, or drawings of physical conditions relating to existing surface or subsurface structures at the Site are known to Owner.
- B.** Not used.

SC-5.06 Hazardous Environmental Conditions

SC 5.06 Delete Paragraphs 5.06.A and 5.06.B in their entirety and insert the following:

- A.** No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.
- B.** Not Used.

SC-5.07 Historic or Paleontological Conditions at Site

SC 5.07 Add the following new paragraph immediately following Paragraph 5.06:

- A.** Immediately upon discovery of potential historical objects of an archeological or paleontological nature with the Project Site do the following:

1. Restrict or suspend operations in the immediate area of the discovery to preserve the potential historical objects, and
 2. Notify Engineer of presence of potential historical objects.
- B. Engineer will make arrangements for objects disposition or record the desired relevant data.
 - C. Support the preservation and salvage effort directed by Engineer. Do not perform Work related to preservation and salvage efforts that Contractor considers Extra Work without written approval of Engineer.
 - D. Owner may restrict or suspend Contractor's operations in the immediate area of the historical objects for a period not to exceed 72-hours, without a Contractor claim for damages. Owner will not impose restrictions over 72-hours, unless agreed by Contractor and Owner in writing.

ARTICLE 6 – BONDS AND INSURANCE

SC-6.03 Contractor's Liability Insurance

SC 6.03 Add the following new paragraph immediately after Paragraph 6.03.J:

- K. The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers' Compensation, and related coverages under Paragraphs 6.03.A.1 and A.2 of the General Conditions:

State:	<u>Statutory</u>
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Federal, if applicable (e.g., Longshoreman's):	<u>Statutory</u>
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Jones Act coverage, if applicable:

Bodily injury by accident, each accident	\$ <u>1,000,000</u>
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Bodily injury by disease, aggregate	\$ <u>1,000,000</u>
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Employer's Liability:

Bodily injury, each accident	\$ <u>1,000,000</u>
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Bodily injury by disease, each employee	\$ <u>1,000,000</u>
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Bodily injury/disease aggregate	\$ <u>2,000,000</u>
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For work performed in monopolistic states, stop-gap liability coverage shall be endorsed to either the worker's compensation or commercial general liability policy with a minimum limit of:

	\$ <u>1,000,000</u>
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Foreign voluntary worker compensation	<u>Statutory</u>
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2. Contractor's Commercial General Liability under Paragraphs 6.03.B and 6.03.C of the General Conditions:

General Aggregate	\$ <u>2,000,000</u>
Products - Completed Operations Aggregate	\$ <u>2,000,000</u>
Personal and Advertising Injury	\$ <u>1,000,000</u>
Each Occurrence (Bodily Injury and Property Damage)	\$ <u>1,000,000</u>

3. Automobile Liability under Paragraph 6.03.D. of the General Conditions:

Bodily Injury:

Each person	\$ <u>1,000,000</u>
Each accident	\$ <u>2,000,000</u>

Property Damage:

Combined Single Limit of	\$ <u>2,000,000</u>
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4. Excess or Umbrella Liability under Paragraph 6.03.E. of the General Conditions:

Per Occurrence	\$ <u>1,000,000</u>
General Aggregate	\$ <u>2,000,000</u>

5. Contractor's Pollution Liability under Paragraph 6.03.F. of the General Conditions:



If box is checked, Contractor is not required to provide Contractor's Pollution Liability insurance under this Contract

6. Additional Insureds: The Owner and Engineer shall be named as additional insureds on the Contractor's general liability, automobile liability, umbrella or excess, and pollution liability policies. The inclusion of more than one named insured shall not operate to impair the rights of one insured against another insured, and the coverages afforded shall apply as though separate policies had been issued to each insured.

7. Any insurance agent shall have in force for any coverage provided by this Contract an Errors and Omissions Coverage with limits of not less than:

Per Occurrence	\$ <u>1,000,000</u>
Annual Aggregate	\$ <u>1,000,000</u>

- L. Prior to commencement of this agreement, the Contractor shall obtain certificates of all insurance required on a form approved by the Owner, signed by an authorized representative of the insurance carrier and stating that all provisions of the specified requirements are satisfied. The certificates shall be submitted directly to the Owner for review and approval with a record copy only to the Engineer for their files. The Contractor shall not begin any work until the Owner has reviewed and approved the insurance certificates and has so notified the Contractor directly in writing. Any notice to proceed that is issued shall be subject to such approval by the Owner.
- M. The insurance policy shall be a standard form policy provided for by a carrier approved by the State of Iowa and shall not contain any exclusions that will restrict coverage on any operations performed by the Contractor or any subcontractor hereof.
- N. The insurance policy shall provide full insurance to cover the Contractor's operating exposures including the picking up of materials, the operation of vehicles, the operation of collection and processing sites, explosion, remote borrow site activities, collapse, underground hazards, and contractual liability as required in Articles 7.17 and 7.18.
- O. It is a condition of the Contract that the policy waives any or all governmental immunity as a defense in any action brought against the insured or any other party to the Contract.
- P. Approval of the insurance by the Owner shall not in any way relieve or decrease the liability of the Contractor hereunder, and it is expressly understood that the Owner or Engineer does not in any way represent that the above specified insurance or limits of liabilities are sufficient or adequate to protect the Contractor's interest or liabilities.

SC-6.04 Owner's Liability Insurance

SC 6.04 Delete Paragraph 6.04.A in its entirety and reference is made to the additional Paragraph 6.03.K.6.

SC-6.05 Property Insurance

SC-6.05.A.1 Add the following new subparagraph after subparagraph 6.05.A.1:

- a. In addition to Owner, Contractor, and all Subcontractors, include as insureds the following:
Engineer – I+S Group, Inc.

SC-6.05.A. Add the following to the list of items in Paragraph 6.05.A, as numbered items:

- 14. include for the benefit of Owner loss of profits and soft cost coverage including, without limitation, fixed expenses and debt service for a minimum of 12 months with a maximum deductible of 30 days, plus attorney's fees and engineering or other consultants' fees, if not otherwise covered;

SC 6.05 Add the following new paragraphs immediately after Paragraph 6.05.F:

- G. All responsibility for maintaining property insurance on any project premises or structures owned, operated, or being constructed by the Contractor remains

solely with the Contractor, who may at their option insure against any other perils, and such responsibility shall remain with the Contractor until such time as this Contract is terminated. Before commencement of the Work, the Contractor shall submit written evidence that the Contractor has obtained and paid, for this period of the Contract, Builder's Risk "All-Risk" Completed Value Insurance Coverage upon entire project, which is the subject of this Contract, and including completed Work, Work in progress, and materials stored off site or in transit. Such insurance shall include as additional named insureds: Owner, Engineer and their consultants, and each of their officers, employees and agents, and any other persons with an insurable interest designated by the Owner.

- H. In the event of conflict between additional Paragraph 6.05.G with other provisions within Paragraph 6.05 of the General Conditions or Paragraph SC-6.05 of the Supplemental Conditions, Paragraph 6.05.G will assume precedence.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

SC-7.01 Supervision and Superintendence

SC 7.01 Add the following new paragraphs immediately after Paragraph 7.01.B:

- C. Contractor's assigned competent resident superintendent shall be personally available at the site of the work within 24 hour notice, and authorized to act in the Contractor's Behalf. This individual shall be fully authorized to:
1. Conduct all business with the subcontractors.
 2. Negotiate and execute all Supplemental Agreements.
 3. Execute the orders and directions of the Engineer without delay.
 4. Promptly supply the materials, equipment, tools, labor, and incidentals necessary for prosecution of the work.
- D. The Contractor shall have a complete set of Drawings and Specifications available on the Project at all times while work is in progress, and shall assume full responsibility for supervision of the work irrespective of the quantity of work subcontracted.
- E. At all times while work is actually being performed, the Contractor shall have at the site of the work a competent individual who is:
1. Authorized and fully capable of managing, directing, and coordinating the work in progress.
 2. Thoroughly experienced in the type of work being performed.
 3. Capable of reading and thoroughly understanding the Drawings and Specifications.
 4. Authorized to receive instructions from the Engineer.

SC-7.02 Labor; Working Hours

SC 7.02 Add the following new subparagraph immediately after Paragraph 7.02.A:

1. Any person employed by the Contractor or by any subcontractor who does not perform assigned work in a proper and skillful manner, or who is intemperate or disorderly, shall be removed from the Project forthwith by the Contractor upon written order of the Engineer, and shall not be employed again on any portion of the Work without Engineer's consent. Should Contractor fail to remove such person, or fail to furnish suitable and sufficient personnel for the proper prosecution of the Work, Engineer may suspend the Work until Contractor has complied with the orders.

SC-7.02.B. Add the following new subparagraphs immediately after Paragraph 7.02.B:

1. Regular working hours will be 7:00AM to 6:00PM, Monday through Friday.
2. Owner's legal holidays are New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving, and Christmas.

SC-7.02.C. Add the following new paragraph immediately after Paragraph 7.02.B:

- C. Contractor shall be responsible for the cost of any overtime pay or other expense incurred by the Owner for Engineer's services (including those of the Resident Project Representative, if any), Owner's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. If Contractor is responsible but does not pay, or if the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.
 1. For purposes of administering the foregoing requirement, additional overtime costs are defined as services performed by the Engineer (including the Resident Project Representative), Owner's representative, and materials testing laboratories considered routine to the project scope and not necessitated from a situation where the public welfare is put at risk.
- D. Upon request by the Engineer, Contractor shall submit satisfactory qualification evidence for any person engaged in special work requiring professional training.

SC-7.09 Taxes

SC 7.09 Add a new paragraph immediately after Paragraph 7.09.A:

- B. Owner is exempt from payment of sales and compensating use taxes of the State of Iowa and of cities and counties thereof on all materials to be incorporated into the Work.
 1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the Work.
 2. Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work.

ARTICLE 10 – ENGINEER’S STATUS DURING CONSTRUCTION

SC-10.03 Project Representative

SC-10.03 Add the following new paragraphs immediately after Paragraph 10.03.A:

- B. The Resident Project Representative (RPR) will be Engineer's representative at the Site, will act as directed by and under the supervision of Engineer, and will confer with Engineer regarding RPR's actions.**
- 1. General: RPR's dealings in matters pertaining to the Work in general shall be with Engineer and Contractor. RPR's dealings with Subcontractors shall only be through or with the full knowledge and approval of Contractor. RPR shall generally communicate with Owner only with the knowledge of and under the direction of Engineer.**
 - 2. Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.**
 - 3. Conferences and Meetings: Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings, and prepare and circulate copies of minutes thereof.**
 - 4. Liaison:**
 - a. Serve as Engineer’s liaison with Contractor. Working principally through Contractor’s authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.**
 - b. Assist Engineer in serving as Owner’s liaison with Contractor when Contractor’s operations affect Owner’s on-Site operations.**
 - c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.**
 - 5. Interpretation of Contract Documents: Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.**
 - 6. Shop Drawings and Samples:**
 - a. Record date of receipt of Samples and Contractor-approved Shop Drawings.**
 - b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.**
 - c. Advise Engineer and Contractor of the commencement of any portion of the Work requiring a Shop Drawing or Sample submittal for which RPR believes that the submittal has not been approved by Engineer.**
 - 7. Modifications: Consider and evaluate Contractor’s suggestions for modifications in Drawings or Specifications and report such suggestions,**

together with RPR's recommendations, if any, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.

8. Review of Work and Rejection of Defective Work:

- a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.
- b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress is defective, will not produce a completed Project that conforms generally to the Contract Documents, or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

9. Inspections, Tests, and System Start-ups:

- a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.
- b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.

10. Records:

- a. Prepare a daily report or keep a diary or log book, recording Contractor's hours on the Site, Subcontractors present at the Site, weather conditions, data relative to questions of Change Orders, Field Orders, Work Change Directives, or changed conditions, Site visitors, deliveries of equipment or materials, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Engineer.
- b. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
- c. Maintain records for use in preparing Project documentation.

11. Reports:

- a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the Progress Schedule and schedule of Shop Drawing and Sample submittals.
- b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.

- c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, force majeure or delay events, damage to property by fire or other causes, or the discovery of any Constituent of Concern or Hazardous Environmental Condition.
- 12. **Payment Requests:** Review applications for payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.
- 13. **Certificates, Operation and Maintenance Manuals:** During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Contract Documents to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.
- 14. **Completion:**
 - a. Participate in Engineer's visits to the Site to determine Substantial Completion, assist in the determination of Substantial Completion and the preparation of a punch list of items to be completed or corrected.
 - b. Participate in Engineer's final visit to the Site to determine completion of the Work, in the company of Owner and Contractor, and prepare a final punch list of items to be completed and deficiencies to be remedied.
 - c. Observe whether all items on the final list have been completed or corrected and make recommendations to Engineer concerning acceptance and issuance of the notice of acceptability of the work.
- C. **The RPR shall not:**
 - 1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
 - 2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
 - 3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
 - 4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's work.
 - 5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.

6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
8. Authorize Owner to occupy the Project in whole or in part.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

SC-17.01 Methods and Procedures

SC-17.01 Add the following new paragraphs immediately after Paragraph 17.01.B.

- C. In an effort to resolve any conflicts that arise during the design or construction of the project or following the completion of the project, the Contractor and the Engineer agree that all disputes between them arising out of or relating to this agreement shall be resolved, if possible, at the lowest possible staff level. If the dispute cannot be resolved between Contractor and Engineer staff, the presidents of the respective firms will meet to attempt to resolve the dispute(s). If resolution is not achieved, the dispute shall be submitted to non-binding mediation.
- D. The rights and remedies available to the Contractor shall be limited to breach of Contract, and no other cause of action, including, without limitation, negligence, misrepresentation or other tort theory. Any litigation concerning claims under the Contract shall be venued in the County District Court of the County the project is located within. Neither the Engineer, nor the Contractor shall be entitled to a jury trial in any such action. If the Owner or Engineer is a prevailing party the Contractor shall reimburse the Owner or Engineer its costs and reasonable attorney's fees. The right and remedies to the Owner hereunder shall be in addition to and shall not be construed in any way as a limitation of any rights and remedies available to the Owner which are otherwise available by law or contract, by special warranty or guarantee, or by other provision of the Contract documents. The provision of this paragraph shall be as effective as if repeated specifically in the contract documents in connection with each particular duty, obligation, right and remedy to which it may apply. All representations, warranties and guarantees made in the Contract documents shall survive final payment, termination or completion of this agreement.
- E. No waiver or failure to enforce any part or provision of the contract documents, including but not limited to the change order process, shall be deemed to be waiver by the Owner of any subsequent default or breach of the same or any other part of provision contained herein, or right to enforce the same or any other part or provision contained herein.

Date of Issuance: _____

Effective Date: _____

PROJECT:	ENGINEER'S PROJECT NUMBER:
OWNER:	DATE OF CONTRACT:
CONTRACTOR:	OWNER'S CONTRACT NUMBER:

The Contract Documents are modified as follows upon execution of this Change Order:

Description:

Attachments:

CHANGE IN CONTRACT PRICE:	CHANGE IN CONTRACT TIMES:
Original Contract Price: _____	Original Contract Times: ☐ Working Days ☐ Calendar Days
(Increase) (Decrease) from previously approved Change Orders Number _____ to _____ _____	Substantial Completion (day or dates): _____ Ready for Final Payment (day or dates): _____
Contract Price prior to this Change Order: _____ \$0.00 _____	(Increase) (Decrease) from previously approved Change Orders Number _____ to _____ Substantial completion (day or dates): _____ Ready for Final Payment (day or dates): _____
(Increase) (Decrease) of this Change Order: _____ \$0.00 _____	Contract Times prior to this Change Order: Substantial Completion (day or dates): _____ Ready for Final Payment (day or dates): _____
Contract Price Incorporating this Change Order: _____ \$0.00 _____	(Increase) (Decrease) of this Change Order: Substantial Completion (day or dates): _____ Ready for Final Payment (day or dates): _____
	Contract Times with all approved Change Orders: Substantial Completion (day or dates): _____ Ready for Final Payment (day or dates): _____

RECOMMENDED:	ACCEPTED:	ACCEPTED:
I +S GROUP	0	0
By: _____	By: _____	By: _____
Engineer (Authorized Signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Date: _____	Date: _____	Date: _____

					Amount	
ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	Increase	Decrease

TOTALS

NET CHANGE IN CONTRACT PRICE
INCREASE (DECREASE) IN CONTRACT TIME, days

\$0.00	\$0.00
\$0.00	

Justification For Changes:

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SUDAS SPECIAL PROVISIONS

FOR THE PURPOSES OF THESE SPECIFICATIONS, SUDAS DIVISION 1 – GENERAL PROVISIONS AND COVENANTS SHALL GOVERN, EXCEPT WITH THE FOLLOWING MODIFICATIONS AND AMENDMENT(S):

1080 – PROSECUTION AND PROGRESS

SP-1.01 Subletting or Assignment of Contract

SP-1.01 Add the following new paragraphs immediately after Paragraph 1.01.C:

C. Subcontracts

3. The ENGINEER shall verify all unexecuted CONTRACTOR and SUBCONTRACTOR agreements, as well as unexecuted agreements between SUBCONTRACTORS & their subcontractors, prior to any agreement between the CONTRACTOR and SUBCONTRACTOR (& their subcontractors) being executed.
4. Prior to the verification of any and all unexecuted agreements, the CONTRACTOR shall submit a copy of the following SUBCONTRACTOR (& their subcontractor) agreement requirement items to the ENGINEER:
 - a. DUNS Number
 - b. Tax ID
 - c. Value of Contract
 - d. State of Iowa Contractor License (through Iowa Workforce Development)
5. Following the review of the SUBCONTRACTOR agreement requirement items, the CONTRACTOR shall submit a fully executed copy of the signed agreement between the CONTRACTOR & SUBCONTRACTOR, as well as any agreements between the SUBCONTRACTOR & their subcontractors to the ENGINEER for further review. ALL contracts must include the federal requirement language as included in the specifications.
6. The ENGINEER shall review all CONTRACTOR and SUBCONTRACTOR agreement requirement items to ensure they are approved to work on Federal Projects.

DIVISION 01: General Requirements

SECTION 01 1000

SUMMARY

PART 1 GENERAL

1.01 PROJECT

- A. Project Name: 22797 Memorial Lift Station Improvements
- B. Owner's Name: City of Storm Lake.
- C. The Project consists of the construction of: Lift station improvements which generally include replacement of the existing 60HP dry pit centrifugal pumps, valves, and related piping; replacement of the electrical MCC, variable frequency drives, controls, lighting and related work; replacement and relocation of HVAC ventilation and heating system; structural rehabilitation, roof replacement, and access modifications.
- D. Sales Tax:
 - 1. Owner is exempt from Iowa Sales and Use Tax and the following shall apply:
 - a. Owner will issue and "Iowa Sales Tax Exemption Certificate" and an authorization letter to the Contractor.
 - b. Contractor shall include "Iowa Sales Tax Exemption Certificate" and authorization with all subcontracts for project.
 - c. Contractor and subcontractors shall not therefore include sales and use tax in Contractor amounts.

1.02 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00 5200 - Agreement Form.

1.03 WORK UNDER OTHER CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.

1.04 SPECIFICATION FORMATS AND COVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 49-division format and CSI/CSC's "MasterFormat" numbering system.
 - 1. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.
- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates. Abbreviated or outlined type includes incomplete sentences.
 - 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - a. Omission of words or phrases, such as; "the Contractor shall", "in conformance with", "shall be", "shall comply with", "as noted on the plans", "according to the plans", "a", "an", "the", and "all", are intentional and depending on the context, are implied.
 - b. Supply omitted words or phrases by inference.
 - c. Part numbers are not intended to be consecutive, but represent standard specification titles.

1.05 OWNER OCCUPANCY

- A. Owner intends to continue to occupy adjacent portions of the existing building during the entire construction period.
- B. Owner intends to occupy a certain portion of the Project prior to the completion date for the conduct of normal operations.
- C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- D. Schedule the Work to accommodate Owner occupancy.

1.06 CONTRACTOR USE OF SITE AND PREMISES

- A. General: Contractor shall have full use of premises for construction operations, including use of Project site, during construction period unless limited as indicated on Drawings by the Contract limits.
- B. Use of Site: Limit use of premises to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Limits: Confine constructions operations to areas indicated on plans.
 - 2. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, the public, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
 - c. Access to lift station shall be maintained at all times.
- C. Provide access to and from site as required by law and by Owner:
 - 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
 - 2. Do not obstruct roadways, sidewalks, or other public ways without permit.

1.07 OWNER'S OCCUPANCY REQUIREMENTS

- A. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits, unless otherwise indicated.
 - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
- B. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.
 - 1. Subparagraphs below describe procedures and requirements necessary before partial occupancy of portions of Project.
 - 2. Engineer will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before Owner occupancy.
 - 3. Obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.
 - 4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions.

1.08 WASTE MATERIAL AND DISPOSAL

- A. Arrange for disposal of waste materials as required.
- B. Stockpile or dispose of salvageable items as directed by Engineer.
- C. Salvageable items remain property of Owner.

1.09 BARRICADES AND LIGHTS

- A. Erect and maintain barricades and lights and/or watchmen for protection and warning of pedestrians and vehicles, prevent access of unauthorized persons to portions of site where work is in progress.
- B. Location and arrangement: conform to ordinances and laws. Meet approval of Engineer and Owner.

1.10 CONSTRUCTION FACILITIES

- A. Storage:
 - 1. Arrange for storage space to suit needs.
 - 2. Store materials and equipment in manner which will preserve their quality and fitness; provide temporary storage buildings as required.
 - 3. Location of construction facilities, including construction plant and yard on site, shall be subject to approval by Engineer; remove upon completion of work.
- B. Service: arrange for water, electrical energy, compressed air, and other services to meet own requirements.
- C. Sanitary: provide suitable sanitary facilities for construction personnel.

1.11 HISTORICAL OR ARCHAEOLOGICAL DISCOVERY

- A. If during the course of construction, evidence of deposits of historical or archaeological interest is found, the Contractor shall cease operations affecting the find and shall notify the Owner who shall notify the Iowa Department of Natural Resources and the Director and Historic Preservation Officer, State Historical Department, E. 12th and Grand, Des Moines, Iowa 50319. No further disturbance of the deposits shall ensue until the Contractor has been notified by the Owner that he may proceed. The Owner will issue a Notice to Proceed only after the State official has surveyed the find and made a determination to this department and the Owner. Compensation to the Contractor, if any, for lost time or changes in construction to avoid the find, shall be determined in accordance with changed conditions or change order provisions of the specifications.

1.12 ENGINEERING SERVICES

- A. Engineer will furnish line and grade required to construct the work.
- B. Contractor shall preserve all monuments, bench marks, reference points and stakes established by the Engineer. In case of willful or careless destruction of the same, the Contractor will be charged with the resulting expense of replacement and shall be responsible for any mistakes or loss of time that may result from their unnecessary loss or disturbance.
- C. It shall be the duty of the Contractor to call to the attention of the Engineer any reference lines, points, or bench marks which may have been disturbed or which seem to be off line or grade.
- D. Contractor shall reimburse Owner for extra engineering cost necessitated by continuance of work beyond the completion date recognizing time extensions granted by Owner.
- E. Contractor shall reimburse Owner for extra engineering cost necessitated by use of equipment other than that detailed in plans and specifications

1.13 WASTE MATERIALS DISPOSAL

- A. Arrange for disposal of waste materials as required.
- B. Stockpile or dispose of salvageable items as directed by Engineer.
- C. Salvageable items remain property of Owner.

END OF SECTION

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General administrative requirements.
- B. Electronic document submittal service.
- C. Preconstruction meeting.
- D. Progress meetings.
- E. Construction progress schedule.
- F. Number of copies of submittals.
- G. Requests for Interpretation (RFI) procedures.
- H. Submittal procedures.

1.02 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Comply with requirements of Section 01 7000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
 - 1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
 - 2. Contractor and Engineer/Architect are required to use this service.
 - 3. It is Contractor's responsibility to submit documents in allowable format.
 - 4. Subcontractors, suppliers, and Engineer/Architect's consultants will be permitted to use the service at no extra charge.
 - 5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
 - 6. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
 - 7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.
- B. Project Closeout: Engineer/Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

3.02 PRECONSTRUCTION MEETING

- A. Attendance Required:
 - 1. Owner.
 - 2. Engineer/Architect.
 - 3. Contractor.
 - 4. Funding Representative.
- B. Agenda:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Submission of executed bonds and insurance certificates.

3. Distribution of Contract Documents.
 4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
 5. Designation of personnel representing the parties to Contract, _____ and Engineer/Architect.
 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 7. Scheduling.
- C. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer/Architect, Owner, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

- A. Attendance Required:
1. Contractor.
 2. Owner.
 3. Engineer/Architect.
 4. Contractor's superintendent.
 5. Major subcontractors.
- B. Agenda:
1. Review minutes of previous meetings.
 2. Review of work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems that impede, or will impede, planned progress.
 5. Review of submittals schedule and status of submittals.
 6. Review of RFIs log and status of responses.
 7. Review of off-site fabrication and delivery schedules.
 8. Maintenance of progress schedule.
 9. Corrective measures to regain projected schedules.
 10. Planned progress during succeeding work period.
 11. Coordination of projected progress.
 12. Maintenance of quality and work standards.
 13. Effect of proposed changes on progress schedule and coordination.
 14. Other business relating to work.
- C. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer/Architect, Owner, participants, and those affected by decisions made.

3.04 CONSTRUCTION PROGRESS SCHEDULE

- A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.

3.05 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
1. Product data.
 2. Shop drawings.
 3. Samples for selection.
 4. Samples for verification.
- B. Submit for review according to the procedures and purposes described herein.
- C. Samples will be reviewed only for aesthetic, color, or finish selection.

- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - CLOSEOUTSUBMITTALS.

3.06 REQUESTS FOR INTERPRETATION (RFI)

- A. Definition: A request seeking one of the following:
1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
 2. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.
- C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
1. Prepare a separate RFI for each specific item.
 - a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
 - b. Do not forward requests which solely require internal coordination between subcontractors.
 2. Prepare in a format and with content acceptable to Owner.
- D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.

3.07 NUMBER OF COPIES OF SUBMITTALS

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

3.08 SUBMITTAL PROCEDURES

- A. General Requirements:
1. Use a single transmittal for related items.
 2. Transmit using approved form.
 - a. Use form generated by Electronic Document Submittal Service software.
 3. Submittal number shall be in reference to Engineer's specification section. If there are multiple submittals to a singular specification section add a hyphen followed by a number. Re-submittals to have original number with an alphabetic suffix.
 4. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
 5. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
 6. Schedule submittals to expedite the Project, and coordinate submission of related items.
 - a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
 - b. For sequential reviews involving Engineer/Architect's consultants, Owner, or another affected party, allow an additional 7 days.
 7. Provide space for Contractor and Engineer/Architect review stamps.
 8. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
 9. Submittals not requested will be recognized, and will be returned "Not Reviewed",
- B. Product Data Procedures:
1. Submit only information required by individual specification sections.
 2. Collect required information into a single submittal.
- C. Shop Drawing Procedures:

1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
2. Do not reproduce Contract Documents to create shop drawings.
3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

3.09 ENGINEER'S REVIEW RESPONSIBILITIES, PROCEDURES AND DEFINITIONS

A. General

1. Review of shop drawings, data, and samples will be for general conformance with the design concept and Contract Documents. They shall not be construed:
 - a. As permitting any departure from the Contract requirements;
 - b. As relieving the Contractor of responsibility for any errors, including details, dimensions, and materials;
 - c. As approving departures from details furnished by the Engineer, except as otherwise provided herein;
 - d. As approving substitutions to specified products or manufacturers.
2. The Engineer does not review for verification of quantities, weights, dimensions, or means and methods.
3. Partial review status will not be given to a submittal. Entire submittal shall be either acceptable or the entire submittal must be resubmitted with corrections as clarified by status definitions below.
4. Submittals will be reviewed in order received unless Contractor requests a revised order of review, in writing. All submittals shall be submitted sufficiently in advance of construction requirements to provide no less than 21 calendar days for review from the time the Engineer receives them. No less than 30 calendar days will be required for major equipment that requires review by more than one engineering discipline.

3.10 RE-SUBMITALS

- A. Re-submittals will be handled in the same manner as first submittals. On re-submittals, direct specific attention, in writing on the transmittal letter and on re-submitted shop drawings by use of revision triangles or other similar methods, to revisions other than the corrections requested by the Engineer, on previous submissions. Any such revisions which are not clearly identified shall be made at the risk of the Contractor. Make corrections to any work done because of this type revision that is not in accordance to the Contract Documents as may be required by the Engineer.

END OF SECTION

SECTION 01 3216
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. AGC (CPSM) - Construction Planning and Scheduling Manual; 2004.
- B. M-H (CPM) - CPM in Construction Management - Project Management with CPM; 2015.

1.02 SUBMITTALS

- A. Within 10 days after date of Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Submit updated schedule with each Application for Payment.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

- A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.02 CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
 - 1. Show drawings, project data, and samples:
 - a. Submittal dates.
 - b. Dates reviewed copies will be required.
 - 2. Decision dates for:
 - a. Products specified by allowances.
 - b. Selection of finishes.
 - 3. Product procurement and delivery dates.
 - 4. Dates for beginning and completion of each element of construction, specifically:
 - a. Excavation work.
 - b. Subcontractor work.
 - c. Equipment installations.
 - d. Equipment tests.
 - e. Start up.
- B. Identify each item by specification section number.
- C. Identify work of separate stages and other logically grouped activities.
- D. Provide sub-schedules to define critical portions of the entire schedule.
- E. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
- F. Provide separate schedule of submittal dates for shop drawings, product data, and samples, owner-furnished products, products identified under Allowances, and dates reviewed submittals will be required from Engineer/Architect. Indicate decision dates for selection of finishes.
- G. Provide legend for symbols and abbreviations used.

3.03 REVIEW AND EVALUATION OF SCHEDULE

- A. Evaluate project status to determine work behind schedule and work ahead of schedule.
- B. After review, revise as necessary as result of review, and resubmit within 10 days.

3.04 UPDATING SCHEDULE

- A. Maintain schedules to record actual start and finish dates of completed activities.
- B. Indicate progress of each activity to date of revision, with projected completion date of each activity.
- C. Annotate diagrams to graphically depict current status of Work.

- D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
- E. Indicate changes required to maintain Date of Substantial Completion.
- F. Submit reports required to support recommended changes.

3.05 DISTRIBUTION OF SCHEDULE

- A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Engineer/Architect, Owner, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

END OF SECTION

SECTION 01 3300
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. See Section 01 3216 "Construction Schedule" for submitting schedules and reports, including Contractor's Construction Schedule.
- C. See Section 01 4000 "Quality Requirements" for submitting test and inspection reports and for mockup requirements.
- D. See Section 01 7700 "Closeout Procedures" for submitting warranties.
- E. See Section 01 7839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

1.02 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Engineer's responsive action.
- B. Informational Submittals: Written information that does not require Engineer's responsive action. Submittals may be rejected for not complying with requirements.

1.03 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- B. Submittals Schedule: Comply with requirements in Section 01 3216 "Construction Schedule" for list of submittals and time requirements for scheduled performance of related construction activities.
- C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 - 3. Resubmittal Review: Allow 10 days for review of each resubmittal.
- D. Identification: Place a permanent label or title block on each submittal for identification.
 - 1. Indicate name of firm or entity that prepared each submittal on label or title block.
 - 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Engineer.
 - 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Engineer.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.

- 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06 1000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06 1000.01.A).
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
- E. Deviations and Substitutions: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.
1. Engineer's approval required. The Contract is based on the materials, equipment and methods described in the Contract Documents.
 2. The Engineer will consider proposals for substitution of materials, equipment, and methods only when such proposals have been made in writing and received by the Engineer **fourteen (14) days prior to bid date** are accompanied by full and complete technical data and all other information required by the Engineer to evaluate the proposed substitution.
 3. Do not substitute materials, equipment, or methods unless such substitution has been specifically approved for this work by the Engineer.
 4. "Or Equal"
 - a. Where the phrase "or equal," "approved equal," or "equal as approved by the Engineer" occurs in the Contract Documents do not assume that material, equipment or methods will be approved as equal by the Engineer unless the item has been specifically approved for this Work by the Engineer
 - b. The decision of the Engineer shall be final.
- F. Additional Copies: Unless additional copies are required for final submittal, and unless Engineer observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
- G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Engineer will return submittals, without review or discard submittals received from sources other than Contractor.
- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 3. Resubmit submittals until they are approved by the Engineer.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Use only final submittals signed and sealed by the Engineer.

1.04 CONTRACTOR'S USE OF ENGINEER'S CAD FILES

- A. General: At the discretion of the Engineer and upon the Contractor's written request, copies of Engineer's CAD files may be provided to Contractor for Contractor's use in connection with Project, subject to the following conditions:
1. Terms listed in the Engineer's "Electronic Media Transfer Agreement," that must be signed and returned prior to release of CAD files.

PART 2 PRODUCTS

2.01 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.

- b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Manufacturer's catalog cuts.
 - e. Wiring diagrams showing factory-installed wiring.
 - f. Printed performance curves.
 - g. Operational range diagrams.
 - h. Compliance with specified referenced standards.
 - i. Copy of all guarantees and warranties issued.
 - j. Testing by recognized testing agency.
- 4. Number of Copies: Submit five copies of Product Data, unless otherwise indicated. Engineer will return two copies. Mark up and retain one returned copy as a Project Record Document. Submit at least one copy of Product Data to Owner.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shopwork manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Notation of coordination requirements.
 - j. Notation of dimensions established by field measurement.
 - k. Relationship to adjoining construction clearly indicated.
 - l. Seal and signature of professional Engineer if specified.
 - m. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
 - 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches .
 - 3. Number of Copies: Submit number of copies of each submittal which contractor requires for distribution plus three (3) copies to be retained by the Engineer.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
 - 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 - 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of appropriate Specification Section.
 - 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - 4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Engineer will return submittal with options selected.
 - 5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the

following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

- a. Number of Samples: Submit three sets of Samples. Engineer will retain two Sample sets; remainder will be returned.
- E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location.
 1. Number of Copies: Submit one copy of product schedule or list, unless otherwise indicated.
- F. Submittals Schedule: Comply with requirements specified in Section 013216 "Construction Schedule."
- G. Application for Payment: Comply with requirements as specified by Engineer.
- H. Schedule of Values: Comply with requirements as specified by Engineer.
- I. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design.
 1. Number of Copies: Submit one copy of subcontractor list, unless otherwise indicated.

2.02 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
 1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Engineer will not return copies.
 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 3. Test and Inspection Reports: Comply with requirements specified in Section 01 4000 "Quality Requirements."
- B. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of Engineers and Owners, and other information specified.
- C. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- D. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- E. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- F. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- I. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- J. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

- K. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- L. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- M. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- N. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment.
- O. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- P. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.
- Q. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
 - 1. Statement on condition of substrates and their acceptability for installation of product.
 - 2. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
- R. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- S. Construction Photographs: Comply with requirements specified in Section 01 7839 "Project Record Documents."
- T. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Engineer.
 - 1. Engineer will not review submittals that include MSDSs and will return them for resubmittal.

2.03 DELEGATED DESIGN

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Engineer.
- B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit three copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 EXECUTION

3.01 CONTRACTOR'S REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
- C. Delay: Costs of delays occasioned by tardiness of submittals may be back-charged as necessary and shall not be borne by the Owner.

3.02 ENGINEER'S ACTION

- A. General: Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Engineer will review each submittal, make marks to indicate corrections or modifications required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken.
- C. Informational Submittals: Engineer will review each submittal and will not return it, or will return it if it does not comply with requirements. Engineer will forward each submittal to appropriate party.
- D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION

SECTION 01 3323
SUBMITTALS OF SHOP DRAWINGS

PART 1 GENERAL

1.01 GENERAL

- A. Submit shop drawings, project data, samples and requests for "or equal" approval, required by specification sections.
- B. Designate in construction schedule proposed submittal dates.

1.02 REFERENCE STANDARDS

- A. Section 01 3000 - Administrative Requirements: Submittal procedures, project meetings, progress schedules and documentation, reports, and coordination.
- B. Section 01 3323a - Requirements for Electronically Submitted Shop Drawings.
- C. Section 01 4000 - Quality Requirements: Product quality monitoring.
- D. Section 01 6000 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

1.03 REQUEST FOR "OR EQUAL" REVIEW

- A. By manufacturer's who wish to receive consideration of equipment other than that specified or named on the plans.
- B. Limited to major pieces of equipment.
- C. Requests and submittals from contractors or manufacturers.
- D. Information required may include but not be limited to:
 - 1. Name model/number and/or description.
 - 2. Drawings and details.
 - 3. Manufacturer's specifications.
 - 4. Catalog cuts.
 - 5. Performance charts.
 - 6. Independent laboratory testing results.
 - 7. Other pertinent data as required.
- E. Time Frame:
 - 1. Request received by Engineer not later than 14 days prior to bid letting.
 - 2. Determination of approval/disapproval not less than 7 days prior to bid letting.
 - 3. Approval to be distributed via Addendum to all plan holders.

1.04 SHOP DRAWINGS

- A. Submit drawings prepared by contractor, subcontractor, supplier or distributor which illustrate some portion of the work.
- B. Show fabrication, layout, setting or erection details.
- C. Identify details by reference to sheet and detail numbers shown on contract drawings.
- D. Minimum sheet size: 8 1/2" x 11".

1.05 PROJECT DATA

- A. Manufacturer's standard schematic drawings:
 - 1. Modify drawings to delete information which is not applicable to project.
 - 2. Supplement standard information to provide additional information applicable to project.
- B. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data.
 - 1. Clearly mark each copy to identify pertinent materials, products or models.
 - 2. Show dimensions and clearances required.
 - 3. Show performance characteristics and capacities.
 - 4. Show wiring diagrams and controls.

1.06 SUBMISSION REQUIREMENTS

- A. Schedule submissions at least ten (10) days before reviewed submittals will be needed.

- B. Submit number of copies of shop drawings, project data and samples which Contractor requires for distribution plus three (3) copies which will be retained by Engineer.
- C. Accompany submittals with transmittal letter containing:
 - 1. Date.
 - 2. Project title and number.
 - 3. Contractor's name and address.
 - 4. The number of each shop drawing, project data and sample submitted.
 - 5. Notification of deviations from Contract Documents.
 - 6. Other pertinent data.
- D. Submittals shall include:
 - 1. Date and revision dates.
 - 2. Project title and number.
 - 3. The names of:
 - a. Engineer.
 - b. Contractor.
 - c. Subcontractor.
 - d. Supplier.
 - e. Manufacturer.
 - f. Separate details when pertinent.
 - 4. Identification of product or material.
 - 5. Relation to adjacent structure or materials.
 - 6. Field dimensions clearly identified as such.
 - 7. Specification section number.
 - 8. Applicable standards such as ASTM number or Federal specification.
 - 9. A blank space 4" x 5" for the Engineer's stamp.
 - 10. Identification of deviations from Contract Documents.
 - 11. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of field measurements and compliance with Contract Documents.

1.07 RESUBMISSION REQUIREMENTS

- A. Shop Drawings
 - 1. Revise initial drawings as required and resubmit as specified for initial submittal.
 - 2. Indicate on drawings any changes which have been made other than those requested by Engineer.
- B. Project data and samples: submit new data and samples as required for initial submittal.

1.08 DISTRIBUTION OF SUBMITTALS AFTER REVIEW

- A. Distribute copies of shop drawings and project data which carry Engineer's stamp as needed.
- B. Distribute samples as directed.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 3323a -- ATTACHMENT

SHOP DRAWING SUBMITTAL FORM

Architects Project # 20-22797

Project Name: Storm Lake – Memorial Lift Station Improvements

Division Number: _____ Shop Drawing # _____

Division Name: _____ Date: _____

Item: _____

Subcontractor or Supplier Approval:	General Contractor Approval:
Architect / Engineer Review:	Other Reviews and Comments:

SECTION 01 3323b -- ATTACHMENT

REQUIREMENTS FOR ELECTRONICALLY SUBMITTED SHOP DRAWINGS:

1. The Contractor shall fill out and include the submittal cover sheet included in the project manual.
2. The shop drawings are to be reviewed by the Contractor before submitting. All field required verifications and missing information shall be completed and duly noted on the drawings. The Contractor shall review them and verify that the products submitted are acceptable per the specifications. The Contractor shall then affix their stamp on the submittal cover sheet. Contractor must review - No pass through drawings are permitted.
3. The Contractor shall prepare a single PDF file so that all sheets of the submittal are included in one document. Only ONE specifications section per submittal is permitted. Each PDF shall contain Bookmarks set to the destination of separate items contained within the file. If the Contractor elects to use their own transmittal sheet it shall be a separate attachment.
4. Scans shall be in color. All pages shall be oriented correctly. Actual sheet sizes for the submittal shall be 11x17 or 8 ½ x11 whenever possible. All print and details must be legible at those sizes. Larger file sheets such as 24x36 sheet size shall be identified in the e-mail.
5. The e-mail subject line shall list the five digit project number first followed by the project name. Then the section number and a brief description of the submittal contents shall follow the submittal number. Example: *22797 Memorial Lift Station – 26 2200 Transformers – Submittal #03.*
6. The PDF file or attachment shall be named as follows. Example: *26 2200 Transformers – Submittal #03.pdf*
7. Samples and color selections associated with the drawings shall be included in a separate attachment when practical. Actual samples, color selections shall be delivered to ISG and the shop drawings will not be reviewed until actual samples are received.
8. The Architect / Engineer will review the drawings, make notes as required on the drawings and stamp them. The PDF file shall then be renamed by adding the action required such as REVIEWED, FURNISH AS CORRECTED, REVISE AND RESUBMIT or REJECTED. Example: *22797 Memorial Lift Station – 26 2200 Transformers – Submittal #03 - REVIEWED.pdf*
9. The Architect / Engineer shall then use the original email and attach the reviewed drawings and forward back to the contractor. The e-mail that they are attached to will be considered the transmittal. Any notes in the body of the email from the engineer / architect shall be considered as written on the sheets of the PDF file.
10. No hard copies will be sent by the Architect / Engineer. Note: Hard copies will be required to be included in the O&M Manuals as part of the project close out submittals.

END OF ATTACHMENT

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Testing and inspection agencies and services.
- B. Control of installation.
- C. Defect Assessment.

1.02 DEFINITIONS

- A. Design Data: Design-related, signed and sealed drawings, calculations, specifications, certifications, shop drawings and other submittals provided by Contractor, and prepared directly by, or under direct supervision of, appropriately licensed design professional.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer/Architect before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 TESTING AND INSPECTION

- A. See individual specification sections for testing and inspection required.

3.03 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not complying with specified requirements.
- B. If, in the opinion of Engineer/Architect, it is not practical to remove and replace the work, Engineer/Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations.
- F. Procedures for Owner-supplied products.
- G. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

- A. Section 01 7419 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

1.03 SUBMITTALS

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.
- B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.
- C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

2.02 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. Use of products having any of the following characteristics is not permitted:
 - 1. Made outside of the United States.
 - 2. Made using or containing CFC's or HCFC's.
 - 3. Containing lead, cadmium, or asbestos.
- C. Where other criteria are met, Contractor shall give preference to products that:
 - 1. Are extracted, harvested, and/or manufactured closer to the location of the project.
 - 2. Have longer documented life span under normal use.
 - 3. Result in less construction waste. See Section 01 7419

2.03 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.
- D. Products that do not meet project specifications may be rejected at any time during the project.
- E. All costs associated with replacement product and delay in project schedule due to rejection shall be at the sole expense of the contractor.

2.04 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 TRANSPORTATION AND HANDLING

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.02 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 7419.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- G. Comply with manufacturer's warranty conditions, if any.
- H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- I. Prevent contact with material that may cause corrosion, discoloration, or staining.
- J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 6200
EQUIPMENT SUBSTITUTIONS

PART 1 GENERAL

1.01 "OR EQUAL" IMPLIED

- A. When manufacturer's names are used within these specification, they are used to establish a standard and the words "or equal", if not stated are implied.

1.02 PRE-BID EQUIPMENT SUBMITTALS

- A. Pre-bid approval of all equipment items listed in the Major Equipment List in the Bid is required except for those manufacturers listed in the respective specification section.
- B. Approval will be for conformance with performance, material, and configuration requirements of the plans and specifications.
 - 1. Submittals will be accepted only from contractors, manufacturers or their representatives holding plans on the project.
 - 2. Submittals will be accepted up to 14 days prior to the date for bid letting as set forth in the NOTICE.
 - 3. Contractors will be notified of approved manufacturers seven (7) days prior to bid letting via addendum.
- C. Pre-submittals shall include as a minimum the following information:
 - 1. Name and address of manufacturer.
 - 2. Trade name.
 - 3. Model and catalogue designation.
 - 4. Dimensional data.
 - 5. Materials of construction.
 - 6. Anchorages.
 - 7. Structural loadings.
 - 8. Horsepower.
 - 9. Electrical characteristics.
 - 10. Manufacturer's data:
 - a. Performance and test data.
 - b. Reference standards.
- D. Pre-Bid approval for equipment will not relieve manufacturer of shop drawings requirement.

1.03 SUBSTITUTION

- A. Equipment listed in Major Equipment List shall be used in the project, unless substitution is made in accordance with the provisions listed herein.
- B. Substitution of equipment following award of the contract must meet the following requirements:
 - 1. Manufacturer cannot follow through with prebid delivery and/or quality promises.
 - 2. Equipment is no longer in production.
 - 3. Project requirements have changed.
- C. Request for substitutions will be made in writing with complete data substantiating the need for substitution.
- D. Submit five (5) copies of request for substitution. Include in request:
 - 1. Complete data substantiating compliance of proposed substitution with Contract Document.
 - 2. For products:
 - a. Product identification, including manufacture's name and address.
 - b. Manufacturer's literature:
 - 1) Product description.
 - 2) Performance and test data.
 - 3) Reference standards.
 - 4) Product specifications.
 - c. Samples.
 - d. Name and address of similar projects on which product was used, and date of installation.
 - 3. For construction methods:

- a. Detailed description of proposed method.
 - b. Drawings illustrating methods.
4. Itemized comparison of proposed substitution with product or method specified.
5. Data relating to changes in construction schedule.
6. Relation to separate contracts.
7. Accurate cost data on proposed substitution in comparison with product or method specified.
- E. In making request for substitution, Bidder/Contractor represents:
 1. Contractor has personally investigated proposed product or method, and determined that it is equal or superior in all respects to that specified.
 2. Contractor will provide the same guarantee for substitution as for product or method specified.
 3. Contractor will coordinate installation of accepted substitution into work, making such changes as may be required for work to be complete in all respects.
 4. Contractor waives all claims for additional costs related to substitution which consequently becomes apparent.
 5. Cost data is complete and includes all related costs under Contractor's Contract, but excludes:
 - a. Costs under separate contracts.
 - b. Architect/Engineer's redesign.
- F. Substitutions will not be considered if:
 1. They are indicated or implied on shop drawings or project data submittals without formal request submitted in accord with Paragraph 1.03.
 2. Acceptance will require substantial revision of Contract Documents.
- G. Price increases in equipment items will not be grounds for product substitutions following the opening of bids.
- H. Appropriate contract price reductions may be sought if substitutions result in a lower quality equipment item than included in BID.
- I. Any revisions to contract drawings and construction made necessary by substituted equipment will be the responsibility of the Contractor.

END OF SECTION

SECTION 01 7000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Surveying for laying out the work.
- F. Cleaning and protection.
- G. Starting of systems and equipment.
- H. Demonstration and instruction of Owner personnel.
- I. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
- J. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
- B. Section 01 3000 - Administrative Requirements: Submittals procedures, Electronic document submittal service.
- C. Section 01 4000 - Quality Requirements: Testing and inspection procedures.
- D. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
 - 1. On request, submit documentation verifying accuracy of survey work.
 - 2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
 - 3. Submit surveys and survey logs for the project record.
- C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
 - 1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences. Include design drawings and calculations for bracing and shoring.
 - 2. Identify demolition firm and submit qualifications.
 - 3. Include a summary of safety procedures.
- D. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
 - 1. Structural integrity of any element of Project.
 - 2. Integrity of weather exposed or moisture resistant element.
 - 3. Efficiency, maintenance, or safety of any operational element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of Owner or separate Contractor.
 - 6. Include in request:
 - a. Identification of Project.
 - b. Location and description of affected work.
 - c. Necessity for cutting or alteration.
 - d. Description of proposed work and products to be used.
 - e. Alternatives to cutting and patching.
 - f. Effect on work of Owner or separate Contractor.
 - g. Written permission of affected separate Contractor.

- h. Date and time work will be executed.
- E. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.04 QUALIFICATIONS

- A. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Engineer/Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,
- B. For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

1.05 PROJECT CONDITIONS

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
- C. Perform dewatering activities, as required, for the duration of the project.
- D. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- E. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
- F. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
- G. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.
- H. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.06 COORDINATION

- A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Notify affected utility companies and comply with their requirements.
- C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- F. Coordinate completion and clean-up of work of separate sections.
- G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Engineer/Architect four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of examination, preparation and installation procedures.
 - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer/Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Engineer/Architect of any discrepancies discovered.
- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Promptly report to Engineer/Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer/Architect.
- F. Utilize recognized engineering survey practices.
- G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
 - 2. Grid or axis for structures.

- 3. Building foundation, column locations, ground floor elevations.
- H. Periodically verify layouts by same means.
- I. Maintain a complete and accurate log of control and survey work as it progresses.

3.05 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Engineer/Architect before disturbing existing installation.
 - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove items indicated on drawings.
 - 2. Relocate items indicated on drawings.
 - 3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
 - 4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- C. Protect existing work to remain.
 - 1. Prevent movement of structure; provide shoring and bracing if necessary.
 - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 - 3. Repair adjacent construction and finishes damaged during removal work.
- D. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
- E. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- F. Refinish existing surfaces as indicated:
 - 1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
 - 2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- G. Clean existing systems and equipment.
- H. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- I. Do not begin new construction in alterations areas before demolition is complete.
- J. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
 - 1. Complete the work.
 - 2. Fit products together to integrate with other work.
 - 3. Provide openings for penetration of mechanical, electrical, and other services.

4. Match work that has been cut to adjacent work.
 5. Repair areas adjacent to cuts to required condition.
 6. Repair new work damaged by subsequent work.
 7. Remove samples of installed work for testing when requested.
 8. Remove and replace defective and non-complying work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
 - E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
 - F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
 - G. Restore work with new products in accordance with requirements of Contract Documents.
 - H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
 - I. Patching:
 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 2. Match color, texture, and appearance.
 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.09 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 SYSTEM STARTUP

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.

- E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 DEMONSTRATION AND INSTRUCTION

- A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.
- B. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.
- C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
- D. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- E. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.

3.12 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.13 FINAL CLEANING

- A. Execute final cleaning prior to Substantial Completion.
 - 1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.
- B. Use cleaning materials that are nonhazardous.
- C. Wipe clean wood and laminate surfaces including doors, countertops, cabinets, window sills, and all other similar items.
- D. Wipe clean all painted surfaces.
- E. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- F. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- G. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- H. Clean filters of operating equipment.
- I. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
- J. Clean site; sweep paved areas, rake clean landscaped surfaces.
- K. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.
- L. Clean Owner-occupied areas of work.

3.14 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
 - 1. Provide copies to Engineer/Architect and Owner.
- B. Notify Engineer/Architect when work is considered ready for Engineer/Architect's Substantial Completion inspection.
- C. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Engineer/Architect's Substantial Completion inspection.
- D. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

- E. Notify Engineer/Architect when work is considered finally complete and ready for Engineer/Architect's Substantial Completion final inspection.
- F. Complete items of work determined by Engineer/Architect listed in executed Certificate of Substantial Completion.

3.15 MAINTENANCE

- A. Provide service and maintenance of components indicated in specification sections.
- B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.
- C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

SECTION 01 7400

CLEANING

PART 1 GENERAL

1.01 DESCRIPTION

- A. Maintain premises and public properties free from accumulations of waste, debris and rubbish caused by operations.
- B. At completion of work remove waste materials, rubbish, tools, equipment, machinery and surplus materials and clean all sight-exposed surfaces; leave project clean and ready for occupancy or use.

1.02 SAFETY REQUIREMENTS

- A. Standards: maintain project in accordance with latest OSHA safety and insurance standards.
- B. Hazards control:
 - 1. Store volatile wastes in covered metal containers and remove from premises daily.
 - 2. Prevent accumulation of wastes which create hazardous conditions.
 - 3. Provide adequate ventilation during use of volatile or noxious substances.
- C. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
 - 1. Do not burn or bury rubbish and waste materials on project site.
 - 2. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary drains.
 - 3. Do not dispose of wastes into streams or waterways.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning materials manufacturer.

PART 3 EXECUTION

3.01 DURING CONSTRUCTION

- A. Ensure that public properties are maintained free from accumulations of waste materials rubbish.
- B. Provide on-site containers for collection of waste materials, debris and rubbish.
- C. Remove waste materials, debris and rubbish from site and legally dispose of at public or private dumping areas off Owner's property.
- D. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.

3.02 FINAL CLEANING

- A. Employ experienced workmen or professional cleaners for final cleaning.
- B. Conduct final inspection of sight-exposed interior and exterior surfaces and of concealed spaces before substantial completion.
- C. Remove grease, dust, dirt, stains, labels, fingerprints and other foreign materials from sight-exposed interior and exterior finished surfaces; polish surfaces so designated to shine finish
- D. Repair, patch and touch up marred surfaces to specified finish to match adjacent surfaces.
- E. Broom clean paved surfaces and rake clean other surfaces of grounds.
- F. Remove snow and ice from access to building.
- G. Maintain cleaning until project, or portion thereof, is occupied by Owner.

END OF SECTION

SECTION 01 7800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

- A. Section C-700 Standard General Conditions.
- B. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- C. Section 01 7000 - Execution and Closeout Requirements: Contract closeout procedures.
- D. Individual Product Sections: Specific requirements for operation and maintenance data.
- E. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

- A. Project Record Documents: Submit documents to Engineer/Architect with claim for final Application for Payment.
- B. Operation and Maintenance Data:
 - 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Engineer/Architect will review draft and return one copy with comments.
 - 2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
 - 3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Engineer/Architect comments. Revise content of all document sets as required prior to final submission.
 - 4. Submit two sets of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
 - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
 - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed shop drawings, product data, and samples.
 - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:

1. Manufacturer's name and product model and number.
 2. Product substitutions or alternates utilized.
 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
1. Measured depths of foundations in relation to finish first floor datum.
 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 4. Field changes of dimension and detail.
 5. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

- A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. For Each Product, Applied Material, and Finish:
 1. Product data, with catalog number, size, composition, and color and texture designations.
 2. Information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- D. Additional information as specified in individual product specification sections.
- E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
 1. Description of unit or system, and component parts.
 2. Identify function, normal operating characteristics, and limiting conditions.
 3. Include performance curves, with engineering data and tests.
 4. Complete nomenclature and model number of replaceable parts.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
- C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- D. Include color coded wiring diagrams as installed.
- E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

- F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- G. Provide servicing and lubrication schedule, and list of lubricants required.
- H. Include manufacturer's printed operation and maintenance instructions.
- I. Include sequence of operation by controls manufacturer.
- J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- K. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- L. Include test and balancing reports.
- M. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

- A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- D. Prepare data in the form of an instructional manual.
- E. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- F. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- G. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.
- H. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Engineer/Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
- I. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
- J. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- K. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.
- L. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- M. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
- N. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Engineer, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.

- d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
3. Part 3: Project documents and certificates, including the following:
- a. Shop drawings and product data.
 - b. Air and water balance reports.
 - c. Certificates.
 - d. Photocopies of warranties and bonds.

3.06 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.
- F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
- G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
- H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

SECTION 01 7839
PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings, including Shop Drawings.
 - 2. Record Specifications, including Change Orders.
 - 3. Record Product Data and Record Field Tests.
- B. See Divisions 02 through 46 for specific requirements for Project Record Documents of the Work in those Sections.

1.02 SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one (1) set of marked-up Record Prints.
- B. Record Specifications: Submit one (1) copy of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one (1) copy of each Product Data submittal.
- D. Record Field Tests: Submit one (1) copy of each test result required by the specifications.

PART 2 PRODUCTS

2.01 RECORD DRAWINGS

- A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.
 - 1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 - 2. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 - 3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 - 4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
 - 1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 - 2. Identification: As follows:
 - a. Project name and Project number.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name and Address of Contractor.

2.02 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. Note related Change Orders and Record Drawings where applicable.

2.03 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders and Record Drawings where applicable.

2.04 FIELD TESTS AND MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble field tests and miscellaneous records required by other Specification Sections for record keeping and submittal in connection with actual performance of the Work. Bind or file field tests and miscellaneous records and identify each, ready for continued use and reference.

PART 3 EXECUTION

3.01 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Engineer's reference during normal working hours.

END OF SECTION

DIVISION 03: Concrete

SECTION 03 0100
MAINTENANCE OF CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete repair products and accessories.
- B. Scope of Work: As determined by Owner for current Work to be completed. The Work may include but is not limited to:
 - 1. Crack Injection.
 - 2. Concrete Spall Repair.
 - 3. Waterproofing Coatings.
 - 4. Related repair Work necessary to complete crack injection, spall repair, waterproof coatings and similar Work. Include all related product accessories for a complete system installation.
- C. Attachments: Product information data sheets in the order listed herein below under approved product manufactureres.

1.02 SUBMITTALS

- A. Make submittals directly to Owner.
- B. Product Data: Indicate product standards, physical and chemical characteristics, technical specifications, limitations, maintenance instructions, and general recommendations regarding each material.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Each cementitious patching-mortar; crack-injection-adhesive; and insert product manufacturer shall employ factory-trained technical representatives who are available for consultation and Project-site inspection and assistance at no additional cost.
- B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer to apply packaged patching-mortar materials and epoxy crack injection materials.
- C. Product Compatibility: Verify compatibility of all materials with related work in which they come into contact, and with materials covered by this section.
- D. Provide primer coat for all systems and products where recommend by product manufacturer. No Exceptions.
- E. Maintenance Program: Prepare a written plan for maintenance of cast-in-place concrete, including each phase or process, protection of surrounding materials during operations, and control of debris and runoff during the Work. Describe in detail materials, methods, equipment, and sequence of operations to be used for each phase of the Work.

1.04 MOCK-UP(S)

- A. Build mockups to demonstrate aesthetic effects and set quality standards for materials and execution.
- B. Test each type of maintenance procedure required on each type of existing construction, to determine the most appropriate procedures to use and as a record of expected results.
- C. Crack Injection: Prepare two samples of each type of injection.
- D. Horizontal Surface Repair: Total of 10 foot square area, demonstrating each type of repair.
- E. Vertical Surface Repair: Total of 10 foot square area, demonstrating each type of repair.
- F. Locate mock-up(s) where directed.
- G. Re-work mock-up(s) until satisfactory to Owner.
- H. Satisfactory mock-up(s) may remain as part of the work.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturers' instructions for storage, shelf life limitations, and handling of products.

PART 2 PRODUCTS

2.01 APPROVED CEMENTITIOUS PATCHING AND REPAIR PRODUCTS

- A. Crack Injection:
 - 1. Dural Injection Gel and Guide by EUCLID Chemical: www.euclidchemical.com.
 - 2. Masterinject 1380 by BASF Master Builders Solutions: www.master-builders-solutions.basf.us/en-us.
- B. Concrete Spall Repair:
 - 1. Verticoat Supreme Repair Mortar by EUCLID Chemical: www.euclidchemical.com.
 - 2. MasterEmaco S 488CI by BASF Master Builders Solutions: www.master-builders-solutions.basf.us/en-us.
- C. Waterproofing Coatings (Mark: EF-1):
 - 1. VANDES BB 75 by EUCLID Chemical: www.euclidchemical.com.
 - 2. MasterSeal 581 by BASF Master Builders Solutions: www.master-builders-solutions.basf.us/en-us.

2.02 ACCESSORIES

- A. Exposed Rebar Repair Primer: Zincrich Rebar Primer by BASF or Equivalent.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Beginning of installation means acceptance of substrate.

3.02 PREPARATION

- A. Prepare concrete surfaces to be repaired in accordance with product manufacturers instructions.

3.03 INSTALLATION

- A. Install approved products in accordance with manufacturers instructions.

END OF SECTION

SECTION 03 0712
STRUCTURAL CONCRETE PANEL

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Structural Concrete Panels.

1.02 RELATED REQUIREMENTS

- A. Section 05 4000 - Cold-Formed Metal Framing

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications and installation instructions with Project conditions and materials clearly identified or detailed for each required system.

1.04 QUALITY ASSURANCE

- A. Pre-Installation Conference:
 - 1. At least one week prior to starting the Structural Concrete Panel floor system work, conduct a pre-installation conference at the project site.
 - a. Parties shall include, but not be limited to, the Architect, General Contractor, Structural Engineer, Owner's Representative, Structural Concrete Panel Contractor and the Framing Contractor.
- B. Field Quality Control:
 - 1. At frequent intervals during construction, the job site will be visited by the Owner's Representative to confirm that the Structural Concrete Panel floor system is being installed per this specification.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Delivery:
 - 1. Deliver material to site promptly without undue exposure to weather.
 - 2. Deliver in manufacturer's unopened containers, bundles, or panels fully identified with name, brand, type and grade.
- B. Storage:
 - 1. Store above ground in dry, ventilated space.
 - 2. Protect materials from soiling, rusting and damage.

1.06 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. When mechanically fastened, do not install Structural Concrete Panels when ambient or conditioned temperature is below 0 Deg F.
 - 2. Temperature must be at least 40 Deg F for at least 24 hours after installation if adhesive is used, unless the adhesive manufacturer permits the use of its product at a lower temperature.
 - 3. Prior to the application of finished flooring, Structural Concrete Panels must be conditioned at the same temperature as required for the finished flooring for at least 48 hours.
 - 4. Do not apply finished flooring over Structo-Crete structural concrete panels that are wet, frozen or contain frost.

PART 2 - PRODUCTS

2.01 PRODUCTS AND MANUFACTURERS

- A. Structural Concrete Panel: Listed products establish standard of quality and are manufactured by United States Gypsum Company (USG), Chicago, IL.
- B. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

- A. Structural Concrete Panel:
 - 1. Structural Concrete Panel, 3/4 inch x 48 inches x 96 inches.
 - 2. Edges: Tongue and Groove.
- B. Structural Concrete Panel Fasteners:

1. Corrosion-resistant #8 self-drilling/tapping screws: 1 5/8 inch at 12 inches o.c. in panel field and 6 inches o.c. at panel perimeter unless otherwise specified by Structural Engineer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and adjoining construction and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.
 1. Steel framing to receive the Structural Concrete Panels shall be structurally sound, free from bows, twists or other malformations and in general compliance with local building code requirements. Damaged framing shall be replaced before installation of Structural Concrete Panel.

3.02 GENERAL INSTALLATION REQUIREMENTS

- A. Framing:
 1. The floor joists and other floor framing components must be designed to meet the strength and deflection criteria specified in the contract documents. The attachment flange or bearing edge must be a minimum 1.625 inch (41 mm) wide. Metal framing must be a minimum 18 gauge.
 2. Joist bearing shall be provided at the foundation that is uniform and level.
 3. Joists shall be located directly over bearing studs or a header installed at the top of the bearing wall to distribute the load.
 4. On steel framing, a web stiffener shall be provided at reaction points and/or concentrated loads as specified in the contract documents. End blocking shall be provided where joists ends are not otherwise restrained from rotation.
 5. Additional joists shall be provided under parallel partitions and around all floor openings that interrupt one or more spanning members. Framing must be properly fastened to the supporting walls or structure.
 6. All blocking or bridging must be installed prior to the installation of Structural Concrete Panels.
 7. Framing must be of good quality, free of bows, twists or other malformations.
- B. Structural Panel Application:
 1. The panels shall be cut to size with a circular saw equipped with carbide-tipped cutting blade and a dry dust collection device or a water-dispensing device that limits the amount of airborne dust. Wear safety glasses and a NIOSH-approved dust mask when cutting the panel. Collected dust shall be disposed in a safe manner and in compliance with local, state and federal ordinances.
 2. Structural Concrete Panels shall be installed in a horizontal (long edges perpendicular to the framing) manner. Panels may be installed with either surface against the framing. However, because the panel markings that facilitate fastening are on one side only, applying the board with the marking toward the installer is the preferred orientation.
 3. The use of adhesives in addition to the mechanical attachment of Structural Concrete Panels to the framing or to adjacent Structural Concrete Panels is optional. The fire, sound and structural ratings of the Structural Concrete Panel floor system are based on mechanical attachment only.
 4. If the specification calls for an adhesive/mechanical connection, only apply adhesive to the top of the joists that can be covered by one panel at a time.
 5. Begin panel installation by snapping a line across the joists parallel to the rim joist at a distance equal to the width of the first panel being placed. Plan the layout so the first and last panel row width is a minimum of 24 inches wide.
 6. Place the cut edge or tongue along the rim joist. Place each panel across three or more supports. Cut panels to length as needed to ensure that the butt end of the panel is centered on the framing member. Install panels in a direction that ensures that the butt end falls over the open side of the joist. This will help keep adjacent ends in the same place.
 7. Fasten each panel after it has been placed following the fastening schedule listed in the contract documents. Begin fastening at one end and fan out across the panel. Do not fasten all the corners first. After the installation of one complete row, begin the next row. Slide panels together so that the tongue of the panel being installed fits into the groove of the installed panel. No gaps are required between panels. If adhesives or sealants are specified in the joints, carefully apply a 1/4-3/8 inch diameter bead of adhesive to the

bottom of the grooves of the installed panels. Only apply enough adhesive to cover the joint that will be covered by the first panel in the second row. Install the second panel and all subsequent panels in a similar manner to complete the row. Install all rows in a running bond pattern so that end joints fall over the center of the framing members and are staggered by at least two supports from where the end joints fall in the adjacent rows.

8. Cutouts in the panels should be made before installing the panel whenever possible. If a cutout is required after the panel is installed, set the depth of the saw blade to ensure that the framing is not scored. Support the ends and edges of cutouts with framing if they are larger than 6 inches in either direction.
 9. Drive fasteners so the heads are flush with the surface of the board. See Materials 2.02 B for the correct fastener to be used.
- C. Clean Up:
1. Leftover material shall be removed from the job site.
 2. Remove all foreign material from the floor surface and vacuum all dust from the surface.

END OF SECTION

SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete formwork.
- B. Elevated concrete slabs.
- C. Floors and slabs on grade.
- D. Concrete foundation walls.
- E. Concrete reinforcement.
- F. Joint devices associated with concrete work.
- G. Concrete curing.
- H. Concrete finishing.
 - 1. Floor surfaces to be left exposed.

1.02 RELATED REQUIREMENTS

- A. Section 07 9200 - Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.
- B. Section Division 22 - Plumbing Piping Specialties: Mechanical items for casting into concrete.
- C. Section Division 26 - Grounding and Bonding for Electrical Systems: Electrical items for casting into concrete. Coordinate location with electrical contractor.
- D. Section Division 32 - Exterior Concrete Flatwork. Refer to concrete flatwork for all aspects of exterior concrete flatwork except stoops, aprons, and any other concrete element bearing on the building's foundation walls.

1.03 REFERENCE STANDARDS

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).
- B. ACI 301 - Specifications for Structural Concrete; 2016.
- C. ACI 302.1R - Guide to Concrete Floor and Slab Construction; 2015.
- D. ACI 302.2R - Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials
- E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).
- F. ACI 305R - Guide to Hot Weather Concreting; 2010.
- G. ACI 306R - Guide to Cold Weather Concreting; 2016.
- H. ACI 308R - Guide to External Curing of Concrete; 2016.
- I. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2018).
- J. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2016.
- K. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2012.
- L. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2016.
- M. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2016b.
- N. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2019a.
- O. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2016a.
- P. ASTM C150/C150M - Standard Specification for Portland Cement; 2016.
- Q. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2016.

- R. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2016.
- S. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).
- T. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2019.
- U. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2017.
- V. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 2013.
- W. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures; 2015.
- X. ASTM E1155 - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers; 2014.
- Y. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2018a.
- Z. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2017.
- AA. COE CRD-C 572 - Corps of Engineers Specifications for Polyvinylchloride Waterstop; 1974.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
- C. Mix designs: Submit mix design for each mix showing compliance with specified requirements.
- D. Test Reports: Submit report for each test or series of tests specified.
- E. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.
- F. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
- B. Follow recommendations of ACI 305R when concreting during hot weather.
- C. Follow recommendations of ACI 306R when concreting during cold weather.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
 - 1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
 - 2. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
 - 3. Form Ties: Contractor's choice of standard product type that will leave no metal within 1-1/2 inches of concrete surface.

2.02 REINFORCEMENT MATERIALS

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
 - 1. Type: Deformed billet-steel bars.
 - 2. Finish: Unfinished, unless otherwise indicated.
- B. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

3. Do not use clay bricks or similar blocks/chunks of material as rebar chairs. Concrete dobies as rebar chairs are acceptable.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
 1. Acquire cement for entire project from same source.
- B. Fine and Coarse Aggregates: ASTM C33/C33M.
 1. Acquire aggregates for entire project from same source.
 2. Provide aggregate free of shale at all slab locations exposed to freeze/thaw action.
- C. Fly Ash: ASTM C618, Class C or F.
- D. Calcined Pozzolan: ASTM C618, Class N.
- E. Silica Fume: ASTM C1240, proportioned in accordance with ACI 211.1.
- F. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.04 ADMIXTURES

- A. Chemical Admixture:
 1. Manufacturers by concrete supplier:
 - a. BASF: www.basf.com.
 - b. Grace Construction Products: www.grace.com.
 - c. Fritz-Pak: www.fritzpak.com.
 - d. Mapei GRT: www.mapei.com.
 - e. Sika Corporation U.S.: www.sika.com.
 - f. Euclid Chemical: www.euclidchemical.com.
 - g. Substitutions: See Section 01 6000 - Product Requirements.
- B. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
- C. Admixtures shall comply with ASTM C494.
- D. Air Entrainment Admixture: ASTM C260/C260M.

2.05 ACCESSORY MATERIALS

- A. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
 1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch.
 2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.
- B. Epoxy Grout: Hilti Hit-Hy 200 Epoxy System. No substitutions.

2.06 BONDING AND JOINTING PRODUCTS

- A. Latex Bonding Agent: Non-redispersible acrylic latex, complying with ASTM C1059 Type II.
 1. Manufacturers:
 - a. SpecChem, LLC; Strong Bond Acrylic Bonder: www.specchemllc.com/#sle.
 - b. W. R. Meadows, Inc; ACRY-LOK-: www.wrmeadows.com/#sle.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- B. Waterstops: Hydrophilic Butyl Rubber Waterstops.
 1. Configuration: Rectangular, continuous.
 2. Size: Approximately 1 inch by 1 inch.
 3. Acceptable Products:
 - a. JP Specialties, Inc.: www.jpsspecialties.com.
 - b. Henry: www.henry.com.
 - c. Durajoint: www.durajoint.com.
 - d. Adeka Corporation: www.adeka.com.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
- C. Waterstops: PVC, complying with COE CRD-C 572.
 1. Configuration: As indicated on drawings.
 2. Manufacturers:
 - a. JP Specialties, Inc.: www.jpsspecialties.com.

- b. Durajoint: www.durajoint.com.
 - c. Sika: www.sika.com.
 - d. WR Meadows, Inc: www.wrmeadows.com.
 - e. Grace Construction Products: www.na.graceconstruction.com.
 - f. Substitutions: See Section 01 6000 - Product Requirements.
- D. Expansion-Joint Filler: Polyethylene/polypropylene semi-rigid closed-cell backing complying with ASTM D 3575/ASTM D 8139/ASTM D 1751, 1/2 inch thick and full depth of slab less 1/2 inch with peel-off feature. Provide product by BASF Construction Chemicals-Building Systems, W.R. Meadows, Namaco, or equivalent.
- 1. Place peel-off feature at top of slab when sealants are specified. Remove peel-off portion of expansion-joint filler prior to application of sealants.
 - 2. Place peel off feature at bottom of slab when no sealants are specified.

2.07 CURING MATERIALS

- A. Liquid Membrane Curing Compound: ASTM C 309, Type 2, Class B, White Pigmented.
 - 1. Product: L&M CURE R2 by Laticrete or approved equivalent.
 - a. Other Approved Products:
 - 1) SpecRez White by SpecChem.
 - 2. Application Locations: Exterior Concrete surfaces unless indicated otherwise. Finish surfaces to a light broom finish prior to applying curing compound.
- B. Moisture-Retaining Sheet: ASTM C171.
 - 1. White-burlap-polyethylene sheet, weighing not less than 3.8 ounces per square yard.

2.08 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
 - 1. For trial mixtures method, employ independent testing agency acceptable to Engineer/Architect for preparing and reporting proposed mix designs.
- C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.
- D. Materials In General: Do not use materials or combinations thereof that will result in a reaction that is detrimental to the structural integrity or visual appearance of concrete.
- E. Normal Weight Concrete: Refer to structural notes on the drawings.

2.09 MIXING

- A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.
- B. Transit Mixers: Comply with ASTM C94/C94M.
- C. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.
 - 1. Use latex bonding agent only for non-load-bearing applications.

- E. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

3.04 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Place concrete for floor slabs in accordance with ACI 302.1R.
- C. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.05 SLAB JOINTING

- A. Locate joints as indicated on drawings.
 - 1. If no pattern is shown, contractor shall provide for 15 by 15 feet saw cut areas and shall contact Engineer for exact locations of joints.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.
 - 1. Install wherever necessary to separate slab from other building members, including columns, walls, equipment foundations, footings, stairs, manholes, sumps, and drains.
- D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 24 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.
 - 1. Do not exceed 2 inches deep when/if slab thicknesses are greater than 8 inches.

3.06 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. Refer to structural notes on the drawings.

3.07 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.
- C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide other finishes as follows:
 - 1. Grout-Cleaned Finish (Class A per ACI 347): Wet concrete surfaces and apply grout of a consistency of thick paint to coat surface and fill small holes. Mix one part portland cement to one and one-half parts fine sand with 1:1 moisture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
 - a. Locations: Provide this finish only where indicated on the drawings.
- D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
 - 1. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.
 - a. Installation of sealant is recommended prior to installation of floor sealers to prevent the need for cleaning of saw cut joints for proper sealant adhesion.
 - b. Chemical Curer/Sealer/Dustproofer/Hardener(When Applicable): Apply product per manufacturer's instructions after curing and protection procedures are complete.
 - 1) Acceptable Product:
 - (a) Laticrete: www.laticrete.com.
 - (b) Product: L&M Seal Hard; Concrete Sealer, Densifier, Chemical Hardener.
 - (1) Location: Garage/shop/warehouse type areas.
 - 2) Other Acceptable Manufacturers:
 - (a) Dayton Superior Corporation: www.daytonsuperior.com.

- (b) BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 - (c) Ashford Formula by Curecrete Distribution, Inc: www.ashfordformula.com.
 - (d) L.M. Scofield Company: www.scofield.com.
 - (e) The Euclid Chemical Company: www.euclidchemical.com.
- 3) Substitutions: See Section 01 6000 - Product Requirements.
- E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains as indicated on drawings.
- F. At exterior slabs, aprons, and other horizontal locations provide a light broom finish and liquid membrane curing compound finish unless indicated otherwise.
- G. At interior slabs do not over trowel where concrete is to be left exposed to avoid slippery surfaces when wet. Review finishing with Architect's representative prior to completing the work.

3.08 CURING AND PROTECTION

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Surfaces Not in Contact with Forms:
 - 1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than 7 days by saturated burlap unless noted otherwise.
 - a. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.
 - 2. Final Curing: Begin after initial curing but before surface is dry.

3.09 FIELD QUALITY CONTROL

- A. Provide free access to concrete operations at project site and cooperate with appointed firm.
- B. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
- C. Submit proposed mix design of each class of concrete to Engineer/Architect for review prior to commencement of concrete operations.

3.10 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Engineer/Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
 - 1. Concrete damaged by the construction activities required to complete the Work of this section shall also be considered defective concrete.
- C. Repair or replacement of defective concrete will be determined by the Engineer/Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer/Architect for each individual area.

3.11 PROTECTION

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

DIVISION 04: Masonry

SECTION 04 0100
MAINTENANCE OF MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water and Chemical cleaning (Chemical cleaning only if needed) of masonry surfaces.
- B. Replacement of masonry units (Replacement only if needed).
- C. Tuckpointing/Repointing mortar joints.
- D. Repair of damaged masonry.
- E. Cementitious repair mortar.
- F. Injection mortar and grout.
- G. Stone Repair Compound.

1.02 REFERENCE STANDARDS

- A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; 2011.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week prior to commencing work of this section.
 - 1. Require attendance of parties directly affecting work of this section.
 - 2. Review conditions of installation, installation procedures, and coordination with related work.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on cleaning compounds and cleaning solutions.
- C. Samples: Submit four samples of face brick units to illustrate matching color, texture and extremes of color range.
- D. Manufacturer's Instructions: For cleaning materials, indicate special procedures, conditions requiring special attention.

1.05 QUALITY ASSURANCE

- A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.
- B. Restorer: Company specializing in masonry restoration with minimum five years of documented experience.

1.06 FIELD CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Restoration and Cleaning Chemical: OneRestore by EaCo Chem; www.eacochem.com or approved equivalent.
- B. Heritage Lime Putty Mortar Type O: US Heritage Group; www.usheritage.com or approved equivalent.
- C. Mortar Type O: TCC Materials; www.tccmaterials.com or approved equivalent.
- D. Heritage High Lime Hydrate Mortar Type N: US Heritage Group; www.usheritage.com or approved equivalent.
- E. Mortar Type N: TCC Materials; www.tccmaterials.com or approved equivalent.
- F. Dispersed Hydrated Lime DIM - Injection Mortar: US Heritage Group; www.usheritage.com or approved equivalent.

- G. Heritage Masonry Repair Mortar IG10 - Injection Grout: US Heritage Group; www.usheritage.com or approved equivalent.
- H. Heritage Masonry Repair Mortar HS60 - Sandstone Patch: US Heritage Group; www.usheritage.com or approved equivalent.
- I. Sure Klean Cleaning and Protective Treatments: Prosoco; www.prosoco.com or approved equivalent.
- J. Substitutions: See Section 01 6000 - Product Requirements.

2.02 CLEANING MATERIALS

- A. Cleaning Agent: Detergent type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces to be cleaned and restored are ready for work of this section.

3.02 METHOD OF CLEANING

- A. Test cleaning should start with the gentlest means available (warm water and a soft bristle brush) and then, only if necessary, advance to detergents and other cleaners. Water pressures should begin with very low pressures, such as 100 psi, and only be increased if necessary. Water pressure should not exceed 400 psi. If damage to the historic masonry as part of the cleaning is observed (even if it is not getting perfectly clean) then the cleaning method should be reduced to non-damaging levels.

3.03 PREPARATION

- A. Protect surrounding elements from damage due to restoration procedures.
- B. Separate areas to be protected from restoration areas using means adequate to prevent damage.
- C. Mask immediately adjacent surfaces with material that will withstand cleaning and restoration procedures.
- D. Protect roof membrane and flashings from damage with 1/2 inch plywood laid on roof surfaces over full extent of work area and traffic route.
- E. When using cleaning methods that involve water or other liquids, install drainage devices to prevent runoff over adjacent surfaces unless those surfaces are impervious to damage from runoff.

3.04 REBUILDING

- A. Cut out damaged and deteriorated masonry with care in a manner to prevent damage to any adjacent remaining materials.
- B. Support structure as necessary in advance of cutting out units.
- C. Cut away loose or unsound adjoining masonry and mortar to provide firm and solid bearing for new work.
- D. Build in new units following procedures for new work specified in other section(s).
- E. Mortar Mix: Colored and proportioned to match existing work.
- F. Ensure that anchors are correctly located and built in.
- G. Install built in masonry work to match and align with existing, with joints and coursing true and level, faces plumb and in line. Build in all openings, accessories and fittings.

3.05 REPOINTING

- A. Perform repointing prior to cleaning masonry surfaces.
- B. Cut out loose or disintegrated mortar in joints to minimum 1 inch depth or until sound mortar is reached.
- C. Use power tools only after test cuts determine no damage to masonry units will result.
- D. Do not damage masonry units.

- E. When cutting is complete, remove dust and loose material by brushing and blowing with high pressure air.
- F. Premoisten joint and apply mortar. Pack tightly in maximum 1/4 inch layers. Form a smooth, compact concave joint to match existing.
- G. Follow manufacture's repointing guidelines and instructions.

3.06 INSTALLATION INSTRUCTIONS

- A. Install with in strict accordance with manufacture's installation instructions. See attached product cut sheets.

3.07 CLEANING EXISTING MASONRY

- A. Cleaning Detergent: Brush clean masonry surfaces at indicated locations with cleaning agent in accordance with the manufacturer's instructions. Saturate masonry with clean water and flush loose mortar and dirt.

3.08 CLEANING NEW MASONRY

- A. Verify mortar is fully set and cured.
- B. Clean surfaces and remove large particles with wood scrapers, brass or nylon wire brushes.

3.09 RESTORATION CLEANING

- A. Clean surfaces and remove large particles with wood scrapers or non-ferrous wire brush.
- B. Provide a second application if required to match mock-up area.
- C. Allow sufficient time for solution to remain on masonry and agitate with soft fiber brush or sponge.
- D. Rinse from the bottom up with potable water applied at 400 psi and at a rate of 4 gal/min.

3.10 AGING

- A. Rub in new masonry work to match, as close as possible, adjacent original work.
 - 1. Use carbon black in small amounts, rubbing in well with burlap rags.
- B. After each application, dust off surplus and wash down with low pressure hose. Allow surface to dry before proceeding with succeeding applications.
- C. Continue process until acceptance.

3.11 CLEANING

- A. Immediately remove stains, efflorescence, or other excess resulting from the work of this section.
- B. Remove excess mortar, smears, and droppings as work proceeds and upon completion.
- C. Clean surrounding surfaces.

END OF SECTION

DIVISION 05: Metals

SECTION 05 4000
COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formed steel stud interior wall framing.
- B. Formed steel joist framing and bridging.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood blocking and miscellaneous framing.

1.03 REFERENCE STANDARDS

- A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.
- B. AISI SG02-1 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- E. ASTM C955 - Standard Specification for Cold-Formed Steel Structural Framing Members; 2018, with Editorial Revision.
- F. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2011a (Reapproved 2015).
- G. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data on factory-made framing connectors, showing compliance with requirements.
- C. Shop Drawings: Indicate component details, bearing, anchorage, loading, welds, and type and location of fasteners, and accessories or items required of related work.
 - 1. Design data:
- D. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention .

1.05 PROJECT CONDITIONS

- A. Verify that field measurements are as indicated on shop drawings.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Framing:
 - 1. ClarkDietrich Building Systems: www.clarkdietrich.com.
 - 2. Marino: www.marinoware.com.
 - 3. Phillips Manufacturing Company: www.phillipsmfg.com.
 - 4. The Steel Network, Inc: www.SteelNetwork.com.
 - 5. Custom Stud, Inc: www.customstud.com.
 - 6. Telling Industries: www.tellingindustries.com.
 - 7. Super Stud Building Products, Inc: www.buysuperstud.com.
 - 8. Substitutions: See Section 01 6000 - Product Requirements.
- B. Framing Connectors and Accessories:
 - 1. Same manufacturer as metal framing.
 - 2. Simpson Strong Tie: www.strongtie.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FRAMING SYSTEM

- A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.
- B. Design Requirements: Provide completed framing system having the following characteristics:
 - 1. Design: Calculate structural characteristics of cold-formed steel framing members according to AISI S100-12.
 - 2. Structural Performance: Design, engineer, fabricate, and erect to withstand specified design loads for project conditions within required limits.
 - 3. Design Loads: In accordance with applicable codes.
 - 4. Live load deflection meeting the following, unless otherwise indicated:
 - 5. Able to tolerate movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
 - 6. Able to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

2.03 FRAMING MATERIALS

- A. Studs and Track: ASTM C955; studs formed to channel, "C", or "Sigma" shape with punched web; U-shaped track in matching nominal width and compatible height.
 - 1. Gage and Depth: As indicated on drawings.
- B. Joists and Purlins: Fabricated from ASTM A653/A653M steel sheet, with G90/Z275 hot dipped galvanized coating.
 - 1. Base Metal: Structural Steel (SS), Grade 33/230.
 - 2. Gage and Depth: As indicated on drawings.
- C. Framing Connectors: Factory-made, formed steel sheet.
 - 1. Material: ASTM A653/A653M SS Grade 33 and 40 (minimum), with G90/Z275 hot dipped galvanized coating for base metal thickness less than 10 gage, 0.1345 inch, and factory punched holes and slots.
 - 2. Structural Performance: Maintain load and movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
 - 3. Fixed Connections: Provide non-movement connections for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners.

2.04 FASTENERS

- A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M.
 - 1. Products:
- B. Anchorage Devices: Tapcon or equivalent type fasteners.

2.05 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.
- B. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION OF STUDS

- A. Install components in accordance with manufacturers' instructions and ASTM C1007 requirements.
- B. Place studs at 16 inches on center; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using fastener method.
- C. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.

- D. Install load bearing studs full length in one piece. Splicing of studs is not permitted.
- E. Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.
- F. Attach cross studs to studs for attachment of fixtures anchored to walls.
- G. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.

3.03 INSTALLATION OF JOISTS AND PURLINS

- A. Install framing components in accordance with manufacturer's instructions.
- B. Make provisions for erection stresses. Provide temporary alignment and bracing.
- C. Locate joist end bearing directly over load bearing studs or provide load distributing member to top of stud track.
- D. Provide web stiffeners at reaction points.
- E. Touch-up field welds and damaged galvanized surfaces with primer.

3.04 TOLERANCES

- A. Maximum Variation from True Position: 1/4 inch.
- B. Maximum Variation of any Member from Plane: 1/4 inch.

END OF SECTION

SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel items.

1.02 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014.
- E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2018.
- F. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- G. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on all finishing products, including VOC content.
- C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
 - 2. Indicate unit identification mark and location for each unique item.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections, Angles, and Plates: ASTM A36/A36M and Stainless Steel.
- B. Steel Tubing: ASTM A500/A500M, Grade B cold-formed structural tubing.
- C. Stainless Steel Materials: A316 or A304 Stainless Steel; #4 Brushed, ASTM A240, ASME SA240.
- D. Fasteners: Provide expansion, sleeve, and adhesive anchors by HILTI, Simpson or approved equal.
- E. Bolts, Nuts, and Washers: ASTM A307, Grade A, galvanized to ASTM A153/A153M where connecting galvanized components. Stainless Steel Where Applicable.
- F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- G. Touch-Up Primer for Galvanized Surfaces: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

2.02 MATERIALS - STAINLESS STEEL

- A. Pipe: ASTM A666, Type 304.

2.03 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Mark each item with its identification mark. Use a non-permanent method at units that will remain exposed; welding is not acceptable, it shall be ground smooth, filled, and primed by the supplier at no additional cost to the Owner.
- C. Fabricate items with joints tightly fitted and secured.

- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FABRICATED ITEMS

- A. Grating Joists and Supports: As detailed; Stainless Steel.
- B. Mechanical Equipment Stands: As detailed; Galvanized.
- C. Lintels/Support Angles: As detailed; galvanized finish, unless noted otherwise.
- D. Items indicated on the drawings.

2.05 FINISHES - STEEL

- A. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.

2.06 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

2.07 PREFABRICATED ACCESSORIES

- A. Brackets: Provide products as indicated on the drawings by UNISTRUT or equivalent.

2.08 CONCRETE ANCHORING SYSTEMS

- A. Approved Manufacturers/Products:
 - 1. HILTI: www.us.hilti.com.
 - 2. MiTek: www.mitek-us.com.
 - 3. Powers: www.powers.com.
 - 4. Red Head: www.itwredhead.com.
 - 5. Simpson Strong-Tie: www.strongtie.com.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Perform field welding in accordance with AWS D1.1/D1.1M.
- D. Obtain approval prior to site cutting or making adjustments not scheduled.
- E. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 05 5100

METAL STAIRS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Stairs with grating treads.
- B. Landings of similar construction.
- C. Structural stair framing and supports.
- D. Handrails and guards.

1.02 REFERENCE STANDARDS

- A. AISC 201 - AISC Certification Program for Structural Steel Fabricators, Standard for Steel Building Structures; 2006.
- B. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- C. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- D. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc; 2011.
- E. NAAMM AMP 510 - Metal Stairs Manual; 1992, Fifth Edition.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
 - 2. Include the design engineer's seal and signature on each sheet of shop drawings.
- C. Design Data: As required by authorities having jurisdiction.
- D. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is certified under AISC 201.
- E. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.04 QUALITY ASSURANCE

- A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer; include engineer's stamp.
- B. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.
- C. Fabricator Qualifications:
 - 1. A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 201.
- D. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

PART 2 PRODUCTS

2.01 METAL STAIRS - GENERAL

- A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
 - 1. Regulatory Requirements: Provide stairs and railings complying with the most stringent requirements of local, state, and federal regulations; where requirements of the contract documents exceed those of regulations, comply with the contract documents.
 - 2. Structural Design: Provide complete stair and railing assemblies complying with the applicable local code.

3. Dimensions: As indicated on drawings.
 4. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
 5. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
 6. Separate dissimilar metals using paint or permanent tape.
- B. Metal Jointing and Finish Quality Levels:
1. Commercial: Exposed joints as inconspicuous as possible, whether welded or mechanical; underside of stair not covered by soffit IS considered exposed to view.
 - a. Welded Joints: Intermittently welded on back side, filled with body putty, and sanded smooth and flush.
 - b. Welds Exposed to View: Ground smooth and flush.
 - c. Mechanical Joints: Butted tight, flush, and hairline.
 - d. Bolts Exposed to View: Countersunk flat or oval head bolts; no exposed nuts.
 - e. Exposed Edges and Corners: Eased to small uniform radius.
 - f. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for satin or matte finish.
- C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
- D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.02 METAL STAIRS WITH GRATING TREADS

- A. Jointing and Finish Quality Level: Commercial, as defined above.
- B. Risers: Open.
- C. Tread Grating: Grip Strut Grating, serrated diamond pattern; channel depth x width x height as indicated; Products by McNICHOLS or approved equivalent.
1. Material: Aluminum.
- D. Treads: Aluminum bar grating.
1. Grating Type: Welded.
 2. Bearing Bar Depth: 1 inch, minimum.
 3. Top Surface: Standard.
 4. Nosing: Checkered plate.
 5. Nosing Width: 1-1/4 inch, minimum.
 6. Anchorage to Stringers: End plates welded to grating, bolted to stringers.
- E. Stringers: Aluminum; designers preference.
- F. Railings: Aluminum pipe.

2.03 HANDRAILS AND GUARDS

- A. Wall-Mounted Rails: Round pipe or tube rails unless otherwise indicated.
1. Outside Diameter: 1 1/2 inch, minimum, to 1-1/2 inches, maximum.
- B. Guards:
1. Rails: Round pipe or tube rails unless otherwise indicated.
 - a. Outside Diameter: 1 1/2 inch, minimum, to 1-1/2 inches, maximum.
 2. End and Intermediate Posts: Same material and size as top rails.
 - a. Horizontal Spacing: As indicated on drawings.
 - b. Mounting: Welded to top surface of stringer.

2.04 ACCESSORIES

- A. Fasteners and Welding Materials: As recommended by manufacturer.

2.05 EXPANSION ANCHORS

- A. Approved Products: Red Head Concrete Anchoring Solutions: www.itwredhead.com.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. When field welding is required, clean and strip primed steel items to bare metal.

3.03 INSTALLATION

- A. Install components plumb and level, accurately fitted, free from distortion or defects.
- B. Provide anchors, plates, angles, and hangers required for connecting stairs to structure.
- C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- D. Provide welded field joints where specifically indicated on drawings. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.
- F. Obtain approval prior to site cutting or creating adjustments not scheduled.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION

DIVISION 06: Wood, Plastics, and Composites

SECTION 06 1000
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roofing nailers.
- B. Preservative treated wood materials.
- C. Miscellaneous framing and sheathing.

1.02 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- B. AWWA U1 - Use Category System: User Specification for Treated Wood; 2018.
- C. PS 1 - Structural Plywood; 2009.
- D. PS 20 - American Softwood Lumber Standard; 2020.
- E. WWPA G-5 - Western Lumber Grading Rules; 2017.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
 - 2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

2.02 DIMENSION LUMBER

- A. Grading Agency: Western Wood Products Association; WWPA G-5.
- B. Sizes: Nominal sizes as indicated on drawings, S4S.
- C. Moisture Content: S-dry or MC19.
 - 1. Plates: MC15 or KD15.
- D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

- A. Miscellaneous Applications:
 - 1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
 - 2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
 - 3. Other Locations: PS 1, C-D Plugged or better.
 - 4. Electrical Component Mounting: APA rated sheathing, fire retardant treated.

2.04 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
 - 2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.

2.05 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 - 1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.
- B. Preservative Treatment:
 - 1. Manufacturers:
 - a. Arch Wood Protection, Inc: www.wolmanizedwood.com.
 - b. Viance, LLC: www.treatedwood.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. All wood exposed to or in contact with masonry or concrete shall be Preservative Treated Wood.
- B. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.
- C. Securely install blocking, size within 1/16 of required dimension, and install plumb and level.

3.02 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- C. Provide the following specific non-structural framing and blocking:
 - 1. Items indicated on the drawings and in the specifications.

3.03 CLEANING

- A. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- B. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 7413
MOLDED FIBERGLASS GRATING

PART 1 – GENERAL

1.01 SECTION INCLUDES:

- A. Moulded Fiberglass Grating and Accessories; fiberglass reinforced polymer (FRP).

1.02 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-01 Specification Sections, apply to work of this section.
- B. ANSI/ACMA/FGMC FRP Composites Grating Manual for Pultruded and Molded Grating and Stair Treads.

1.03 SCOPE OF WORK:

- A. Furnish all labor, materials, equipment and incidentals governed by this section necessary to install the fiberglass reinforced polymer (FRP) products as specified herein.

1.04 QUALITY ASSURANCE:

- A. The material covered by these specifications shall be furnished by an ISO-9001:2008 certified manufacturer of proven ability who is regularly engaged in the manufacture, fabrication and installation of FRP systems.
- B. Substitution of any component or modification of system shall be made only when approved by the Architect or Design Engineer.
- C. Fabricator Qualifications: Firm experienced in successfully producing FRP fabrications similar to that indicated for this project, with sufficient production capacity to produce required units without causing delay in the work.
- D. In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for work.

1.05 DESIGN CRITERIA:

- A. The design of FRP Molded Grating, including connections, shall be in accordance with governing building codes and standards as applicable.
- B. Design live loads of FRP molded grating shall be in accordance with the following design loads based on the latest adopted International Building Code:
 - 1. 60 psf live load (non-emergency exit walkways)
 - 2. 300 lb concentrated load
- C. Molded grating shall not deflect more than 1/4 inch and structural support members shall not deflect more than L/180 of span for structural members unless specifically stated otherwise in drawings and/or supplementary conditions. Connections shall be designed to transfer the design loads.

1.06 SUBMITTALS:

- A. Shop drawings of all fabricated components shall be submitted to the Design Engineer for approval in accordance with the requirements of Section 01 6000. Fabrication shall not start until receipt of Design Engineer's approval marked "Approved", "Approved As Submitted" or "Approved As Noted".
- B. Manufacturer's catalog data showing:
 - 1. Materials of construction
 - 2. Dimensions, spacings, and construction of grating, handrails and building panels.
- C. Detail shop drawings showing:
 - 1. Dimensions
 - 2. Sectional assembly
 - 3. Location and identification mark
 - 4. Size and type of supporting frames required
- D. Samples of each type of product shall be submitted for approval in accordance with the requirements of Section 01 6000.

1.07 SHIPPING AND STORAGE INSTRUCTIONS:

- A. All gratings and components shall be shop fabricated and assembled into the largest practical size suitable for transporting.
- B. All materials and equipment necessary for the fabrication and installation of all component shall be stored before, during, and after shipment in a manner to prevent cracking, twisting, bending, breaking, chipping or damage of any kind to the materials or equipment, including damage due to over exposure to the sun. Any material which, in the opinion of the Design Engineer, has become damaged as to be unfit for use, shall be promptly removed from the site of work, and the Contractor shall receive no compensation for the damaged material or its removal.
- C. Identify and match-mark all components and fabrications for installation and field assembly.

PART 2 – PRODUCTS

2.01 GENERAL:

- A. Materials used in the manufacture of the FRP products shall be raw materials in conformance with the specification and certified as meeting the manufacturer's approved list of raw materials.
- B. All raw materials shall be as specified by the contract.
- C. The visual quality of the pultruded shapes shall conform to ASTM D4385.
- D. Molded components shall be manufactured to achieve the following performance requirements (Refer to "Design" below for resin system and color):
 - 1. All mechanical performance standards set forth by the Fiberglass Grating Manufacturers Council (FGMC) in the FRP Composites Grating Manual for Pultruded and Molded Grating and Stair Treads.
 - 2. A flame spread rating of 25 or less in accordance with ASTM test method E-84, and flammability characteristics of UL 94 V0 and the self-extinguishing requirements of ASTM D635.
 - 3. NSF Standard 61 Certified with flammability characteristics of UL 94 V0 and the self-extinguishing requirements of ASTM D635.
 - 4. Food-grade with flammability characteristics of UL 94 V0 and the self-extinguishing requirements of ASTM D635.
- E. Where applicable, after fabrication, all cut ends, holes and abrasions of FRP shapes shall be sealed with a compatible resin coating.
- F. Where applicable FRP products exposed to weather shall contain an ultraviolet inhibitor.
- G. Where applicable all glass fibers shall be covered with resin to protect against their exposure due to wear or weathering.
- H. All grating shall have non-skid grit finish; medium grit.
- I. Basis of Design: 2" FRP Panel/Grating - GatorPlate 2020 or Pre-Approved Equal Systems that provide a monolithic surface that meets the loading requirements.
- J. Basis of Design: 2" FRP Grating - GatorGrate 2020 or Pre-Approved Equal Systems that meets the loading requirements.
- K. Manufacturers:
 - 1. Strongwell: www.strongwell.com.
 - 2. Fibergrate: www.fibergrate.com.
 - 3. National Grating: www.nationalgrating.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- L. The materials covered by these specifications shall be furnished by an ISO-9001 certified manufacturer.

2.02 PULTRUDED GRATINGS:

- A. General
 - 1. Grating shall be shipped from the manufacturer, palletized and banded with exposed edges protected to prevent damage in shipment.
 - 2. Each piece shall be clearly marked showing manufacturer's applicable drawing number.
- B. Design

1. The grating shall be one piece construction with the tops of the bearing bars and cross bars in the same plane.
 2. The mesh pattern and thickness shall be:
 - a. 2 inch square mesh, 2 inch thick.
 3. Resin systems and colors are:
 - a. The resin used in the manufacture of the grating shall be standard vinyl ester.
 - b. Color shall be high visibility yellow or gray as selected by the Architect.
 4. Grating (exclusive of food grade) shall be fire retardant with a flame spread rating of 25 or less when tested in accordance with ASTM E-84. Food grade grating shall be fire retardant with a flame spread rating of 30 or less when tested in accordance with ASTM E-84.
 5. Grating shall meet all mechanical performance standards set forth by the Fiberglass Grating Manufacturers Council (FGMC) in the FRP Composites Grating Manual for Pultruded and Molded Grating.
 6. For slip resistance, the top of each bar shall:
 - a. have sand or quartz grit applied; medium grit
- C. Products
1. The FRP molded grating shall be manufactured by the open mold process.
 2. Standard FRP Curb Angles of gray fire retardant vinyl ester resin system.
 3. Hold down clamps shall be of type 316 stainless steel:
 - a. Type M clips for attaching grating to supports.
 - b. Type J clips for attaching grating to supports for moderate loads.
 - c. Type C clips for joining two unsupported edges.
 4. Grating with cover plate
 - a. Grating shall be the same as described above in this section.
 - b. The cover plate for molded grating shall be an integrally molded plate as manufactured by Strongwell.
 - c. The integrally molded plate may use the same resin as the grating.
 - d. The integrally molded plate shall be bonded to the grating, and a non-skid grit shall be affixed to the top surface of the assembly.
 5. If required, all cut and machined edges, holes and abrasions shall be sealed with a compatible resin.
 6. All panels shall be fabricated to the sizes shown on the approved shop drawing.

PART 3 – EXECUTION

3.01 PREPARATION:

- A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction.
- B. Coordinate delivery of such items to project site.

3.02 INSPECTION AND TESTING:

- A. The Design Engineer shall have the right to inspect and test all materials to be furnished under these specifications prior to their shipment from the point of manufacture.
- B. All labor, power, materials, equipment and appurtenances required for testing shall be furnished by the Contractor at no cost to the Owner.

3.03 INSTALLATION, GENERAL:

- A. Fastening to in-place construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous FRP fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts and other connectors as determined by the Design Engineer.
- B. Cutting, fitting and placement: Perform cutting, drilling and fitting required for installation of miscellaneous FRP fabrications. Set FRP fabrication accurately in location, alignment and elevation; with edges and surfaces level, plumb, true and free of rack; measured from established lines and levels.

- C. Provide temporary bracing or anchors in form work for items that are to be built into concrete masonry or similar construction.

3.04 ALL FRP INSTALLATION:

- A. If required, all field cut and drilled edges, holes and abrasions shall be sealed with a catalyzed resin compatible with the original resin as recommended by the manufacturer.
- B. Install items specified as indicated and in accordance with manufacturer's instructions.

END OF SECTION

DIVISION 07: Thermal and Moisture Protection

SECTION 07 2130

SPRAY APPLIED THERMAL AND ACOUSTIC INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Spray applied thermal and acoustic insulation.

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Installation Instructions: Indicate preparation required, installation techniques, jointing requirements, and installation details.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: TC-417 by ThermaCoustic Industries International Limited.
 - 1. Materials: Spray-applied material shall be TC-417 white glass fiber together with TC-417 synthetic emulsion adhesive conforming to CAN/ULC S-114 and ASTM E-136.
 - 2. Adhesive shall be mixed with fresh, clean, potable water in the exact proportion as recommended by the manufacturer.
 - 3. R-Value: 20 minimum; 5 inch thick.
 - 4. Color: Standard.
 - 5. Application Locations: Where indicated on the drawings.
- B. Other Acceptable Manufacturers:
 - 1. K-13 Spray-On Systems; International Cellulose Corporation.
 - 2. Monoglass Spray Thermal / Acoustic Insulation: Monoglass Spray-On Insulation.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ACCESSORIES

- A. Accessories: Provide all accessories for a complete system.

PART 3 EXECUTION

3.01 PREPARATION

- A. Prepare surfaces in accordance with manufacturer's instructions.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Use a 'one-pass' application procedure.
- C. Trowel in accordance with manufacturer's instructions for a smoother finish.

3.03 CLEAN-UP

- A. Remove overspray from equipment and surfaces not intended to be covered. Perform all removal work while installed products is still wet.

END OF SECTION

SECTION 07 3113
ASPHALT SHINGLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Asphalt shingle roofing.
- B. Flexible sheet membranes for eave protection and underlayment.
- C. Associated metal flashings and accessories.

1.02 REFERENCE STANDARDS

- A. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2019.
- B. ASTM D3462/D3462M - Standard Specification for Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules; 2019.
- C. ICC-ES AC188 - Acceptance Criteria for Roof Underlayments; 2012, with Editorial Revision (2015).
- D. NRCA MS104 - The NRCA Roofing Manual: Steep-slope Roof Systems; 2013.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating material characteristics.
- C. Samples: Submit two samples of each shingle color indicating color range and finish texture/pattern; for color selection.
- D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Perform Work in accordance with the recommendations of NRCA Steep Roofing Manual.

1.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a ten year period after Date of Substantial Completion.
- C. Provide lifetime manufacturer's warranty for coverage against black streaks caused by algae.
- D. Provide ten year manufacturer's warranty for wind damage.

PART 2 PRODUCTS

2.01 SHINGLES

- A. Base Manufacturer: Certainteed Corporation; Product Landmark - Pro Designer Shingles with SureStart 4-STAR Coverage: www.certainteed.com.
 - 1. NRCA (RM) - The NRCA Roofing Manual; 2019.
 - 2. GAF: www.gaf.com.
 - 3. Owens Corning Corp: www.owenscorning.com.
 - 4. Tamko: www.tamko.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 ASPHALT SHINGLES

- A. Asphalt Shingles: Asphalt-coated glass felt, mineral granule surfaced, complying with ASTM D3462/D3462M; Class A fire resistance.
 - 1. Weight: 250 lb/100 sq ft.
 - 2. Self-sealing type.
 - 3. Style: Laminated overlay.
 - 4. Color: As selected by the Architect/Owner.

2.03 SHEET MATERIALS

- A. Underlayment: Synthetic non-asphaltic sheet, intended by manufacturer for mechanically fastened roofing underlayment without sealed seams.

1. Minimum Requirements: Comply with requirements of ICC-ES AC188 for non-self-adhesive sheet.
 2. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
 3. Ultraviolet (UV) Resistance and Weatherability: Approved in writing by manufacturer for exposure to weather for minimum of six months.
 4. Low Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.
 5. Fasteners: As recommended by manufacturer or building code qualification report or approval.
 6. Manufacturers:
 - a. Certaineed Corporation; Product DiamondDeck Underlayment.
 - b. Other approved shingle manufacturers products.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- B. Eave Protection Membrane (Ice and Water Shield): Self-adhering polymer-modified asphalt sheet complying with ASTM D 1970; 60 mil total thickness; with strippable treated release paper and polyethylene sheet top surface.
1. Manufacturers:
 - a. Certaineed Corporation; Product Winterguard.
 - b. Other approved shingle manufacturers products.
 - c. Substitutions: See Section 01 6000 - Product Requirements.
- C. Flexible Flashing: Self-adhering polymer-modified asphalt sheet complying with ASTM D1970/D1970M; 60 mil total thickness; with strippable treated release paper and polyethylene sheet top surface.
1. Manufacturers:
 - a. Certaineed Corporation; Product Winterguard.
 - b. Other approved shingle manufacturers products.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.04 ACCESSORIES

- A. Nails: Standard round wire shingle type, of hot-dipped zinc coated steel, 10 wire gage, 0.1019 inch shank diameter, 3/8 inch head diameter, of sufficient length to penetrate through roof sheathing or 3/4 inch into roof sheathing or decking.
- B. Lap Cement: Fibrated cutback asphalt type, recommended for use in application of underlayment, free of toxic solvents .
- C. Ridge Vents: Cor-A-Vent V-600E Ridge Ventilation System; Lomanco OmniRoll; or approved equivalent.
- D. Other Accessories: Provide all other accessories including but not limited to pipe boots, vent caps, and storm collars for a complete installation.
- E. Verify that sheathing panel edges perpendicular to roof framing members have sheathing clips installed or are supported by continuous blocking. Immediately notify Architect if they are not.

2.05 METAL FLASHINGS

- A. Metal Flashings: Provide sheet metal eave edge, gable edge, and fascia covers and other flashing to provide a complete roofing system.
 1. Form flashings to protect roofing materials from physical damage and shed water.
 2. Form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance.
 3. Hem exposed edges of flashings minimum 1/4 inch on underside.
- B. Sheet Metal: Prefinished galvanized steel, as specified in Section 07 6200.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions prior to beginning work.
- B. Verify that deck is of sufficient thickness to accept fasteners.
- C. Verify that roof penetrations and plumbing stacks are in place and flashed to deck surface.
- D. Verify roof openings are correctly framed.

- E. Verify deck surfaces are dry, free of ridges, warps, or voids.

3.02 PREPARATION

- A. At areas where eave protection membrane is to be adhered to substrate, fill knot holes and surface cracks with latex filler.
- B. Broom clean deck surfaces before installing underlayment or eave protection.
- C. Install eave edge and gable edge flashings tight with fascia boards. Weather lap joints 2 inches and seal with plastic cement. Secure flange with nails spaced 8 inches on center.

3.03 INSTALLATION - EAVE PROTECTION MEMBRANE

- A. Install eave protection membrane from eave edge to minimum 4 ft up-slope beyond interior face of exterior wall.
- B. Install eave protection membrane in accordance with manufacturer's instructions.

3.04 INSTALLATION - UNDERLAYMENT

- A. Underlayment: Install underlayment perpendicular to slope of roof, with ends and edges weather lapped minimum 4 inches. Stagger end laps of each consecutive layer. Nail in place. Weather lap minimum 4 inches over eave protection.
- B. Items projecting through or mounted on roof: Weather lap and seal watertight with plastic cement.

3.05 INSTALLATION - METAL FLASHING AND ACCESSORIES

- A. Weather lap joints minimum 2 inches and seal weather tight with plastic cement.
- B. Secure in place with nails at 8 inches on center. Conceal fastenings.
- C. Items Projecting Through or Mounted on Roofing: Flash and seal weather tight with plastic cement.

3.06 INSTALLATION - SHINGLES

- A. Install shingles in accordance with manufacturer's instructions.
 - 1. Fasten individual shingles using 2 nails per shingle, or as required by code, whichever is greater.
 - 2. Fasten strip shingles using 4 nails per strip, or as required by code, whichever is greater.
- B. Place shingles in straight coursing pattern with 5 inch weather exposure to produce double thickness over full roof area. Provide double course of shingles at eaves.
- C. Project first course of shingles 3/4 inch beyond fascia boards.
- D. Extend shingles 1/4 inch beyond face of gable edge fascia boards.
- E. Extend shingles on both slopes across valley in a weave pattern and fasten. Extend shingles a minimum of 12 inches beyond valley center line to achieve woven valley, concealing the valley protection.
- F. Cap hips with individual shingles, maintaining 5 inch weather exposure. Place to avoid exposed nails.
- G. Coordinate installation of roof mounted components or work projecting through roof with weather tight placement of counterflashings.
- H. Complete installation to provide weather tight service.

3.07 PROTECTION

- A. Do not permit traffic over finished roof surface.

END OF SECTION

SECTION 07 6200
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings, counterflashings, and other items indicated on the drawings.
- B. Sealants for joints within sheet metal fabrications.
- C. Manufactured metal gutters and downspouts.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Wood nailers for sheet metal work.
- B. Section 07 9200 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

1.03 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- C. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2018).
- D. CDA A4050 - Copper in Architecture - Handbook; current edition.
- E. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.
- F. NRCA's ANSI/SPRI ES-1 - American National Standard for Edge Systems Used with Low Slope Roof Systems - Certification Listing for Shop-fabricated Edge Metal Flashings; 2003.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- C. Samples: Submit two samples 8 by 8 inch in size illustrating metal finish color.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 5 years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

- A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, (0.0239 inch) thick base metal.
 - 1. Do not use unfinished galvanized steel flashings in finished locations, interior or exterior, unless specifically indicated.
- B. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, (0.0239) inch thick base metal, shop pre-coated with PVDF coating.
 - 1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.

2. Color: As selected by Engineer/Architect from manufacturer's full colors.
3. Face Heights: Flashings 8 inch or less shall be a minimum of 24 gauge, over 8 inch shall be 22 gauge, or as indicated on the drawings. Continuously supported flashing over 8 inches may be 24 gauge unless noted otherwise.

2.02 MANUFACTURED PRODUCTS

- A. Metal gutters and downspouts.
 1. Product: Rollex Rainware Gutters and Downspouts: www.rollex.com.
 - a. Other acceptable Manufacturers:
 - 1) EDCO: www.edcoproducts.com.
 - 2) ATAS International, Inc: www.atas.com.
 - 3) ABC Seamless: www.abcseamless.com.
 - 4) Substitutions: See Section 01 6000 - Product Requirements.
 2. Profile: 5 inch K style.
 - a. Provide as few joints as possible base on Rollex's 10', 16', and 22' lengths.
 3. Down Spout: Corrugated rectangular profile.
 4. Accessories: Fasteners, trim, and related flashings.
 5. Color: As selected.
 6. Warranty: Correct defective Work within a two year period after Substantial Completion, including defects in water tightness and integrity of seals.

2.03 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

2.04 ACCESSORIES

- A. Fasteners: Galvanized steel, with soft neoprene washers.
- B. Primer: Zinc chromate type.
- C. Sealant: Type specified in Section 07 9200.
- D. Plastic Cement: ASTM D4586/D4586M, Type I.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 INSTALLATION

- A. Install manufactured products according to manufacturers instructions including all accessory components to create a complete system.
- B. Secure flashings in place using concealed fasteners.
- C. Apply sealant between metal flashings and felt flashings.
- D. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- E. Seal metal joints watertight.

END OF SECTION

SECTION 07 7200
ROOF ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Equipment rails.
- B. Roof hatches.

1.02 REFERENCE STANDARDS

- A. 29 CFR 1910.23 - Ladders; current edition.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- C. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2010 (Reapproved 2015).

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used.
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Maintenance requirements.
- C. Shop Drawings: Submit detailed layout developed for this project and provide dimensioned location and number for each type of roof accessory.
- D. Warranty Documentation:
 - 1. Submit manufacturer warranty.
 - 2. Ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products under cover and elevated above grade.

1.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 ROOF HATCHES AND VENTS

- A. Basis of Design: (These are default Bilco models/series; Refer to schedule on drawings for sizes and locations.)
 - 1. Type D is a "Roof Scuttle" Roof Hatch type.
- B. Roof Hatch Manufacturers:
 - 1. Acudor Products Inc: www.acudor.com/#sle.
 - 2. Babcock-Davis: www.babcockdavis.com/#sle.
 - 3. Bilco Company: www.bilco.com/#sle.
 - 4. Dur-Red Products: www.dur-red.com.
 - 5. Milcor, Inc: www.milcorinc.com.
 - 6. Nystrom, Inc: www.nystrom.com/#sle.
 - 7. Karp Associates, Inc: www.karpinc.com.
 - 8. Elmdor Access Doors: www.elmdorstoneman.com.
 - 9. Precision Ladders: www.precisionladders.com.
 - 10. Substitutions: See Section 01 6000 - Product Requirements.
- C. Frames and Curbs: One-piece curb and frame with integral cap flashing to receive roof flashings; extended bottom flange to suit mounting.
 - 1. Insulation: Manufacturer's standard; 1 inch rigid glass fiber, located on outside face of curb.

- D. Safety Railing System: Manufacturer's standard accessory safety rail system mounted directly to curb.
 - 1. Comply with 29 CFR 1910.23, with a safety factor of two.
 - 2. Posts and Rails: Aluminum tube.
 - 3. Gate: Same material as railing; automatic closing with latch.
 - a. Allow for gate option, however verify if it is to be included during the shop drawing process.
 - 4. Finish: Manufacturer's standard, factory applied finish.
- E. Hardware: Type 316 stainless steel, unless otherwise indicated or required by manufacturer.
 - 1. Lifting Mechanisms: Compression or torsion spring operator with shock absorbers that automatically opens upon release of latch; capable of lifting covers despite 10 psf load.
 - 2. Hinges: Heavy duty pintle type.
 - 3. Hold open arm with vinyl-coated handle for manual release.
 - 4. Latch: Upon closing, engage latch automatically and reset manual release.
 - 5. Manual Release: Pull handle on interior.
 - 6. Locking: Padlock hasp on interior.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Engineer/Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

3.04 CLEANING

- A. Clean installed work to like-new condition.

3.05 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 07 8400

FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping systems.
- B. Firestopping of all joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on drawings or not.
- C. Marking and identification of fire walls, fire barriers, fire partitions, smoke barriers, and smoke partitions, or any other wall required to have protected openings or penetrations.

1.02 REFERENCE STANDARDS

- A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2019.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).
- C. ITS (DIR) - Directory of Listed Products; current edition.
- D. FM (AG) - FM Approval Guide; current edition.
- E. UL (FRD) - Fire Resistance Directory; Current Edition.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Each respective trade shall provide submittals as it relates to their Scope of Work.
- C. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
- D. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- E. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- F. Installer Qualification: Submit qualification statements for installing mechanics.

1.04 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the specified fire ratings when tested in accordance with methods indicated.
 - 1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
 - 2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
 - 3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.
- B. Installer Qualifications: Personnel specializing and trained in performing the work of this section and:
 - 1. Trained by manufacturer.
- C. Each respective trade shall perform the Work of this section as it relates to their Scope of Work. Coordinate the Work between all trades so that firestopping locations and adjacent Work are within the limitations of firestopping products to be used at each location.
- D. Prior to installation of any of the fire-resistive "through" or "membrane" penetration fire block systems and any fire-resistive "joint" systems, detailed testing, and installation information on each of the specific listed assemblies intended for use must be submitted to Building Official for code review. The specific assemblies must also be listed for each intended use (i.e. proper penetration size and rating condition and for the type of construction material that it is being used in/on). Each trade person responsible for sealing said conditions must provide this information to the building inspector for review prior to installation of any assembly.

1.05 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

2.02 FIRESTOPPING SYSTEMS

- A. Firestopping: Any material meeting requirements.
 - 1. Fire Ratings: Use any system that is listed by UL (FRD) and tested in accordance with ASTM E814 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.

2.03 MATERIALS

- A. Firestopping Sealants: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.
- B. Intumescent Firestop Sealants
 - 1. FlameSafe FS 1900 Intumescent Elastomeric Sealant.
 - 2. 3M Fire Barrier Caulk CP25WB+
 - 3. A/D Firebarrier Intumescent Caulk.
 - 4. Hilti USA
 - 5. Specified Technologies, Inc: www.stifirestop.com.
- C. Endothermic Water-Based Sealants
 - 1. FlameSafe FS 900 Endothermic Sealant
 - 2. 3M Interam FireDam 150 Caulk
 - 3. A/D Firebarrier Seal & Seal NS
 - 4. Hilti USA
 - 5. Specified Technologies, Inc: www.stifirestop.com.
- D. Elastomeric Firestop Coating
 - 1. FlameSafe FS2900 Intumescent Elastomeric Firestop Coating
 - 2. 3M FireDam Spray
 - 3. A/D Firebarrier Spraymastic
 - 4. Hilti USA
 - 5. Specified Technologies, Inc: www.stifirestop.com.
- E. Intumescent Firestop Putty
 - 1. FlameSafe FSP 1000 Intumescent Putty
 - 2. 3M Fire Barrier Moldable Putty+
 - 3. A/D Firebarrier Putty
 - 4. Hilti USA
 - 5. Specified Technologies, Inc: www.stifirestop.com.
- F. Firestop Mortar
 - 1. FlameSafe Mortar Seal
 - 2. 3M Fire Barrier Mortar
 - 3. A/D Firebarrier Mortar
 - 4. Hilti USA
 - 5. Specified Technologies, Inc: www.stifirestop.com.
- G. Firestop Bags
 - 1. FlameSafe Intumescent Firestop Bags
 - 2. A/D Firebarrier Pillows
 - 3. Hilti USA
 - 4. Specified Technologies, Inc: www.stifirestop.com.

- H. Firestop Sleeves
 - 1. FlameSafe Intumescent Sleeve
 - 2. Hilti USA
 - 3. Specified Technologies, Inc: www.stifirestop.com.
- I. Wrap Strips
 - 1. FlameSafe Intumescent Wrap Strip
 - 2. 3M Fire Barrier FS-195+ Wrap/Strip
 - 3. A/D Firebarrier Wrap Strip
 - 4. Hilti USA
 - 5. Specified Technologies, Inc: www.stifirestop.com.
- J. Restraining Collars
 - 1. FlameSafe FSRC 100/FSRC 150 Restraining Collars
 - 2. 3M Fire Barrier RC-1 Restraining collar
 - 3. A/D Firebarrier Collars & Collar Strips
 - 4. Hilti USA
 - 5. Specified Technologies, Inc: www.stifirestop.com.
- K. Composite Sheet
 - 1. 3M Fire Barrier CS-195+ Composite Sheet
 - 2. Hilti USA
 - 3. Specified Technologies, Inc: www.stifirestop.com.
- L. Accessories
 - 1. Forming or Damming Materials as specified by the manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.
- C. Install backing materials to arrest liquid material leakage.

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by authorities having jurisdiction.
- C. Install labeling required by code.
 - 1. Marking and Identification: Fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling. Such identification shall:
 - a. Be located in accessible concealed floor, floor-ceiling or attic spaces;
 - b. Be located within 15 feet of the end of each wall and at intervals not exceeding 30 feet measured horizontally along the wall or partition; and
 - c. Include lettering not less than 3 inches in height with a minimum 3/8 inch stroke in a contrasting color incorporating the suggested wording. "FIRE AND/OR SMOKE BARRIER-PROTECT ALL OPENINGS" or other wording.

3.04 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

3.05 PROTECTION

- A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 9200

JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

1.02 REFERENCE STANDARDS

- A. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- B. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- C. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2002 (Reapproved 2013).

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
- C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- E. Samples for Verification: Where custom sealant color is specified, obtain directions from Engineer/Architect and submit at least two physical samples for verification of color of each required sealant.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and with at least five years of documented experience.

1.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Base Manufacturer: Tremco Global Sealants: www.tremcosealants.com.
- B. Other Acceptable Manufacturers:
 - 1. Master Builders Solutions by BASF: www.master-builders-solutions.basf.us/en-us.
 - 2. Bostik Inc: www.bostik-us.com.
 - 3. Manus Products, Inc.: www.manus.net.
 - 4. Pecora Corporation: www.pecora.com.
 - 5. PSI, Polymeric Systems, Inc.: www.polymericsystems.com.
 - 6. Red Devil: www.reddevil.com.

7. Sherwin-Williams Company: www.sherwin-williams.com.
8. Sika Corporation US: usa.sika.com.
9. W.R.Meadows: www.wrmeadows.com.
10. Substitutions: See Section 01 6000 - Product Requirements.

2.02 JOINT SEALANT APPLICATIONS

- A. Scope:
1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
 - a. Wall expansion and control joints.
 - b. Joints between door, window, and other frames and adjacent construction.
 - c. Joints between different exposed materials.
 - d. Openings below ledge angles in masonry.
 - e. Other joints indicated below.
 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. Other joints indicated below.
 - c. Other joints where indicated on the drawings.
 3. Do not seal the following types of joints.
 - a. Intentional weepholes in masonry.
 - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - d. Joints where installation of sealant is specified in another section.
 - e. Joints between suspended panel ceilings/grid and walls.
- B. Exterior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.
1. Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane "traffic-grade" sealant.
- C. Interior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.

2.03 JOINT SEALANTS - GENERAL

- A. Colors: Color shall be selected by the Engineer/Architect from manufacturer's full range unless specifically indicated to be a specific color.

2.04 NONSAG JOINT SEALANTS

- A. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multicomponent; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 25 percent, minimum.
 2. Manufacturers:
 - a. Dymonic FC or Dymeric 240 FC manufactured by Tremco Commercial Sealants.
 - b. Sonolastic NP1 or NP2 manufactured by Master Builders Solutions by BASF.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.05 SELF-LEVELING SEALANTS

- A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multicomponent; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
1. Movement Capability: Plus and minus 25 percent, minimum.
 2. Manufacturers:
 - a. THC-901, Vulkem 445SSL (also Dymonic FC, or Dymeric 240 FC) manufactured by Tremco Commercial Sealants.
 - b. MasterSeal SL 1, SL 2 (also NP 1, or NP 2 manufactured by Master Builders Solutions by BASF.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

2.06 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
 - 1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
 - 2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type C - Closed Cell Polyethylene.
 - 3. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- D. Install bond breaker backing tape where backer rod cannot be used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- H. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04 CLEANING

- A. Clean adjacent soiled surfaces.

3.05 PROTECTION

- A. Protect sealants until cured.

END OF SECTION

DIVISION 08: Openings

SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire-rated hollow metal doors and frames.

1.02 RELATED REQUIREMENTS

- A. Section 08 7100 - Door Hardware.
- B. Section 09 9123 - Interior Painting: Field painting.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2016.
- G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.
- H. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.
- I. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- J. ITS (DIR) - Directory of Listed Products; current edition.
- K. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.
- L. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.
- M. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.
- N. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
- O. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.
- P. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
- Q. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.
- B. Maintain at project site copies of reference standards relating to installation of products specified.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
 - 1. Ceco Door; Curries or Fleming, an Assa Abloy Group company: www.assaabloydss.com.
 - 2. De La Fontaine Inc: www.delafontaine.com/#sle.
 - 3. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
 - 4. Steelcraft, an Allegion brand: www.allegion.com/sle.
 - 5. Technical Glass Products: www.tgpamerica.com.
 - 6. Mesker: www.meskerdoor.com.
 - 7. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DESIGN CRITERIA

- A. Requirements for Hollow Metal Doors and Frames:
 - 1. Steel used for fabrication of doors and frames shall comply with one or more of the following requirements; Galvannealed steel conforming to ASTM A653/A653M, cold-rolled steel conforming to ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel conforming to ASTM A1011/A1011M, Commercial Steel (CS) Type B for each.
 - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 - 3. Door Top Closures: Flush end closure channel, with top and door faces aligned.
 - 4. Door Edge Profile: Beveled, both sides.
 - 5. Typical Door Face Sheets: Flush.
 - 6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Flush.
 - 7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
 - 8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

- A. Door Finish: Factory primed and field finished.
- B. Fire-Rated Doors:
 - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 2 - Heavy-duty.
 - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 1 - Full Flush.
 - d. Door Face Metal Thickness: 18 gage, 0.042 inch, minimum.
 - 2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
 - 3. Provide units listed and labeled by UL (DIR) or ITS (DIR).
 - a. Attach fire rating label to each fire rated unit.
 - 4. Door Core Material: Manufacturers standard core material/construction in compliance with requirements.
 - 5. Door Thickness: 1-3/4 inch, nominal.

2.04 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Frame Finish: Factory primed and field finished.
- C. Door Frames, Fire-Rated: Face welded type.
 - 1. Fire Rating: Same as door, labeled.
 - 2. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
- D. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
- E. Frames Depth: Size frame depth to accommodate wall assembly thickness and to allow proper attachment to assembly components.

2.05 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Finish: Paint in field. Color as selected/indicated by the Architect.

2.06 ACCESSORIES

- A. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- B. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Install door hardware as specified in Section 08 7100.

3.03 TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.04 ADJUSTING

- A. Adjust for smooth and balanced door movement.

3.05 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 08 3100
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Floor access door and frame units, interior and exterior.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000: Openings in concrete; materials for cast-in-place.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Manufacturer's Installation Instructions: Indicate installation requirements and rough-in dimensions.

PART 2 PRODUCTS

2.01 ACCESS DOOR AND PANEL APPLICATIONS

2.02 FLOOR ACCESS UNITS

- A. Floor Access Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
 - 1. Size: As indicated on the drawings.
 - 2. Hardware: Stainless steel, Type 316.
 - a. Hinges: Removable pin.
- B. Floor Access Units: Aluminum, minimum 1/4 inch thick.
 - 1. Design Load: Design to support live load of 300 lb/sq ft with deflection not to exceed 1/180 of span.
 - 2. Operation: Manual opening, and manual closing.
 - 3. Cover Pattern: Diamond tread plate.
 - 4. Lift Handle: Recessed, non-removable.
 - 5. Finish: Mill finish.
 - 6. Locking: Padlock Bar.
 - 7. Fall Protection: Grating or posts and chains where indicated on the drawings.
 - 8. Manufacturers:
 - a. Basis of Design: Bilco models/series; Refer to schedule on drawings for sizes and locations..
 - b. Other acceptable Manufacturers:
 - 1) Halliday Products: www.hallidayproducts.com.
 - c. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings are correctly sized and located.

3.02 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings. Secure rigidly in place.
- C. Position units to provide convenient access to the concealed work requiring access.

END OF SECTION

SECTION 08 7100
DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hardware for hollow metal doors.
- B. Hardware for fire-rated doors.
- C. Weatherstripping and gasketing.

1.02 RELATED REQUIREMENTS

- A. Section 08 1113 - Hollow Metal Doors and Frames.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. BHMA A156.1 - American National Standard for Butts and Hinges; 2013.
- C. BHMA A156.3 - American National Standard for Exit Devices; 2014.
- D. BHMA A156.4 - American National Standard for Door Controls - Closers; 2013.
- E. BHMA A156.5 - American National Standard for Cylinders and Input Devices for Locks; 2014.
- F. BHMA A156.13 - American National Standard for Mortise Locks & Latches Series 1000; 2012.
- G. BHMA A156.16 - American National Standard for Auxiliary Hardware; 2013.
- H. BHMA A156.18 - American National Standard for Materials and Finishes; 2012.
- I. BHMA A156.21 - American National Standard for Thresholds; 2014.
- J. BHMA A156.22 - American National Standard for Door Gasketing and Edge Seal Systems, Builders Hardware Manufacturers Association; 2012.
- K. BHMA A156.28 - American National Standard for Recommended Practices for Mechanical Keying Systems; 2013.
- L. DHI (KSN) - Keying Systems and Nomenclature; 1989.
- M. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames; 2004.
- N. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.
- O. ITS (DIR) - Directory of Listed Products; current edition.
- P. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
- Q. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- R. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2016.
- S. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.
- T. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
- U. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- V. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.
- B. Keying Requirements Meeting:
 - 1. Schedule meeting at project site prior to Contractor occupancy.
 - 2. Attendance Required:
 - a. Contractor.
 - b. Owner.
 - c. Engineer/Architect.

- d. Installer's Architectural Hardware Consultant (AHC).
- 3. Agenda:
 - a. Establish keying requirements.
- 4. Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following:
- 5. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer/Architect, Owner, participants, and those affected by decisions made.
- 6. Deliver established keying requirements to manufacturers.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.
- C. Shop Drawings - Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.
 - 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
 - 2. Provide complete description for each door listed.
- D. Shop Drawings - Electrified Door Hardware: Submit diagrams for power, signal, and control wiring for electrified door hardware that include details of interface with building safety and security systems. Provide elevations and diagrams for each electrified door opening as follows:
 - 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC).
 - 2. Elevations: Submit front and back elevations of each door opening showing electrified devices with connections installed and an operations narrative describing how opening operates from either side at any given time.
 - 3. Diagrams: Submit point-to-point wiring diagram that shows each device in door opening system with related colored wire connections to each device.
- E. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- F. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- G. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Tools: One set of each special wrench or tool applicable for each different or special hardware component, whether supplied by hardware component manufacturer or not.

1.06 QUALITY ASSURANCE

- A. Standards for Fire-Rated Doors: Maintain one copy of each referenced standard on site, for use by Engineer/Architect and Contractor.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least three years of documented experience.
- D. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) to assist in work of this section.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

- B. Warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion.
 - 1. Closers: Five years, minimum.
 - 2. Exit Devices: Three years, minimum.
 - 3. Locksets and Cylinders: Three years, minimum.
 - 4. Other Hardware: Two years, minimum.

PART 2 PRODUCTS

2.01 DESIGN AND PERFORMANCE CRITERIA

- A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.
- B. Provide individual items of single type, of same model, and by same manufacturer.
- C. Provide door hardware products that comply with the following requirements:
 - 1. Applicable provisions of federal, state, and local codes.
 - 2. Accessibility: ADA Standards and ICC A117.1.
 - 3. Applicable provisions of NFPA 101.
 - 4. Fire-Rated Doors: NFPA 80, listed and labeled by qualified testing agency for fire protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
 - 5. Hardware on Fire-Rated Doors: Listed and classified by UL (DIR), ITS (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for application indicated.
 - 6. Hardware for Smoke and Draft Control Doors: Provide door hardware that complies with local codes, and requirements of assemblies tested in accordance with UL 1784.
 - a. Air Leakage Rate: Tested in accordance with UL 1784, with air leakage rate not to exceed 3.0 cfm/sf of door opening at 0.10 inch of water for both ambient and elevated temperature tests.
- D. Fasteners:
 - 1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
 - a. Aluminum fasteners are not permitted.
 - b. Provide phillips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.
 - 2. Fire-Rated Applications: Comply with NFPA 80.
 - a. Provide wood or machine screws for hinges mortised to doors or frames, strike plates to frames, and closers to doors and frames.
 - b. Provide steel through bolts for attachment of surface mounted closers, hinges, or exit devices to door panels unless proper door blocking is provided.

2.02 HINGES

- A. Manufacturers:
 - 1. McKinney; an Assa Abloy Group company: www.assaabloydss.com.
 - 2. Bommer Industries, Inc: www.bommer.com.
 - 3. Hager Companies: www.hagerco.com/#sle.
 - 4. Stanley, dormakaba Group: www.stanleyhardwarefordoors.com/#sle.
 - 5. Ives, an Allegion brand: www.allegion.com/us.
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Hinges: Complying with BHMA A156.1, Grade 1.
 - 1. Provide hinges on every swinging door.
 - 2. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
 - 3. Provide ball-bearing hinges at each door.
 - 4. Provide stainless steel hinges on exterior doors and interior doors in wet locations.
 - 5. Provide following quantity of butt hinges for each door:
 - a. Doors From 60 inches High up to 90 inches High: Three hinges.

2.03 FLUSH BOLTS

- A. Flush Bolts: Comply with BHMA A156.16, Grade 1.
 - 1. Flush Bolt Throw: 3/4 inch, minimum.

2. Provide dustproof floor strike for bolt into floor, except at metal thresholds.
3. Self-Latching Flush Bolts: Automatically latch upon closing of door; manually retracted; located on inactive leaf of pair of doors.

2.04 EXIT DEVICES

- A. Manufacturers:
 1. Basis of Design: Grade 1 - Lever Handle as Selected - Mortise Cylinders Lever Lock - Smooth Mechanism Case.
 2. Corbin Russwin, Sargent, or Yale; an Assa Abloy Group company: www.assaabloydss.com.
 3. Precision, dormakaba Group: www.precisionhardware.com/#sle.
 4. Von Duprin, an Allegion brand: www.allegion.com/us.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Exit Devices: Complying with BHMA A156.3, Grade 1.
 1. Lever design to match lockset trim.
 2. Provide cylinder with cylinder dogging or locking trim.
 3. Provide exit devices properly sized for door width and height.
 4. Provide strike as recommended by manufacturer for application indicated.
 5. Provide UL (DIR) listed exit device assemblies for fire-rated doors and panic device assemblies for non-fire-rated doors.

2.05 LOCK CYLINDERS

- A. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.
 1. Provide standard type cylinders, Grade 1, with six-pin core in compliance with BHMA A156.5 at locations indicated.
 2. Provide cylinders from same manufacturer as locking device.
 3. Provide cams and/or tailpieces as required for locking devices.

2.06 MORTISE LOCKS

- A. Manufacturers:
 1. Basis of Design: Grade 1 - Lever Handle as Selected.
 2. Corbin Russwin, Sargent, or Yale; an Assa Abloy Group company: www.assaabloydss.com.
 3. Best, dormakaba Group: www.bestaccess.com/#sle.
 4. Hager Companies: www.hagerco.com/#sle.
 5. Schlage, an Allegion brand: www.allegion.com/us.
 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Mortise Locks: Comply with BHMA A156.13, Grade 1, Security, 1000 Series.
 1. Latchbolt Throw: 3/4 inch, minimum.
 2. Deadbolt Throw: 1 inch, minimum.
 3. Backset: 2-3/4 inch unless otherwise indicated.
 4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
 - a. Finish: To match lock or latch.

2.07 COORDINATORS

- A. Coordinators: Provide on doors having closers and self-latching or automatic flush bolts to ensure that inactive door leaf closes before active door leaf.
 1. Type: Bar, unless otherwise indicated.
 2. Material: Aluminum, unless otherwise indicated.
 3. Ensure that coordination of other door hardware affected by placement of coordinators and carry bar is applied properly for completely operable installation.

2.08 CLOSERS

- A. Manufacturers; Surface Mounted:
 1. Basis of Design: Grade 1 - Parallel Arm Push Side Mount - Metal Cover Plate - Sprayed to match.
 2. Corbin Russwin, Norton, Rixson, Sargent, or Yale; an Assa Abloy Group company: www.assaabloydss.com.

3. Hager Companies: www.hagerco.com/#sle.
 4. LCN, an Allegion brand: www.allegion.com/us.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Closers: Complying with BHMA A156.4, Grade 1.
1. Provide door closer on each fire-rated and smoke-rated door.

2.09 KICK PLATES

- A. Manufacturers:
1. Basis of Design: 10 inch high x .05 inch thick, stainless steel.
 2. Hiawatha, Inc, an Activar Construction Products Group company: www.activarcpg.com/hiawatha/#sle.
 3. Ives, an Allegion brand: www.allegion.com/us/#sle.
 4. Trimco: www.trimcohardware.com/#sle.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Kick Plates: Provide along bottom edge of push side of every door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.
1. Size: 8 inch high by 2 inch less door width (LDW) on push side of door.

2.10 ASTRAGALS

- A. Manufacturers:
1. Basis of Design: Pemko 355CS.
 2. Pemko; an Assa Abloy Group company: www.assaabloydss.com.
 3. Hager Companies: www.hagerco.com/#sle.
 4. National Guard Products, Inc: www.ngpinc.com.
 5. Zero International, Inc: www.zerointernational.com.
 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Astragals: Comply with BHMA A156.22.
1. Type: Split, two parts, and with sealing gasket.
 2. Material: Aluminum, with neoprene weatherstripping.
 3. Provide non-corroding fasteners at exterior locations.

2.11 THRESHOLDS

- A. Manufacturers:
1. Basis of Design: Reese S205A.
 2. Pemko; an Assa Abloy Group company: www.assaabloydss.com.
 3. Hager Companies: www.hagerco.com/#sle.
 4. National Guard Products, Inc: www.ngpinc.com.
 5. Zero International, Inc: www.zerointernational.com.
 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Thresholds: Comply with BHMA A156.21.
1. Provide threshold at each exterior door, unless otherwise indicated.
 2. Type: Flat surface.
 3. Material: Aluminum.
 4. Threshold Surface: Fluted horizontal grooves across full width.
 5. Field cut threshold to profile of frame and width of door sill for tight fit.
 6. Provide non-corroding fasteners at exterior locations.

2.12 WEATHERSTRIPPING AND GASKETING

- A. Manufacturers:
1. Pemko; an Assa Abloy Group company: www.assaabloydss.com.
 2. Hager Companies: www.hagerco.com/#sle.
 3. National Guard Products, Inc: www.ngpinc.com.
 4. Zero International, Inc: www.zerointernational.com.
 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Weatherstripping and Gasketing: Complying with BHMA A156.22.
1. Head and Jamb Type: Adjustable.
 2. Door Sweep Type: Encased in retainer.

3. Material: Aluminum, with brush weatherstripping.

2.13 LATCH PROTECTOR

- A. Latch Protector: Provide on door to protect latch from being tampered with while in locked position.
 1. Type: Standard latch protector.
 2. Material: Stainless steel.

2.14 KEY CONTROL SYSTEMS

- A. Key Control Systems: Complying with guidelines of BHMA A156.28.
 1. Provide keying information in compliance with DHI (KSN) standards.
 2. Keying: Grand master keyed.
 3. Supply keys in following quantities:
 - a. 1 each Grand Master keys.

2.15 FINISHES

- A. Finishes: Provide door hardware of same finish, unless otherwise indicated.
 1. Primary Finish: 626; satin chromium plated over nickel, with brass or bronze base material (former US equivalent US26D); BHMA A156.18.
 2. Exceptions:
 - a. Where base material metal is specified to be different, provide finish that is an equivalent appearance in accordance with BHMA A156.18.
 - b. Hinges for Fire-Rated Doors: Steel base material with painted finish, in compliance with NFPA 80.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.
- C. Install hardware for smoke and draft control doors in accordance with NFPA 105.
- D. Use templates provided by hardware item manufacturer.
- E. Do not install surface mounted items until application of finishes to substrate are fully completed.
- F. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.
 1. For Steel Doors and Frames: Install in compliance with DHI (LOCS) recommendations.

3.03 ADJUSTING

- A. Adjust work under provisions of Section 01 7000 - Execution and Closeout Requirements.
- B. Adjust hardware for smooth operation.
- C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.04 CLEANING

- A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

3.05 PROTECTION

- A. Protect finished Work under provisions of Section 01 7000 - Execution and Closeout Requirements.
- B. Do not permit adjacent work to damage hardware or finish.

PART 4 SCHEDULE

4.01 BASIC DOOR HARDWARE AND DOOR OPERATION INTENT HAS BEEN LISTED BELOW. PROVIDE ANY ADDITIONAL HARDWARE TO MEET APPLICABLE CODES AND TO ACHIEVE OPERATION, FUNCTION, AND INTENT. IF INTENT IS UNCLEAR TO BIDDER, CONTACT THE ARCHITECT REPRESENTATIVE FOR CLARIFICATION. PLEASE NOTE THAT SOME REQUIRED DOOR HARDWARE ITEMS ARE ONLY LISTED ABOVE AND NOT WITHIN THE HARDWARE GROUP.

5.01 HARDWARE GROUP 1 (DOUBLE DOOR - INTERIOR)

- A. Hinges
- B. Rim Exit Device - Active Leaf - Classroom Function
- C. Automatic Flush Bolts - Inactive Leaf
- D. Closers, Overhead Holders with fuse link, and Stops
- E. Coordinator
- F. Gasketing
- G. Intumescent Seals
- H. Fire Rating labels

5.02 HARDWARE GROUP 2 (DOUBLE DOOR - EXTERIOR)

- A. Hinges
- B. Mortise Lockset - Active Leaf - Entrance Function
- C. Latch Protector Plate
- D. Automatic Flush Bolts - Inactive Leaf
- E. Closers, Overhead Holders, and Stops
- F. Coordinator
- G. Weatherstripping
- H. Between Door Seal
- I. Drip
- J. Threshold
- K. Sweeps

END OF SECTION

DIVISION 09: Finishes

SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Acoustic insulation.
- D. Gypsum wallboard.
- E. Joint treatment and accessories.
- F. Prefabricated Wood Blocking System.

1.02 RELATED REQUIREMENTS

- A. Section 05 4000 - Cold-Formed Metal Framing: Structural steel stud framing.

1.03 REFERENCE STANDARDS

- A. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- B. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- C. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
- D. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- E. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.
- F. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
 - 1. GA-214 - Recommended Levels of Gypsum Board Finish; Gypsum Association; 2007.
- G. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.
- H. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2016.
- I. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- J. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.
- K. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2015.
- L. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- M. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
- N. ASTM E413 - Classification for Rating Sound Insulation; 2016.
- O. GA-216 - Application and Finishing of Gypsum Board; 2013.
- P. GA-600 - Fire Resistance Design Manual; 2015.
- Q. UL (FRD) - Fire Resistance Directory; Current Edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate the location of all expansion joints in plan and elevation view. Include details at intersections of walls, floors, ceilings, and other construction.
- C. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum five years of documented experience.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
- B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
 - 1. Acoustic Attenuation: STC as indicated calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
 - 2. Walls indicated to receive sound insulation that are not indicated to meet an STC rating are not intended to be constructed as an acoustic assembly.
- C. Fire Rated Assemblies: Provide completed assemblies complying with applicable code.
 - 1. Gypsum Association File Numbers: Comply with requirements of GA-600 for the particular assembly.
 - 2. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

2.02 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
 - 2. Marino: www.marinoware.com.
 - 3. Phillips Manufacturing Co: www.phillipsmfg.com/#sle.
 - 4. The Steel Network, Inc: www.steelnetwork.com.
 - 5. Custom Stud, Inc: www.customstud.com.
 - 6. Telling Industries: www.buildstrong.com.
 - 7. Super Stud Building Products, Inc: www.buysuperstud.com.
 - 8. Substitutions: See Section 01 6000 - Product Requirements.
- B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
 - 1. Shapes and Sizes: As indicated on the drawings.
- C. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and fastened as indicated on drawings.

2.03 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
 - 1. American Gypsum Company: www.americangypsum.com.
 - 2. CertainTeed Corporation: www.certainteed.com.
 - 3. Georgia-Pacific Gypsum: www.gpgypsum.com.
 - 4. Lafarge North America Inc: www.lafargenorthamerica.com.
 - 5. National Gypsum Company: www.nationalgypsum.com.
 - 6. PABCO Gypsum: www.pabco gypsum.com.
 - 7. USG Corporation: www.usg.com.
 - 8. Substitutions: See Section 01 6000 - Product Requirements.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 - 2. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 - 3. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
 - b. Ceilings: 5/8 inch.

2.04 ACCESSORIES

- A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness: 3 or more inches as required to fill wall depth.
 - 1. ASTM E84 surface burning characteristics: Flame Spread Index 25 or less; Smoke Developed Index 450 or less.
- B. Finishing Accessories: ASTM C1047, galvanized steel, rolled zinc, rigid plastic, or aluminum, unless noted otherwise.
 - 1. Types: As detailed or required for finished appearance.
 - a. Products for specific applications:
 - 1) Expansion Joints (V-Groove Joint): Trim-Tex #093V Expansion joint or approved equal shall be used at expansion joints in flat wall or ceiling applications.
 - 2) Angled Joints: Trim-Tex Magic Corner or approved equal shall be used at angular walls and ceilings.
 - 3) Wall Termination: Trim-Tex Tear Away XT Extra Tall Masking or approved equal shall be used at all location where new construction terminates into existing construction or non-gypsum construction.
 - 2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead at exposed panel edges.
 - 3. Products:
 - a. Same manufacturer as framing materials.
 - b. Phillips Manufacturing Co: www.phillipsmfg.com/#sle.
 - c. Trim-Tex, Inc.: www.trim-tex.com.
 - d. Fry Reglet: www.fryreglet.com.
 - e. Substitutions: See Section 01 6000 - Product Requirements.
- C. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
 - 1. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
 - 2. Ready-mixed vinyl-based joint compound.
 - 3. Powder-type vinyl-based joint compound.
- D. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.
- E. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion resistant.
- F. Prefabricated Blocking Systems: DANBACK 3/4 inch standard/treated plywood or approved equal: www.danback.com.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Studs: Space studs as permitted by standard.
 - 1. Extend partition framing to structure where indicated and to ceiling in other locations.
 - 2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
 - 3. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.
- C. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- D. Blocking: Install blocking for support of:

1. Wall mounted door hardware.
2. All other items indicated on the drawings and in the specifications.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

3.04 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Provide solid continuous shims under first layer of gypsum board as necessary to minimize variations in plane. Tolerance of surface shall be as indicated.
- C. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
 1. Exception: Tapered edges to receive joint treatment at right angles to framing.
- D. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- E. Installation on framing: Use screws for attachment of gypsum board.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as follows:
 1. Not more than 30 feet apart on walls, soffits, and ceilings in any direction.
 2. At intersections of soffits and intersecting walls.
 3. At intersection of half height wall and intersecting walls.
 4. At locations indicated on the drawings.
 5. Other locations where cracking may occur due to changes in height and structure.
 6. All jointing locations shall be indicated on shop drawings.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.06 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C 840 (additional reference guideline; GA-214 - Recommended Levels of Gypsum Board Finish), as follows:
 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - a. No visible defects should be apparent under normal lighting conditions. Provide Level 5 finish where defects become apparent at no additional cost to the Owner.
 - b. Contractors that cannot guarantee their Level 4 finish will be free of visible defects under normal lighting conditions should provide a Level 5 finish.
 - c. If the Architect or Owner is unsatisfied with a Level 4 finish due to visible defects under normal lighting conditions then a Level 5 finish shall be installed at no additional cost to the Owner. No exceptions.
 2. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
 3. Level 1: Wall areas above finished ceilings, whether or not accessible in the completed construction.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
 2. Tapered edges of gypsum board that are not located at taped and filled joints shall also be filled and sanded smooth to match the plane of the wall.

3.07 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 6500
RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Installation accessories.

1.02 REFERENCE STANDARDS

- A. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2014).

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Selection Samples: Submit manufacturer's complete set of color samples for Engineer/Architect's initial selection.
- D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Wall Base: 20 linear feet of each type and color.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.
- B. Installer Qualifications: Company specializing in performing resilient flooring installation, with minimum of five years of documented experience.

1.05 FIELD CONDITIONS

- A. Maintain temperature in storage area between 55 degrees F and 90 degrees F.
- B. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.01 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
 - 1. Fill all voids with approved products to create a solid and continuous surface at all resilient base locations.

3.02 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

3.03 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

SECTION 09 9123
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
 - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
 - 2. Exposed surfaces of primed and unprimed metal items in finished areas unless specifically indicated to not be painted.
 - 3. Mechanical and Electrical:
 - a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, electrical equipment, and pipes, unless otherwise indicated.
 - b. In finished areas, paint shop-primed items.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
 - 5. Floors, unless specifically indicated.
 - 6. Glass.
 - 7. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 09 2116 - Gypsum Board Assemblies: Joint and surface treatment prior to painting.

1.03 DEFINITIONS

- A. Comply with ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.
- D. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
- E. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
 - 4. Manufacturer's installation instructions.

5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
1. Where sheen is specified, submit samples in only that sheen.
 2. Where sheen is not specified, discuss sheen options with Engineer/Architect before preparing samples, to eliminate sheens definitely not required.
 3. Allow 15 days for approval process, after receipt of complete samples by Engineer/Architect.
 4. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as factory finished items, have been approved.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 6000 - Product Requirements, for additional provisions.
 2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
 3. Label each container with color in addition to the manufacturer's label.
 4. Do not provide or leave extra paint materials for the Owner.
 5. Do provide product info, color names, and installation locations for all products and colors. Information shall be included in the Operation and Maintenance Manual.

1.06 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Engineer/Architect is obtained using the specified procedures for substitutions.
- B. Paints:
1. Base Manufacturer: Sherwin Williams: www.sherwin-williams.com.
 2. Other Manufacturers: Approved products shall meet performance and physical characteristics of base manufacturer (basis of design) product including published ratio of solids by volume, plus or minus two percent.
- C. Other Acceptable Manufacturers: Submit product information for each line of paint for Architect's approval. Substitutions of Base Manufacturer's products may not be accepted during the shop drawing process.
1. Behr Process Corporation: www.behr.com/#sle.
 2. Benjamin Moore & Co: www.benjaminmoore.com.
 3. Diamond Vogel Paints: www.diamondvogel.com/#sle.
 4. PPG Paints: www.ppgpaints.com/#sle.

5. Pratt & Lambert Paints: www.prattandlambert.com/#sle.
6. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
7. Tnemec: www.tnemec.com.
8. Valspar Corporation: www.valsparpaint.com/#sle.

D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
 1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - a. Spayed finish; is preferred on all metal surfaces; is required on the following surfaces:
 - 1) Metal doors and frames; prior to hardware installation.
 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 3. Provide commercial grade paint systems by approved paint manufacturer for substrates not specifically covered under paint systems.
 - a. Consult with Architect/Engineer/Designer for approval of additional products and systems. Provide quantifiable product information.
 4. Supply each paint material in quantity required to complete entire project's work from a single production run.
 5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- C. Volatile Organic Compound (VOC) Content:
 1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Engineer/Architect from the manufacturer's full line.
- E. Colors: As indicated on drawings.
 1. Where indicated or scheduled colors do not match the paint product lines indicated below it is anticipated that colors will be color matched; product lines below are intended to set a level of standard for the product lines used for each application.
 2. Locations Not Indicated: Selection to be made by Engineer/Architect after award of contract.
 3. Extend colors to surface edges; colors may change at any edge as directed by Engineer/Architect.
 4. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.
- F. Coats: The number of coats specified, are based on manufacturer's recommendations. Provide for additional coats, as necessary, for complete coverage and true color. Additional coats due to a lack of coverage shall be provided at no additional cost to the Owner. No exceptions.
- G. Coverage: Do not stretch products beyond their recommended coverage rate nor install fewer coats than specified regardless of appearance after previous coats are applied. Thin product application may show surface imperfections or inconsistencies that would otherwise not be visible. Additional coats due to a lack of proper coverage shall be provided at no additional cost to the Owner. No exceptions.

2.03 PAINT SYSTEMS - INTERIOR

- A. Paint Product: **Pro Industrial Pre-Catalyzed Waterbased Epoxy (Single-Component)**
 - 1. Primer: Prime and/or touch up as per Manufacturers recommended Specifications in accordance with specified Product.
 - 2. Number of Paint Coats Over Primer: Two.
 - 3. Types of Substrates:
 - a. Steel.
 - b. Drywall.
 - 4. Sheen: As scheduled on the drawings.
 - 5. Location Types:
 - a. Hollow metal doors and frames.
 - b. Other metals unless noted otherwise.

2.04 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Engineer/Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Gypsum Wallboard: 12 percent.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask and/or protect all surfaces, appurtenances not affiliated with coating process, including but not limited to electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- F. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP 1.
 - 2. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

- D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- E. Painting shall be free from paint runs; no exceptions.
- F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

SECTION 09 9600

COATING SYSTEMS FOR WASTEWATER TREATMENT FACILITY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Coating systems for wastewater processing facilities.

1.02 RELATED SECTIONS

- A. Section 01 3000 - Submittal Procedures.

1.03 REFERENCES

- A. ASTM D 16 - Terminology Relating to Paint, Varnish, Lacquer, and Related Products.
- B. ASTM D 4263 - Indicating Moisture in Concrete by the Plastic Sheet Method.
- C. ASTM F 1869 - Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- D. AWWA D 102- Painting Steel Water Storage Tanks
- E. International Concrete Repair Institute (ICRI) Guideline No. 310.2-1997 (formerly 03732) - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.
- F. NACE SP0188 - Standard Recommended Practice, Discontinuity (Holiday) Testing of Protective Coatings.
- G. NAPF 500-03-04 Abrasive Blast Cleaning.
- H. SSPC-SP 1 - Solvent Cleaning.
- I. SPPC-SP 5/NACE 1 - White Metal Blast Cleaning.
- J. SSPC-SP 6/NACE 3 - Commercial Blast Cleaning.
- K. SSPC-SP 10/NACE 2 - Near-White Metal Blast Cleaning.
- L. SSPC-SP 16 Brush-Off Blast Cleaning of Non-Ferrous Metals
- M. SSPC-SP 13/NACE 6 - Surface Preparation of Concrete.
- N. SSPC-TU 11 - Inspection of Fluorescent Coating Systems

1.04 DEFINITIONS

- A. Definitions of Painting Terms: ASTM D 16, unless otherwise specified.
- B. Dry Film Thickness (DFT): Thickness of a coat of cured paint measured in mils (1/1000 inch).

1.05 SUBMITTALS

- A. Comply with Section 01 3000 - Submittal Procedures.
- B. Product Data: Submit manufacturer's product data for each coating, including generic description, complete technical data, surface preparation, and application instructions.
- C. Color Samples: Submit manufacturer's color samples showing full range of standard colors.
- D. Manufacturer's Quality Assurance: Submit manufacturer's certification that coatings comply with specified requirements and are suitable for intended application.
- E. Applicator's Quality Assurance: Submit list of a minimum of 5 completed projects of similar size and complexity to this Work. Include for each project:
 - 1. Project name and location.
 - 2. Name of owner.
 - 3. Name of contractor.
 - 4. Name of engineer.
 - 5. Name of coating manufacturer.
 - 6. Approximate area of coatings applied.
 - 7. Date of completion.
- F. Warranty: Submit manufacturer's standard warranty.

1.06 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
 - 1. Specialize in manufacture of coatings with a proven successful experience.
 - 2. Able to demonstrate successful performance on comparable projects.
 - 3. Single Source Responsibility: Coatings and coating application reducers and additives shall be products of a single manufacturer.
- B. Applicator's Qualifications:
 - 1. Experienced in application of specified coatings on projects of similar size and complexity to this Work.
 - 2. Applicator's Personnel: Employ persons trained for application of specified coatings.
- C. Preapplication Meeting: Convene a preapplication meeting two 2 weeks before start of application of coating systems. Require attendance of parties directly affecting work of this section, including Contractor, Engineer, applicator, and manufacturer's representative. Review the following:
 - 1. Environmental requirements.
 - 2. Protection of surfaces not scheduled to be coated.
 - 3. Surface preparation.
 - 4. Application.
 - 5. Repair.
 - 6. Field quality control.
 - 7. Cleaning.
 - 8. Protection of coating systems.
 - 9. One-year inspection.
 - 10. Coordination with other work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying:
 - 1. Coating or material name.
 - 2. Manufacturer.
 - 3. Color name and number.
 - 4. Batch or lot number.
 - 5. Date of manufacture.
 - 6. Mixing and thinning instructions.
- B. Storage:
 - 1. Store materials in a clean dry area and within temperature range in accordance with manufacturer's instructions.
 - 2. Keep containers sealed until ready for use.
 - 3. Do not use materials beyond manufacturer's shelf life limits.
- C. Handling: Protect materials during handling and application to prevent damage or contamination.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Weather:
 - 1. Air and Surface Temperatures: Prepare surfaces and apply and cure coatings within air and surface temperature range in accordance with manufacturer's instructions.
 - 2. Surface Temperature: Minimum of 5 degrees F (3 degrees C) above dew point.
 - 3. Relative Humidity: Prepare surfaces and apply and cure coatings within relative humidity range in accordance with manufacturer's instructions.
 - 4. Precipitation: Do not prepare surfaces or apply coatings in rain, snow, fog, or mist.
 - 5. Wind: Do not spray coatings if wind velocity is above manufacturer's limit.
- B. Ventilation: Provide ventilation during coating evaporation stage in confined or enclosed areas in accordance with AWWA D 102.
- C. Dust and Contaminants:
 - 1. Schedule coating work to avoid excessive dust and airborne contaminants.

2. Protect work areas from excessive dust and airborne contaminants during coating application and curing.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. The Sherwin-Williams Company (www.sherwin.com/protective).
- B. For immersion surfaces, Opt-Check optically activated pigment (OAP) technology is strongly recommended for rapid holiday detection in accordance with SSPC-TU 11
- C. Other Acceptable Manufacturers: Submit product information for each line of paint for Architect's approval. Substitutions of Base Manufacturer's products may not be accepted during the shop drawing process.
 1. Diamond Vogel Paints: www.diamondvogel.com.
 2. PPG Paints: www.ppgpaints.com.
 3. Sherwin-Williams Company: www.sherwin-williams.com.
 4. Tnemec: www.tnemec.com.
- D. Substitutions: Not permitted.
- E. Note: Not all systems are used. Refer to drawings for finished items. Provide systems specified herein where not specifically indicated.

2.02 COATING SYSTEMS FOR STEEL - STRUCTURAL, TANKS, PIPE, EQUIPMENT, AND MISCELLANEOUS

- A. Type CS-__ - Exterior Exposed:
 1. System Type: Epoxy/epoxy/urethane.
 2. Surface Preparation: SSPC-SP 6 with a surface profile of 2.0 to 3.0 mils.
 3. Primer: Macropoxy 646. DFT 3.0 to 5.0 mils.
 4. Intermediate Coat: Macropoxy 646. DFT 3.0 to 5.0 mils.
 5. Finish Coat: Acrolon Ultra or Hi-Solids Polyurethane. DFT 2.0 to 4.0 mils.
 6. Total DFT: 8.0 to 14.0 mils.
 7. Finish Color: As indicated on the drawings or Color Schedule.
- B. Type CS-__ - Interior Exposed:
 1. System Type: Epoxy/epoxy.
 2. Surface Preparation: SSPC-SP 6 with a surface profile of 2.0 to 3.0 mils.
 3. Primer: Dura-plate 235 MPE. DFT 7.0 to 9.0 mils.
 4. Finish: Dura-plate 235 MPE. DFT 7.0 to 9.0 mils.
 5. Total DFT: 14.0 to 18.0 mils. Finish Color: As indicated on the drawings or Color Schedule.

2.03 COATING SYSTEMS FOR GALVANIZED STEEL AND NONFERROUS METAL - PIPE AND MISCELLANEOUS FABRICATIONS

- A. Type CS-__ - Exterior Exposed:
 1. System Type: Epoxy/urethane.
 2. Surface Preparation: SSPC SP 16.
 3. Primer: Macropoxy 646. DFT 3.0 to 5.0 mils.
 4. Finish Coat: Acrolon Ultra or Hi-Solids Polyurethane. DFT 2.0 to 4.0 mils.
 5. Total DFT: 5.0 to 9.0 mils.
 6. Finish Color: As indicated on the drawings, or color schedule.
- B. Type CS-__ - Interior Exposed:
 1. System Type: Epoxy.
 2. Surface Preparation: SSPC SP 16.
 3. Primer: Macropoxy 646. DFT 3.0 to 5.0 mils.
 4. Finish Coat: Macropoxy 646. DFT 3.0 to 5.0 mils.
 5. Total DFT: 6.0 to 10.0 mils.
 6. Finish Color: As indicated on the drawings, or color schedule.
- C. Type CS-__ - Immersion (Wastewater)*:
 1. System Type: Epoxy/epoxy.
 2. Surface Preparation: SSPC-SP 16.

3. Primer Coat: Sher-Glass FF: DFT 8.0 to 12.0 mils
4. Finish Coat: Sher-Glass FF: DFT 8.0 to 12.0 mils
5. Total DFT: 16.0 to 24.0 mils.
6. *Zinc-rich coatings including galvanizing are readily consumed in acidic conditions, so complete coverage is essential. Spray apply Dura-Plate UHS for one or two coat application. OAP technology strongly recommended.

2.04 COATING SYSTEMS FOR DUCTILE OR CAST IRON - PIPE, PUMPS, AND VALVES

- A. Type CS-__ - Exterior Exposed:
 1. System Type: Epoxy/epoxy/urethane.
 2. Surface Preparation: NAPF 500-03-04 with the exception that ALL rust and mold coating be removed. Only tightly adherent annealing oxide may remain..
 3. Primer: Macropoxy 646. DFT 3.0 to 5.0 mils.
 4. Intermediate Coat: Macropoxy 646. DFT 3.0 to 5.0 mils.
 5. Finish Coat: Ultra or Hi-Solids Polyurethane. DFT 2.0 to 4.0 mils.
 6. Total DFT: 8.0 to 14.0 mils.
 7. Finish Color: As indicated on the drawings, or color schedule.
 8. Copoxy Shop Primer and Corothane I Galvapac Zinc Primer are also acceptable.
- B. Type CS-__ - Below Ground (Buried):
 1. System Type: Coal tar epoxy.
 2. Surface Preparation: NAPF 500-03-04 with the exception that ALL rust and mold coating be removed. Only tightly adherent annealing oxide may remain..
 3. Primer: None.
 4. Finish Coat: Hi-Mil Sher-Tar Epoxy. DFT 14.0 to 20.0 mils.
 5. Total DFT: 14.0 to 20.0 mils.
 6. Finish Color: Black.
- C. Type CS-__ - Interior Exposed:
 1. System Type: Epoxy/epoxy.
 2. Surface Preparation: SSPC-SP 6 with a surface profile of 2.0 to 3.0 mils.
 3. Primer: Dura-plate 235 MPE. DTF 7.0 to 9.0 mils.
 4. Finish Coat: Dura-plate 235 MPE. DTF 7.0 to 9.0 mils.
 5. Total DFT: 9.0 to 15.0 mils.
 6. Finish Color: As indicated on the drawings, or color schedule.
 7. Total DFT: 14.0 to 18.0 mils. Finish Color: As indicated on the drawings or Color Schedule.
- D. Type CS-__ - Immersion (Wastewater):
 1. System Type: Epoxy/epoxy/epoxy.
 2. Surface Preparation: NAPF 500-03-04 with the exception that ALL rust and mold coating be removed. Only tightly adherent annealing oxide may remain.
 3. Primer: Dura-plate UHS DFT 8.0 to 10 mils.
 4. Finish Coat: Dura-plate UHS DFT 10.0 to 14 mils.
 5. Total DFT: 18.0 to 24.0 mils. Finish Color: As indicated on the drawings, or color schedule.
 6. Spray apply Dura-Plate UHS for one or two coat application. OAP technology strongly recommended.
 7. Finish Color: As indicated on the drawings, or color schedule.

2.05 COATING SYSTEMS FOR PVC

- A. Type CS-__ - Interior or Exterior Exposed:
 1. System Type: Acrylic.
 2. Surface Preparation: Scarify.
 3. Primer: Pro Industrial Pro-Cryl Universal Primer. DFT 2.0 to 4.0 mils.
 4. Finish Coat: Pro-Industrial Acrylic. DFT 2.5 to 4.0 mils.
 5. Total DFT: 4.5 to 8.0 mils.
 6. Finish Color: As indicated on the drawings, or color schedule.

2.06 COATING SYSTEMS FOR INSULATED PIPE

- A. Type CS-__ - Interior or Exterior Exposed:

1. System Type: Acrylic.
2. Surface Preparation: Clean and dry.
3. Primer: Pro Industrial Pro-Cryl Universal Primer. DFT 2.0 to 4.0 mils.
4. Finish Coat: Pro-Industrial Acrylic. DFT 2.5 to 4.0 mils.
5. Total DFT: 4.5 to 8.0 mils.
6. Finish Color: As indicated on the drawings, or color schedule.

2.07 COATING SYSTEMS FOR PRECAST CONCRETE, CAST-IN-PLACE CONCRETE, AND DENSE CONCRETE MASONRY UNITS

- A. Type CS-12 - Immersion (Wastewater): (Mark: IF-1)
 1. Scope: Coat entire wet well with immersion recommendation.
 2. System Type: Epoxy/epoxy.
 3. Surface Preparation: SSPC-SP 13/NACE 6 with a surface profile of ICRI CSP 2 or 3.
 4. Filler: Fill bug holes, air pockets and other voids with Steel-Seam FT910.
 5. Primer: Dura-Plate 235 UHS. DFT 8.0 to 12.0 mils.
 6. Finish: Dura-Plate 235 UHS. DFT 22.0 to 28.0 mils.
 7. Total DFT: 30.0 to 40.0 mils.
 8. Finish Color: White.
 9. Where flexibility is required, use SherFlex Elastomeric Polyurethane at 60.0 to 100.0 mils total DFT over an epoxy primer.
- B. Type CS-13 - Interior Exposed: (Mark: IF-2)
 1. System Type: Epoxy.
 2. Surface Preparation: SSPC-SP 13/NACE 6 to achieve a surface profile of ICRI CSP 2 or 3.
 3. Primer: Pro-Industrial Waterborne Catalyzed Epoxy. DFT 2.0 to 4.0 mils. Roll or backroll.
 4. Finish Coat: Pro-Industrial Waterborne Catalyzed Epoxy. DFT 3.0 to 4.0 mils.
 5. Total DFT: 5.0 to 8.0 mils.
 6. Finish Color: White.

2.08 COATING SYSTEMS FOR SECONDARY CONTAINMENT

- A. Type CS-___ - Chemical Storage Containment Area:*
 1. System Type: High-solids epoxy.
 2. Surface Preparation: SSPC-SP 13/NACE 6 with a surface profile of ICRI CSP 4 or 5.
 3. Primer: Corobond 100. DFT 4.0 to 6.0 mils.
 4. Intermediate Coat: Cor-Cote HCR FF. DFT 15.0 to 20.0 mils.
 5. Finish Coat: Cor-Cote HCR FF. DFT 15.0 to 20.0 mils.
 6. Total DFT: 34.0 to 46 mils.
 7. Finish Color: As indicated on the drawings. *Limited Color Selection*
 8. Verify resistance to stored commodities and anticipated traffic load PRIOR to installation.
- B. Type CS-___ - Floors, Severe Chemical, Abrasion, and Traffic Exposure:*
 1. System Type: Aggregate-filled epoxy novalac.
 2. Surface Preparation: SSPC-SP 13/NACE 6 with a surface profile of ICRI CSP 5 or 6.
 3. Primer: Corobond 100. DFT 4.0 to 6.0 mils.
 4. First Coats: Cor-Cote HCR Mortar, double broadcast. DFT 1/8 inch.
 5. Finish Coat: Cor-Cote HCR FF. DFT 15.0 to 20.0 mils.
 6. Total DFT: Greater than 1/8 inch (125 mils).
 7. Finish Color: As indicated on the drawings. *Limited Color Selection*
 8. Verify resistance to stored commodities and anticipated traffic load PRIOR to installation.

2.09 COATING SYSTEMS FOR POROUS CONCRETE MASONRY UNITS

- A. Type CS-___ - Interior Exposed:
 1. System Type: Cementitious Acrylic/epoxy
 2. Surface Preparation: SSPC-SP 13/NACE 6. Clean and dry.
 3. Primer: Cement Plex 875. Spreading rate 80 to 100 sq. ft/gal.
 4. Intermediate Coat: Pro-Industrial Waterborne Catalyzed Epoxy. DFT 2.0 to 4.0 mils.
 5. Finish Coat: Pro-Industrial Waterborne Catalyzed Epoxy. DFT 3.0 to 4.0 mils.
 6. Total DFT: 5.0 to 8.0 mils plus filler.
 7. Finish Color: As selected by Architect from manufacturer's standard colors.

2.10 ACCESSORIES

- A. Coating Application Accessories:
 - 1. Accessories required for application of specified coatings in accordance with manufacturer's instructions, including thinners.
 - 2. Products of coating manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions under which coating systems are to be applied. Notify Engineer of areas or conditions not acceptable. Do not begin surface preparation or application until unacceptable areas or conditions have been corrected.

3.02 PROTECTION OF SURFACES NOT SCHEDULED TO BE COATED

- A. Protect surrounding areas and surfaces not scheduled to be coated from damage during surface preparation and application of coatings.
- B. Immediately remove coatings that fall on surrounding areas and surfaces not scheduled to be coated.

3.03 SURFACE PREPARATION OF STEEL

- A. Prepare steel surfaces in accordance with manufacturer's instructions.
- B. Fabrication Defects:
 - 1. Correct steel and fabrication defects revealed by surface preparation.
 - 2. Remove weld spatter and slag.
 - 3. Round sharp edges and corners of welds to a smooth contour.
 - 4. Smooth weld undercuts and recesses.
 - 5. Grind down porous welds to pinhole-free metal.
 - 6. Remove weld flux from surface.
- C. Ensure surfaces are dry.
- D. Immersion or Below Grade Surfaces: Remove visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter in accordance with SSPC-SP 10/NACE 2. Create a surface profile as specified in Part 2 or as required by the coating manufacturer..
- E. Exterior Exposed or Interior Exposed Surfaces: Remove visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter in accordance with SSPC-SP 6/NACE 3. Create a surface profile as specified in Part 2 or as required by the coating manufacturer..
- F. Abrasive Blast-Cleaned Surfaces: Coat abrasive blast-cleaned surfaces with primer before visible rust forms on surface. Do not leave blast-cleaned surfaces uncoated for more than 8 hours.
- G. Shop Primer: Shop primed steel shall receive a field sweep blast prior to the application of subsequent coats. Prepare shop primer to receive field coat in accordance with manufacturer's instructions. Removal all unknown shop primers and re-prime in accordance with this specification.

3.04 SURFACE PREPARATION OF GALVANIZED STEEL AND NONFERROUS METAL

- A. Prepare galvanized steel and nonferrous metal surfaces in accordance with SSPC-SP16 and the coating manufacturer's instructions.
- B. Test galvanized surfaces for chromate treatments and remove as required by SSPC-SP 16, or other Engineer approved method.
- C. Ensure surfaces are dry.

3.05 SURFACE PREPARATION OF DUCTILE OR CAST IRON

- A. Prepare ductile or cast iron surfaces in accordance with NAPF 500-03-04 Abrasive Blast Cleaning with the exception that ALL rust and mold coating be removed. Only tightly adherent annealing oxide may remain. Bituminous coated pipe shall NOT be allow if field painting is required..

- B. Bituminous coated pipe shall NOT be allow if field painting is required.
- C. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.

3.06 SURFACE PREPARATION OF PVC

- A. Prepare PVC surfaces in accordance with manufacturer's instructions.
- B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.
- C. Scarify PVC surfaces.

3.07 SURFACE PREPARATION OF INSULATED PIPE

- A. Prepare insulated pipe surfaces in accordance with manufacturer's instructions.
- B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.

3.08 SURFACE PREPARATION OF CONCRETE

- A. Interior, Wet Substrate:
 - 1. Prepare concrete surfaces in accordance with manufacturer's instructions, SSPC-SP 13/NACE 6, and ICRI 310.2.
 - 2. Allow concrete to cure for a minimum of 28 days.
 - 3. Test concrete for moisture in accordance with ASTM D 4263 and, if necessary, F 1869.
 - 4. Abrasive blast surface to remove laitance and solid contaminants and to provide clean, sound substrate with uniform anchor profile.
 - 5. Verify that the pH of the cleaned concrete surfaces to be coated is within the range of to 8 to 11. Application of coating materials outside this range will not be permitted without written approval from the Engineer.
 - 6. Fill holes, pits, voids, and cracks with manufacturer approved surfer.
 - 7. Ensure surfaces are clean, dry, and free of oil, grease, chalk, form release agents, and other contaminants.
- B. Exterior and Interior Dry:
 - 1. Prepare concrete surfaces in accordance with manufacturer's instructions, SSPC-SP 13/NACE 6, and ICRI 310.2.
 - 2. Allow concrete to cure for a minimum of 28 days.
 - 3. Test concrete for moisture in accordance with ASTM D 4263 and, if necessary, F 1869.
 - 4. Level concrete protrusions and mortar spatter.
 - 5. Verify that the pH of the cleaned concrete surfaces to be coated is within the range of to 8 to 11. Application of coating materials outside this range will not be permitted without written approval from the Engineer.
 - 6. Fill hairline cracks less than 1/64 inch (0.4 mm) in accordance with manufacturer's instructions.
 - 7. Prepare cracks wider than 1/64 inch (0.4 mm), moving cracks, gaps, and expansion joints in accordance with manufacturer's instructions.
 - 8. Ensure surfaces are clean, dry, and free of oil, grease, chalk, form release agents, and other contaminants.

3.09 SURFACE PREPARATION OF CONCRETE FLOORS

- A. Prepare concrete surfaces in accordance with manufacturer's instructions, SSPC-SP 13/NACE 6, and ICRI 310.2.
- B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.
- C. Allow concrete to cure for a minimum of 28 days before coating.
- D. Test concrete for moisture in accordance with ASTM D 4263 and, if necessary, F 1869.
- E. Verify that the pH of the cleaned concrete surfaces to be coated is within the range of to 8 to 11. Application of coating materials outside this range will not be permitted without written approval from the Engineer.

3.10 SURFACE PREPARATION OF POROUS CONCRETE MASONRY UNITS

- A. Prepare porous concrete masonry unit surfaces in accordance with manufacturer's instructions and SSPC-SP 13/NACE 6.
- B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.

- C. Allow mortar to cure for a minimum of 28 days before coating.
- D. Level protrusions and mortar spatter.

3.11 APPLICATION

- A. Apply coatings in accordance with manufacturer's instructions.
- B. Mix and thin coatings, including multi-component materials, in accordance with manufacturer's instructions.
- C. Keep containers closed when not in use to avoid contamination.
- D. Do not use mixed coatings beyond pot life limits.
- E. Use application equipment, tools, pressure settings, and techniques in accordance with manufacturer's instructions.
- F. Uniformly apply coatings at spreading rate required to achieve specified DFT.
- G. Apply coatings to be free of film characteristics or defects that would adversely affect performance or appearance of coating systems.
- H. Stripe paint with brush critical locations on steel such as welds, corners, and edges using specified primer. Apply and additional strip coat of the intermediate coating material in immersion areas.
- I. Roll or backroll the first coat of epoxy or block filler applied to concrete or interior block substrates to work the material into the substrate.

3.12 REPAIR

- A. Materials and Surfaces Not Scheduled To Be Coated: Repair or replace damaged materials and surfaces not scheduled to be coated.
- B. Damaged Coatings: Touch-up or repair damaged coatings. Touch-up of minor damage shall be acceptable where result is not visibly different from adjacent surfaces. Recoat entire surface where touch-up result is visibly different, either in sheen, texture, or color.
- C. Coating Defects: Repair in accordance with manufacturer's instructions coatings that exhibit film characteristics or defects that would adversely affect performance or appearance of coating systems.

3.13 FIELD QUALITY CONTROL

- A. Required Inspections and Documentation:
 - 1. Verify coatings and other materials are as specified.
 - 2. Verify environmental conditions are as specified.
 - 3. Verify surface preparation and application are as specified.
 - 4. Verify DFT of each coat and total DFT of each coating system are as specified using wet film and dry film gauges. DFT's shall be measured in accordance with SSPC-PA2.
 - 5. Coating Defects: Check coatings for film characteristics or defects that would adversely affect performance or appearance of coating systems.
 - a. Check for holidays on interior steel immersion surfaces using holiday detector in accordance with NACE SP0188 or SSPC TU-11 using a safe blue light inspection lamps if OAP technology is used.
 - 6. Report:
 - a. Prepare inspection reports daily.
 - b. Submit written reports describing inspections made and actions taken to correct nonconforming work.
 - c. Report nonconforming work not corrected.
 - d. Submit copies of report to Engineer and Contractor.
- B. Manufacturer's Field Services: Manufacturer's representative shall provide technical assistance and guidance for surface preparation and application of coating systems.

3.14 CLEANING

- A. Remove temporary coverings and protection of surrounding areas and surfaces.

3.15 PROTECTION OF COATING SYSTEMS

- A. Protect surfaces of coating systems from damage during construction.

3.16 ONE-YEAR INSPECTION

- A. Owner will set date for one-year inspection of coating systems.
- B. Inspection shall be attended by Owner, Contractor, Engineer, and manufacturer's representative.
- C. Repair deficiencies in coating systems as determined by Engineer in accordance with manufacturer's instructions.

3.17 COLOR SCHEDULE:

- A. To facilitate identification of piping in plants and pumping stations follow the TenStates Identification with Sherwin-Williams Colors system (See attachment to this Section):

END OF SECTION

TenStates Identification with Sherwin-Williams Colors

SERVICE	SCHEDULE	SYSTEM 4000 COLOR	BANDS
<u>WATER LINES</u>			
Raw Water	Olive Green	4070 Generator Green	
Settled or Clarified Water	Aqua	4068 Alloy Aqua	
Finished or Potable Water	Dark Blue	4086 Safety Blue	
Sprinklers	Dark Red	4081 Safety Red	
Suction Line (Pump Stations)	Mid Blue	4063 Robotic Blue	
Pressure Line (Pump Stations)	Safety Blue	4086 Safety Blue	
<u>WASTE LINES</u>			
Backwash Waste	Light Brown	4003 Pallet Tan	
Sludge	Dark Brown	4009 Walnut Brown	
Sanitary Sewer or Other	Dark Gray	4025 Anchor Gray	
Sewage Effluent	Clay	4048 Mason Brick	
Raw Sludge	Brown/Black	4001 Bolt Brn	4032 Black
Sludge Recirc	Brown / Yellow	4001 Bolt Brn	4084 Safety Yellow
Sludge Draw Off	Brown/Orange	4001 Bolt Brn	4083 Safety Orange
Sludge Recirc Dischg	Brown	4001 Bolt Brown	
Sludge Gas	Orange-Red	4084 International Orange	
Natural Gas	OrangeRed/Black	4084 Intl Orange	4032 Black
NonPotable Water	Blue / Black	4086 Safety Blue	4032 Black
Potable Water	Blue	4086 Safety Blue	
Chlorine	Yellow	4084 Safety Yellow	
Sulfur Dioxide	Yellow / Red	4084 Safety Yellow	4081 Safety Red
Sewage	Gray	4026 Slate Gray	
Compressed Air	Green	4071 Rain Forest	
<u>CHEMICAL LINES</u>			
Alum or Primary Coagulant	Orange	4083 Safety Orange	
Ammonia	White	White	
Carbon Slurry	Black	Black	
Caustic	Yellow with Green	4084 Safety Yellow	4085 Safety Green
Chlorine	Yellow	4084 Safety Yellow	
Fluoride	Light Blue with Red	4061 Hydro Blue	4081 Safety Red
Lime Slurry	Light Green	4069 Emerald Ice	
Ozone	Yellow with Orange	4084 Safety Yellow	4083 Safety Orange
Phosphate Compounds	Light Green with Red	4069 Emerald Ice	4081 Safety Red
Polymers or Coagulant Aids	Orange with Green	4083 Safety Orange	4085 Safety Green
Potassium Permanganate	Violet	4080 Plumb	
Soda Ash	Light Green with Orange	4069 Emerald Ice	4083 Safety Orange
Sulfuric Acid	Yellow with Red	4084 Safety Yellow	4081 Safety Red
Sulfur Dioxide	Light Green with Yellow	4069 Emerald Ice	4084 Safety Yellow
<u>OTHER LINES</u>			
Compressed Air	Dark Green	4071 Rain Forest	
Gas	Red	4040 Deck Red	
Other Lines	Light Gray	4019 Flint Gray	
Hoists, Trolleys	Yellow	4084 Safety Yellow	
Fire Protection	Red	4081 Safety Red	
Steam	Orange	4083 Safety Orange	
Oil	Ivory	4036 Mill Ivory	

DIVISION 22: Plumbing

SECTION 22 0010

BASIC MECHANICAL PLUMBING REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Basic Mechanical Plumbing Requirements specifically applicable to Division 22 in addition to Division 1 - General Requirements.

1.02 SCOPE OF WORK

- A. The Mechanical Plumbing Contract shall also include furnishing and installing a complete plumbing system for the new building and all other related work as called for under the specifications and shown on plans.

1.03 WORK INCLUDED

- A. The Mechanical Plumbing Contract shall include all work under the listed Division 22 of the Specifications Index and all related Mechanical work as shown on the Drawings for the project.
- B. A Complete table of Mechanical Reference Symbols is shown on the plans.
- C. Under this Contract the Mechanical Contractor shall furnish the Owner with two 3-ring binders of all pertinent systems related documents. Submit manuals to the Engineer for his review. The Engineer will then turn books over to the Owner. The books shall contain the following items:
 - 1. Shop drawings on all major equipment.
 - 2. Operating Instructions for all major equipment.
 - 3. Maintenance Instructions for all major equipment.
 - 4. Wiring diagrams for all equipment.
 - 5. Test and Balance Reports.
- D. The Mechanical Contractor is responsible for contacting the utility companies and coordinating the water, sewer and natural gas connections for the building service. Include all costs in bid.
- E. The Mechanical installation to be made under Divisions 22 is set up for contract bidding as follows:
 - 1. Mechanical Plumbing Contractor is a sub-contractor to the General Contractor.
 - a. The Mechanical contractor is responsible for own equipment, such as cranes, lifts, etc. in order to provide a complete installation of mechanical systems.
 - b. The Mechanical contractor shall be a sub-contractor to the General Contractor and shall include in his bid, prices from sub-contractors for control wiring, and other trades necessary to complete the entire job.

1.04 SPECIFICATIONS COMPLIANCE

- A. The requirements of these specifications shall be complied with in every respect. Therefore, it shall be absolutely mandatory that the job foreman, all lead mechanics, subcontractors and their foreman have completely studied these specifications, be completely knowledgeable as to their entire contents, and maintain a copy at the job-site. Failure to comply with this requirement will be reason to presume the mechanic or subcontractor is not in responsible charge of his work due to ignorance of job requirements, and will be reason for the owner to require dismissal and replacement with approved personnel. Every foreman and lead mechanic shall be provided with a complete copy of this specification.

1.05 INCONSISTENCIES

- A. If there is an inconsistency in the quality and/or quantity of Work required by the Contract Documents, either the greater quality and/or quantity of Work indicated shall be provided in accordance with the Engineer/Architect's interpretation without change in the contract sum.

1.06 WORK NOT INCLUDED

- A. The following work is not included as part of the Contract.
 - 1. The removal and storage of any equipment in the building required to be moved or relocated during the construction process.

1.07 CODES, FEES AND LATERAL COSTS

- A. The Plumbing Installation shall meet all applicable local, state and federal codes and standards.

- B. All permits necessary for a complete plumbing installation shall be paid for by this Contractor.
- C. This contractor shall contact the local utilities for gas, water, sanitary and storm sewers, and include in their bid the any costs associated with service installation charges of the utility(s).
- D. Except in those municipalities which provide state- approved electrical inspection, all installation of electrical equipment wiring shall be inspected by the State Board of Electricity. Allowance shall be made in the bid and contract for the cost of such inspection.
 - 1. Fees for such inspection will be charged in accordance with the rules and regulations of the State Board of Electricity. Evidence of payment of fees shall be provided by the Contractor with his Request for Payment.

1.08 REFERENCES

- A. All equipment, piping, etc., shall be new and shall be installed to meet the approval of the following additional ordinances: ASME Rules for Pressure Tanks, National Board of Fire Underwriter's Rules, American Waterworks and the American Gas Association.

1.09 SUBMITTALS

- A. Submit under provisions of Division 01 3000.
- B. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.
- C. All documents shall be submitted in .pdf format unless pre-approved by Engineer.
- D. The contractor shall not use any equipment or materials that does not have the engineer's stamped approval.
- E. Mark dimensions and values in units to match those specified.

1.10 PROJECT/SITE CONDITIONS

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions.

1.11 SEQUENCING AND SCHEDULING

- A. Construct Work in sequence under provisions of Division 1.

1.12 PRE-CONSTRUCTION COORDINATION AND VERIFICATION

- A. This Contractor shall coordinate his work with other Contractors on this job. Any conflict which cannot be resolved shall be settled by the Architect/Engineer.
- B. Field verification of scale dimensions on plans is directed since actual locations, distances and levels will be governed by actual field conditions.
- C. The Contractors shall check architectural, structural, plumbing, heating, ventilating and electrical plans to avert possible installation conflicts. Should drastic changes from original plans be necessary to resolve such conflicts this Contractor shall notify the Architect/Engineer and secure written approval and agreement on necessary adjustments before the installation is started.
- D. Discrepancies shown on different plans or between plans and actual field conditions or between plans and specifications shall promptly be brought to the attention of the Architect/Engineer for a decision.
- E. The Contractor shall consider and review the complete set of documents, etc., Architectural, Structural, Mechanical, Electrical, etc., (Drawings and Specifications) as his complete set. He will be responsible for any and all mechanical work shown or stated (to be by him), to include this work in his bid and install such items even though they are not specifically shown or stated on the Mechanical section of the plans and specifications.

1.13 COORDINATION

- A. Contractor shall be responsible for continual coordination of the mechanical work with other trades so as to avoid conflicts in installation. Contractor shall cooperate with other trades to assure that construction proceeds in an orderly and timely manner.
- B. Study the civil, structural, electrical, shop and any specialty drawings and specifications to determine required coordination.
 - 1. Anchor bolts, sleeves, inserts and supports that may be required for the mechanical work shall be furnished and installed under the same division of the specifications as the

respective items to be supported. Excluded from this requirement are cast in place anchor bolts.

2. Slots, chases, openings and recesses through floors and walls as specified will be provided by the various trades in their respective materials, but the trade requiring them shall see that they are properly located in zones provided or otherwise approved by the Engineer or Architect and/or Owner.
 3. Locations of pipes, panels, equipment, fixtures, etc., shall be adjusted to accommodate interferences encountered. The Project Coordinator shall determine the exact rerouting and location of each pipe and/or duct encountered prior to fabrication.
 - a. Right-of-Way: Lines which pitch shall have the right of way over those which do not pitch. Lines whose elevations cannot be changed shall have the right of way over lines whose elevations can be changed.
 - b. Offsets, transitions and changes in direction in pipes shall be made as required to maintain proper head room and pitch of sloping lines whether or not indicated on the drawings.
 4. Installation of Arrangement: The contractor shall install all mechanical work to permit removal of, and access to, (without damage to other parts) all parts requiring periodic replacement or maintenance.
- C. Layout Priority:
1. All trades shall understand that other trades will need to work in the same areas during the project. All final decisions as to the right-of-way and runs of utility lines (pipes, ducts, etc.) shall be made by Owner and/or Architect. In general, priority shall be given as follows:
 - a. Process piping which must be drainable
 - b. Sheet metal ductwork
 - c. Light Fixtures
 - d. Plumbing waste lines, downspouts, and vents
 - e. Sprinkler piping
 - f. Gravity water lines
 - g. Ice water or steam lines
 - h. Refrigerant lines
 - i. Gas and air lines
 - j. Plumbing water
 - k. Electrical conduit
 - l. Control air lines
- D. PREPARE DETAILED SHOP DRAWINGS WHERE NECESSARY TO ASSURE PROPER FIT AND NECESSARY CLEARANCE.

1.14 CUTTING, PATCHING AND FIRESTOPPING

- A. The Plumbing Contractor shall set all sleeves in construction for their Work.
- B. Where cutting is required, it shall be done by the Plumbing Contractor.
- C. All patching shall be done by Plumbing Contractor.
- D. All cutting of any kind must be done with great care so as not to leave unsightly surfaces which may not be entirely concealed by plates, escutcheons, or their normal concealing construction, if such unsightly conditions occur, Plumbing Contractor will be required, at their own expense, to replace the damaged construction.
- E. This Plumbing Contractor shall provide and install firestopping materials per Section 07 8400 - Firestopping.

1.15 ACCESS PANELS REQUIRED BY TRADE

- A. Trade requiring access shall provide and install access panels where not shown or specified.
- B. The finished appearance and function will be subject to approval by the Architect/Owner.
- C. Provide panels that accommodate adjacent finishes in finished spaces.
- D. Access panels shall meet all code requirements for each location they are installed and shall be sized appropriately.

1.16 ELECTRICAL

- A. Electrical Contractor shall furnish all motor starters and motor controls and provide all wiring for motor control operation, except if specified otherwise.

1.17 ADDITIONAL ELECTRICAL COSTS

- A. If the Mechanical Contractor substitutes equipment for specified units, the mechanical contractor shall be responsible for any additional electrical installation costs for this substitution whether the other equipment was listed as equal in the specification or was approved equal after the project was in the bidding process.

1.18 GUARANTEE

- A. This Contractor shall be responsible for the proper installation and working of everything in this contract and shall guarantee to remedy free of charge any defects in workmanship and materials that may appear to give or gives rise to trouble of any kind for a period of one year from date of final substantial completion.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

3.01 NOT USED

END OF SECTION

SECTION 22 0513

COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General construction and requirements.
- B. Applications.

1.02 RELATED REQUIREMENTS

- A. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.
- B. Section 26 2913 - Enclosed Controllers.

1.03 REFERENCE STANDARDS

- A. NEMA MG 1 - Motors and Generators; 2016.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.

1.05 QUALITY ASSURANCE

- A. Conform to NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

PART 2 PRODUCTS

2.01 GENERAL CONSTRUCTION AND REQUIREMENTS

- A. Electrical Service: Refer to Section 26 0583 for required electrical characteristics.
- B. Construction:
 - 1. Open drip-proof type except where specifically noted otherwise.
 - 2. Design for continuous operation in 104 degrees F environment.
 - 3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
- C. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
- D. Wiring Terminations:
 - 1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
 - 2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

2.02 APPLICATIONS

END OF SECTION

SECTION 22 0517

SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe sleeves.
- B. Manufactured sleeve-seal systems.

1.02 REFERENCE STANDARDS

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

PART 2 PRODUCTS

2.01 PIPE SLEEVES

- A. Vertical Piping:
 - 1. Sleeve Length: 2 inch above finished floor.
 - 2. Provide sealant for watertight joint.
 - 3. Blocked Out Floor Openings: Provide 1-1/2 inch angle set in silicon adhesive around opening.
 - 4. Drilled Penetrations: Provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.
- B. Clearances:
 - 1. Provide allowance for insulated piping.
 - 2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch greater than external; pipe diameter.
 - 3. All Rated Openings: Caulked tight with fire stopping material complying with ASTM E814 in accordance with Section 07 8400 to prevent the spread of fire, smoke, and gases.

2.02 MANUFACTURED SLEEVE-SEAL SYSTEMS

- A. Modular/Mechanical Seal:
 - 1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.
 - 2. Provide watertight seal between pipe and wall/casing opening.
 - 3. Elastomer element size and material in accordance with manufacturer's recommendations.
 - 4. Glass reinforced plastic pressure end plates.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- B. Install piping to conserve building space, to not interfere with use of space and other work.
- C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- D. Provide sleeves when penetrating floors. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
- E. Manufactured Sleeve-Seal Systems:
 - 1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
 - 2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.

3. Locate piping in center of sleeve or penetration.
 4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
 5. Tighten bolting for a water-tight seal.
 6. Install in accordance with manufacturer's recommendations.
- F. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

END OF SECTION

SECTION 22 0519
METERS AND GAGES FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pressure gages and pressure gage taps.
- B. Thermometers and thermometer wells.

1.02 REFERENCE STANDARDS

- A. ASME B40.100 - Pressure Gauges and Gauge Attachments; 2013.
- B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers; 2014.
- C. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers; 2014.
- D. UL 393 - Indicating Pressure Gauges for Fire-Protection Service; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.
- C. Operation and Maintenance Data: _____.

PART 2 PRODUCTS

2.01 PRESSURE GAGES

- A. Manufacturers:
 - 1. Dwyer Instruments, Inc; _____: www.dwyer-inst.com/#sle.
 - 2. Moeller Instrument Company, Inc; _____: www.moellerinstrument.com/#sle.
 - 3. Omega Engineering, Inc; _____: www.omega.com/#sle.
 - 4. H.O. Trerice
- B. Pressure Gages: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
 - 1. Case: Steel with brass bourdon tube.
 - 2. Size: 4-1/2 inch diameter.
 - 3. Mid-Scale Accuracy: One percent.
 - 4. Scale: Psi and kPa.

2.02 PRESSURE GAGE TAPPINGS

- A. Gage Cock: Tee or lever handle, brass for maximum 150 psi.

2.03 DIAL THERMOMETERS

- A. Manufacturers:
 - 1. Dwyer Instruments, Inc; _____: www.dwyer-inst.com/#sle.
 - 2. Omega Engineering, Inc; _____: www.omega.com/#sle.
 - 3. H.O. Trerice
- B. Thermometers - Adjustable Angle: Dial type bimetallic actuated; ASTM E1; stainless steel case, adjustable angle with front recalibration, silicone fluid damping, white with black markings and black pointer, hermetically sealed lens, stainless steel stem.
 - 1. Size: 5 inch diameter dial.
 - 2. Accuracy: 1 percent.
 - 3. Calibration: Degrees F.

2.04 THERMOMETER SUPPORTS

- A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

END OF SECTION

SECTION 22 0553

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Pipe markers.

1.02 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2015.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Piping: Pipe markers.
- B. Pumps: Nameplates.
- C. Small-sized Equipment: Tags.
- D. Valves: Tags.

2.02 NAMEPLATES

- A. Manufacturers:
 - 1. Brimar Industries, Inc.: www.pipemarker.com/#sle.
 - 2. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.
 - 3. Seton Identification Products: www.seton.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: Laminated three-layer plastic with engraved letters.

2.03 TAGS

- A. Manufacturers:
 - 1. Advanced Graphic Engraving: www.advancedgraphicengraving.com.
 - 2. Brady Corporation: www.bradycorp.com.
 - 3. Brimar Industries, Inc.: www.pipemarker.com.
 - 4. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.
 - 5. Seton Identification Products: www.seton.com.
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 PIPE MARKERS

- A. Manufacturers:
 - 1. Brady Corporation: www.bradycorp.com.
 - 2. Brimar Industries, Inc: www.pipemarker.com.
 - 3. Kolbi Pipe Marker Co: www.kolbipipemarkers.com.
 - 4. MIFAB, Inc: www.mifab.com.

- 5. Seton Identification Products: www.seton.com.
- 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Comply with ASME A13.1.
- C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.
- F. Color code as follows:
 - 1. Potable, Cooling, Boiler, Feed, Other Water: Green with white letters.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- E. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 22 0719
PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 22 1005 - Plumbing Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

- A. Applicable State Plumbing Code with Amendments
- B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- C. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- D. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- E. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.
- F. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2013).
- G. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2013).
- H. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2017.
- I. ASTM C533 - Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation; 2013.
- J. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2014.
- K. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2015.
- L. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2015.
- M. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.
- N. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2015a.
- O. ASTM C585 - Standard Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing; 2010.
- P. ASTM C591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation; 2015.
- Q. ASTM C610 - Standard Specification for Molded Expanded Perlite Block and Pipe Thermal Insulation; 2011.
- R. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).
- S. ASTM C1410 - Standard Specification for Cellular Melamine Thermal and Sound-Absorbing Insulation; 2014.
- T. ASTM C1695 - Standard Specification for Fabrication of Flexible Removable and Reusable Blanket Insulation for Hot Service; 2010 (Reapproved 2015).
- U. ASTM D1056 - Standard Specification for Flexible Cellular Materials--Sponge or Expanded Rubber; 2014.
- V. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2012.

- W. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- X. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- Y. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 3 years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.
- B. Protect insulation from weather and sunlight, construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.07 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER

- A. Manufacturers:
 - 1. Johns Manville Corporation; _____: www.jm.com/#sle.
 - 2. Knauf Insulation: www.knaufinsulation.com/#sle.
 - 3. Owens Corning Corp: www.owenscorning.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
 - 1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 850 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- C. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
 - 1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 650 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- D. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- E. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- F. Vapor Barrier Lap Adhesive: Compatible with insulation.
- G. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.

- H. Fibrous Glass Fabric:
 - 1. Cloth: Untreated; 9 oz/sq yd weight.
 - 2. Blanket: 1.0 lb/cu ft density.
 - 3. Weave: 5 by 5.

2.03 CELLULAR GLASS

- A. Manufacturers:
 - 1. Pittsburgh Corning Corporation: www.foamglasinsulation.com.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- B. Insulation: ASTM C552, Type II.
 - 1. Apparent Thermal Conductivity; 'K' Value: Grade 6, 0.35 at 100 degrees F.
 - 2. Service Temperature: Up to 800 degrees F.
 - 3. Water Vapor Permeability: 0.005 perm inch.
 - 4. Water Absorption: 0.5 percent by volume, maximum.

2.04 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturer:
 - 1. Aeroflex USA, Inc: www.aeroflexusa.com.
 - 2. Armacell LLC; AP Armaflex: www.armacell.us/#sle.
 - 3. K-Flex USA LLC; Insul-Tube: www.kflexusa.com/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
 - 1. Minimum Service Temperature: Minus 40 degrees F.
 - 2. Maximum Service Temperature:
 - a. 1 inch and below = 220F
 - b. 1.5 and 2" = 300F
 - 3. Connection: Waterproof vapor barrier adhesive.

2.05 JACKETS

- A. PVC Plastic.
 - 1. Manufacturers:
 - a. Johns Manville Corporation: www.jm.com.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F.
 - b. Maximum Service Temperature: 150 degrees F.
 - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 10 mil.
 - e. Connections: Brush on welding adhesive.
 - 3. Covering Adhesive Mastic: Compatible with insulation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with North American Insulation Manufacturers Association (NAIMA) National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

1. Armaflex Fabricated Fittings: Pre-fabricated insulation elbows, tees, and fabricated covers for grooved fittings and couplings to reduce complex cutting and assembly of insulation in the field. Provides complete system integrity for thermal performance and controlling condensation drip from below-ambient systems when used as part of an Armaflex pipe insulation system. UL GREENGUARD Gold Certified for low VOC's and includes Microban® antimicrobial protection from the growth of mold and mildew in the system.
- E. Glass fiber insulated pipes conveying fluids below ambient temperature:
 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- F. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- G. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- H. Glass fiber insulated pipes conveying fluids above ambient temperature:
 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- I. Inserts and Shields:
 1. Application: Piping 1-1/2 inches diameter or larger.
 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 3. Insert Location: Between support shield and piping and under the finish jacket.
 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
 6. ArmaFix EcoLight Pipe Supports: Pipe supports with a load-bearing PET core to support and protect the insulation from crushing or damage, maintaining the thermal integrity of the system and preventing thermal bridging. Armacell insulation is located on the outer part for connection to Armacell's Armaflex insulations. Matches all wall thickness and ID dimensions of Armacell's tube insulation offerings.
- J. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 8400.
- K. Pipe exposed below 10 feet and below: Finish with PVC jacket and fitting covers.

3.03 SCHEDULES

- A. Plumbing Systems:
 1. Domestic Hot Water Supply (140°F or less):
 - a. Glass Fiber Insulation:
 - 1) Pipe Size Range: 0-1.25 inch.
(a) Thickness: 1 inch.
 - 2) Pipe Size Range: 1.5 inch & UP.
(a) Thickness: 2 inch.
 - b. Cellular Glass Insulation:
 - 1) Pipe Size Range: 0-1.25 inch.
(a) Thickness: 1 inch.
 - 2) Pipe Size Range: 1.5 inch & UP.
(a) Thickness: 2 inch.
 2. Domestic Cold Water:
 - a. Flexible Elastomeric Insulation:
 - 1) Pipe Size Range: all inch.
 - 2) Thickness: 1 inch.
 3. Plumbing Vents Within 10 Feet of the Exterior:

- a. Glass Fiber Insulation:
 - 1) Pipe Size Range: 0-2.5 inch.
 - (a) Thickness: 1 inch.
 - 2) Pipe Size Range: 3 inch & UP.
 - (a) Thickness: 2 inch.
- b. Cellular Glass Insulation:
 - 1) Pipe Size Range: 0-2.5 inch.
 - (a) Thickness: 1 inch.
 - 2) Pipe Size Range: 3 inch & UP.
 - (a) Thickness: 2 inch.

END OF SECTION

SECTION 22 1005
PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe, pipe fittings, specialties, and connections for piping systems.
 - 1. Sanitary sewer.
 - 2. Domestic water.
 - 3. Natural gas
 - 4. Flanges, unions, and couplings.
 - 5. Pipe hangers and supports.
 - 6. Valves.
 - 7. Water pressure reducing valves.

1.02 RELATED REQUIREMENTS

- A. Section - Excavation.
- B. Section - Fill.
- C. Section - Trenching.
- D. Section - Disinfecting of Water Utility Distribution.
- E. Section 07 8400 - Firestopping.
- F. Section 08 3100 - Access Doors and Panels.
- G. Section 09 9113 - Exterior Painting.
- H. Section 09 9123 - Interior Painting.
- I. Section 22 0516 - Expansion Fittings and Loops for Plumbing Piping.
- J. Section 22 0719 - Plumbing Piping Insulation.
- K. Section - Expansion Fittings and Loops for Plumbing Piping.
- L. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. Applicable State Plumbing Code with Amendments
- B. ANSI Z21.22 - American National Standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems; 1999, and addenda A&B (R2004).
- C. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2016.
- D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
- E. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2013.
- F. ASME B31.1 - Power Piping; 2018.
- G. ASME B31.9 - Building Services Piping; 2014.
- H. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; 2015.
- I. ASME BPVC-IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators - Welding Brazing and Fusing Qualifications; 2019.
- J. ASSE 1003 - Performance Requirements for Water Pressure Reducing Valves for Domestic Water Distribution Systems; 2009.
- K. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- L. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2016.
- M. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- N. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2016.

- O. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2018.
- P. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2016.
- Q. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2002 (Reapproved 2010).
- R. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2014.
- S. ASTM D2846/D2846M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems; 2014.
- T. ASTM D2855 - Standard Practice for the Two-Step (Primer & Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2015.
- U. ASTM F437 - Standard Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80; 2015.
- V. ASTM F438 - Standard Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40; 2015.
- W. ASTM F439 - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80; 2013.
- X. ASTM F441/F441M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80; 2013.
- Y. ASTM F442/F442M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR); 2013.
- Z. ASTM F493 - Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings; 2014.
- AA. AWWA C550 - Protective Interior Coatings for Valves and Hydrants; 2013.
- AB. AWWA C651 - Disinfecting Water Mains; 2014.
- AC. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.
- AD. MSS SP-78 - Cast Iron Plug Valves, Flanged and Threaded Ends; 2011.
- AE. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.
- AF. NSF 61 - Drinking Water System Components - Health Effects; 2019.
- AG. NSF 372 - Drinking Water System Components - Lead Content; 2016.
- AH. ASTM F 2389-06 - Standard Specification for Pressure-rated Polypropylene (PP) Piping Systems
- AI. CSA B137.11 - Polypropylene (PP-R) Pipe and Fittings for Pressure Applications
- AJ. NSF/ANSI 14 - Plastic Piping System Components and Related Materials

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Project Record Documents: Record actual locations of valves.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Welding Materials and Procedures: Conform to ASME BPVC-IX and applicable state labor regulations.

- D. Welder Qualifications: Certified in accordance with ASME BPVC-IX.
- E. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.07 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.

1.08 EXTRA MATERIALS

- A. See Section 01 6000 - Project Requirements, for additional provisions.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 SANITARY SEWER PIPING, ABOVE GRADE

- A. CPVC Pipe: ASTM D2846/D2846M, ASTM F441/F441M, or ASTM F442/F442M.
 - 1. Fittings: CPVC; ASTM D2846/D2846M, ASTM F437, ASTM F438, or ASTM F439.
 - 2. Joints: ASTM D2846/D2846M, solvent weld with ASTM F493 solvent cement.

2.03 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder.

2.04 NATURAL GAS PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
 - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
 - 2. Joints: Threaded or welded to ASME B31.1.
- B. Copper Tube: ASTM B88 (ASTM B88M), Type K (A) or L (B) annealed.
 - 1. Fittings: ASME B16.26, cast bronze.
 - 2. Joints: Flared.

2.05 FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 Inches and Under:
 - 1. Ferrous pipe: Class 150 malleable iron threaded unions.
 - 2. Copper tube and pipe: Class 150 bronze unions with soldered joints.
- B. Flanges for Pipe Size Over 1 Inch:
 - 1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
 - 2. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.06 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
 - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 - 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.

3. Trapeze Hangers: Welded steel channel frames attached to structure.
 4. Vertical Pipe Support: Steel riser clamp.
- B. Plumbing Piping - Drain, Waste, and Vent:
1. Conform to ASME B31.9.
 2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
 3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 6. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
 7. Vertical Support: Steel riser clamp.
 8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- C. Plumbing Piping - Water:
1. Conform to ASME B31.9.
 2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
 3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
 4. Hangers for Hot Pipe Sizes 2 Inches to 4 Inches: Carbon steel, adjustable, clevis.
 5. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron pipe roll, double hanger.
 6. Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.
 7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded supports or spacers and hanger rods, cast iron roll.
 8. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 9. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
 10. Wall Support for Hot Pipe Sizes 6 Inches and Over: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron pipe roll.
 11. Vertical Support: Steel riser clamp.
 12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 13. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
 14. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron pipe roll and stand, steel screws, and concrete pier or steel support.
 15. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.07 BALL VALVES

- A. Manufacturers:
1. Apollo Valves: www.apollovalves.com/#sle.
 2. Grinnell Products, a Tyco Business: www.grinnell.com.
 3. Conbraco Industries: www.apollovalves.com.
 4. Milwaukee Valve Company: www.milwaukeevalve.com.
 5. Nibco, Inc: www.nibco.com.
 6. Uponor, Inc: www.uponorengineering.com/sle.
 7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded or grooved ends with union.

2.08 PLUG VALVES

- A. Construction 2-1/2 Inches and Larger: MSS SP-78, 175 psi CWP, cast iron body and plug, pressure lubricated, Teflon or Buna N packing, flanged or grooved ends. Provide lever operator with set screw.
- B. Construction 2-1/2 Inches and Larger: MSS SP-78, 175 psi CWP, cast iron body and plug, pressure lubricated, Teflon or Buna N packing, flanged or grooved ends. Provide lever operator with set screw.

2.09 SPRING CHECK VALVES

- A. Manufacturers:
 - 1. Grinnell Products, a Tyco Business: www.grinnell.com.
 - 2. Conbraco Industries: www.apollovalves.com.
 - 3. Milwaukee Valve Company: www.milwaukeevalve.com.
 - 4. Nibco, Inc: www.nibco.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Construction, 2 inches and smaller: MSS SP-80, ANSI 372 certified, 300 psig WOG, bronze body and disc, stainless steel lever and pin with threaded connections.
- C. Construction, 2.5 inches and greater: MSS SP-71, contains less than 0.25% of lead by weight, 125 psi SWP, 3% nickel/iron body, stainless steel trim and flanged connections.

2.10 WATER PRESSURE REDUCING VALVES

- A. Manufacturers:
 - 1. Amtrol Inc: www.amtrol.com/#sle.
 - 2. Watts Regulator Company: www.wattsregulator.com/#sle.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.
- B. Up to 2 Inches:
 - 1. ASSE 1003, bronze body, stainless steel, and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded single union ends.
- C. Over 2 Inches:
 - 1. ASSE 1003, cast iron body with interior lining complying with AWWA C550, bronze fitted, elastomeric diaphragm and seat disc, flanged.

2.11 RELIEF VALVES

- A. Temperature and Pressure Relief:
 - 1. Manufacturers:
 - a. Cla-Val Co: www.cla-val.com.
 - b. Henry Technologies: www.henrytech.com.
 - c. Watts Regulator Company: www.wattsregulator.com.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME BPVC-IV certified and labeled.
- B. Temperature and Pressure:
 - 1. ANSI Z21.22, AGA certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME BPVC-IV certified and labelled.

2.12 STRAINERS

- A. Manufacturers:
 - 1. Armstrong International, Inc: www.armstronginternational.com.
 - 2. Green Country Filter Manufacturing: www.greencountryfilter.com.
 - 3. WEAMCO: www.weamco.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Size 2 inch and Under:
 - 1. Threaded brass body for 175 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.

2. Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
- C. Size 1-1/2 inch to 4 inch:
 1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 22 0516.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- H. Provide access where valves and fittings are not exposed.
 1. Coordinate size and location of access doors with Section 08 3100.
- I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- J. Provide support for utility meters in accordance with requirements of utility companies.
- K. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.
 1. Painting of interior plumbing systems and components is specified in Section 09 9123.
 2. Painting of exterior plumbing systems and components is specified in Section 09 9113.
 3. All metals that are not resistant to corrosion shall be painted per section 9000.
- L. Pipe vents from gas pressure reducing valves to outdoors.
- M. Install water piping to ASME B31.9.
- N. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- O. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- P. Inserts:
 1. Provide inserts for placement in concrete formwork.
 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- Q. Pipe Hangers and Supports:
 1. Install in accordance with ASME B31.9.
 2. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

3. Place hangers within 12 inches of each horizontal elbow.
4. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
5. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
7. Provide copper plated hangers and supports for copper piping.
8. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

3.04 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- C. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Provide spring loaded check valves on discharge of water pumps.
- E. Provide plug valves in natural gas systems for shut-off service.

3.05 TOLERANCES

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.
- B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Disinfect water distribution system in accordance with Section 33 0110.58.
- B. Prior to starting work, verify system is complete, flushed and clean.
- C. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- D. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- E. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- F. Maintain disinfectant in system for 24 hours.
- G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- I. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.07 SCHEDULES

- A. Pipe Hanger Spacing:

**TABLE 313.1
HANGERS AND SUPPORTS**

MATERIALS	TYPES OF JOINTS	HORIZONTAL	VERTICAL
Cast	Lead and Oakum	5 feet, except 10 feet where 10 foot lengths are installed ^{1, 2, 3}	Base and each floor, not to exceed 15 feet
	Compression Gasket	Every other joint, unless over 4 feet then support each joint ^{1, 2, 3}	Base and each floor, not to exceed 15 feet
Cast-Iron Hubless	Shielded Coupling	Every other joint, unless over 4 feet then support each joint ^{1, 2, 3, 4}	Base and each floor, not to exceed 15 feet
Copper Tube and Pipe	Soldered or Brazed	1½ inches and smaller, 6 feet; 2 inches and larger, 10 feet	Each floor, not to exceed 10 feet ⁵
Steel and Brass Pipe for Water or DWV	Threaded or Welded	¾ inch and smaller, 10 feet; 1 inch and larger, 12 feet	Every other floor, not to exceed 25 feet ⁵
Steel, Brass, and Tinned Copper Pipe for Gas	Threaded or Welded	½ inch, 6 feet; ¾ inch and 1 inch, 8 feet; 1¼ inches and larger, 10 feet	½ inch, 6 feet; ¾ inch and 1 inch, 8 feet; 1¼ inches every floor level
Schedule 40 PVC and ABS DWV	Solvent Cemented	All sizes, 4 feet; allow for expansion every 30 feet ^{3, 6}	Base and each floor; provide mid-story guides; provide for expansion every 30 feet ⁶
CPVC	Solvent Cemented	1 inch and smaller, 3 feet; 1¼ inches and larger, 4 feet	Base and each floor; provide mid-story guides ⁶
Lead	Wiped or Burned	Continuous Support	Not to exceed 4 feet
Copper	Mechanical	In accordance with standards acceptable to the Authority Having Jurisdiction	
Steel and Brass	Mechanical	In accordance with standards acceptable to the Authority Having Jurisdiction	
PEX	Cold Expansion, Insert and Compression	1 inch and smaller, 32 inches; 1¼ inches and larger, 4 feet	Base and each floor; provide mid-story guides
PEX-AL-PEX	Metal Insert and Metal Compression	½ inch } ¾ inch } All sizes 98 inches 1 inch }	Base and each floor; provide mid-story guides
PE-AL-PE	Metal Insert and Metal Compression	½ inch } ¾ inch } All sizes 98 inches 1 inch }	Base and each floor; provide mid-story guides
Polypropylene (PP)	Fusion weld (socket, butt, saddle, electrofusion), threaded (metal threads only), or mechanical	1 inch and smaller, 32 inches; 1¼ inches and larger, 4 feet	Base and each floor; provide mid-story guides

For SI units: 1 inch = 25.4 mm, 1 foot = 304.8 mm

Notes:

¹ Support adjacent to joint, not to exceed 18 inches (457 mm).

² Brace not to exceed 40 foot (12 192 mm) intervals to prevent horizontal movement.

³ Support at each horizontal branch connection.

⁴ Hangers shall not be placed on the coupling.

⁵ Vertical water lines shall be permitted to be supported in accordance with recognized engineering principles with regard to expansion and contraction, where first approved by the Authority Having Jurisdiction.

⁶ See the appropriate IAPMO Installation Standard for expansion and other special requirements.

END OF SECTION

SECTION 22 1006
PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Drains.
- B. Back water valves.

1.02 RELATED REQUIREMENTS

- A. Section 22 1005 - Plumbing Piping.
- B. Section 22 3000 - Plumbing Equipment.
- C. Section 22 4000 - Plumbing Fixtures.
- D. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. Applicable State Plumbing Code with Amendments
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. ASME A112.6.3 - Floor and Trench Drains; 2001 (R2007).
- D. ASME A112.6.4 - Roof, Deck, and Balcony Drains; 2008 (Reaffirmed 2012).
- E. ASSE 1011 - Hose Connection Vacuum Breakers; 2004.
- F. ASSE 1012 - Backflow Preventer with Intermediate Atmospheric Vent; 2009.
- G. ASSE 1013 - Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers; 2011.
- H. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance; 2011.
- I. NSF 61 - Drinking Water System Components - Health Effects; 2019.
- J. NSF 372 - Drinking Water System Components - Lead Content; 2016.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.
- D. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.
- E. Operation Data: Indicate frequency of treatment required for interceptors.
- F. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.02 DRAINS

- A. Manufacturers:
 - 1. Jay R. Smith Manufacturing Company: www.jayrsmith.com.
 - 2. Josam Company: www.josam.com.
 - 3. Zurn Industries, LLC: www.zurn.com.

4. Watts Regulator Company: www.watts.com
 5. Wade.
- B. Floor Drain:
1. ASME A112.6.3; _____ stainless steel grate, two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer.

2.03 BACK WATER VALVES

- A. Manufacturers:
1. Jay R. Smith Manufacturing Company; _____: www.jayrsmith.com/#sle.
 2. Zurn Industries, LLC; _____: www.zurn.com/#sle.
- B. Cast Iron Back Water Valves: ASME A112.6.4; lacquered cast iron body and cover, brass valve, .

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.
- C. Pipe relief from backflow preventer to nearest drain.

END OF SECTION

SECTION 22 3000
PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sewage ejectors.
- B. Submersible sump pumps.
- C. Sanitary Sewage Pumps:
 - 1. Centrifugal solids handling.

1.02 RELATED REQUIREMENTS

- A. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. Applicable State Plumbing Code with Amendments
- B. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings; 2015.
- C. ABMA STD 11 - Load Ratings and Fatigue Life for Roller Bearings; 2014.
- D. ANSI Z21.10.1 - Gas Water Heaters - Volume I - Storage Water Heaters with Input Ratings of 75,000 Btu per Hour or Less; 2014.
- E. ANSI Z21.10.3 - Gas-Fired Water Heaters - Volume III - Storage Water Heaters with Input Ratings Above 75,000 Btu per Hour, Circulating and Instantaneous; 2016.
- F. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; 2015.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittals procedures.
- B. Product Data:
 - 1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
 - 2. Indicate pump type, capacity, power requirements.
 - 3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
- C. Shop Drawings:
- D. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.
- E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.
- C. Performance: Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for sump pumps.

PART 2 PRODUCTS

2.01 SEWAGE EJECTORS

- A. Manufacturers:
 - 1. Armstrong Fluid Technology: www.armstrongfluidtechnology.com.
 - 2. Weil.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.
- B. Type: Vertical centrifugal, direct connected, duplex arrangement.
- C. Casing: Cast iron volute with radial clearance around impeller, inlet strainer, slide away couplings.
- D. Impeller: stainless steel; open non-clog, keyed to stainless steel shaft.
- E. Support: Cast iron pedestal motor support on steel floor plate with gas tight gaskets.
- F. Bearings: Forced grease lubricated bronze sleeve spaced maximum 48 inches and grease lubricated ball thrust at floor plate.
- G. Drive: Flexible coupling to vertical, solid shaft ball bearing electric motor.
- H. Sump: Steel cover plate with steel curb frame for grouting into concrete sump with inspection opening and cover, and alarm fittings.
- I. Controls (Duplex): Float operated mechanical alternator with float rod, stops, and corrosion resistant float to alternate operation of pumps, cut-in second pump on rising level or lead pump failure, separate pressure switch high level alarm with transformer, alarm bell, and standpipe and emergency float switch with float rod, stops, and corrosion resistant float to operate both pumps on failure of alternator.
- J. Sump and pump packaged unit shall include:
 - 1. Single submersible grinder pump: Flygt model MP3068HT with 42 gpm, 59 head, 218 impeller. Motor shall be 2.3 HP, 460 V, 3PH. Duosolid Epoxy coating both internal and external.
 - 2. Control Panel shall be Flygt custom panel, NEMA 4X, 304SS, with off level, med level, and high alarm light, Hand-Off-Auto control.

2.02 SUBMERSIBLE SUMP PUMPS

- A. Manufacturers:
 - 1. Armstrong Fluid Technology; _____: www.armstrongfluidtechnology.com/#sle.
 - 2. Weil.
- B. Type: Completely submersible, vertical, centrifugal.
- C. Casing: Cast iron pump body and oil filled motor chamber.
- D. Impeller: Cast iron; open non-clog, stainless steel shaft.
- E. Bearings: Ball bearings.
- F. Sump: Fiberglass basin with steel cover plate; _____ inches diameter, _____ inches deep.
- G. Accessories: Oil resistant 6 foot cord and plug with three-prong connector for connection to electric wiring system including grounding connector.
- H. Servicing: Slide-away coupling consisting of discharge elbow secure to sump floor, movable bracket, guide pipe system, lifting chain and chain hooks.
- I. Controls: Integral diaphragm type level controls with separate liquid level control high level alarm.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.
- B. Pumps:
 - 1. Ensure shaft length allows sump pumps to be located minimum 24 inches below lowest invert into sump pit and minimum 6 inches clearance from bottom of sump pit.

2. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.
3. Align and verify alignment of base mounted pumps prior to start-up

3.02 SCHEDULES: SEE PLANS.

END OF SECTION

DIVISION 23: Heating, Ventilation, and Air-Conditioning (HVAC)

SECTION 23 0010
BASIC MECHANICAL HVAC REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Basic Mechanical HVAC Requirements specifically applicable to Division 23 in addition to Division 1 - General Requirements.

1.02 SCOPE OF WORK

- A. The Mechanical HVAC Contract shall also include furnishing and installing a complete heating, ventilating and air conditioning system for the new building and all other related work as called for under the specifications and shown on plans.

1.03 WORK INCLUDED

- A. The Mechanical HVAC Contract shall include all work under the listed Division 23 of the Specifications Index and all related Mechanical work as shown on the Drawings for the project.
- B. A Complete table of Mechanical Reference Symbols is shown on the plans.
- C. Under this Contract the Mechanical Contractor shall furnish the Owner with two 3-ring binders of all pertinent systems related documents. Submit manuals to the Engineer for his review. The Engineer will then turn books over to the Owner. The books shall contain the following items:
 - 1. Shop drawings on all major equipment.
 - 2. Operating Instructions for all major equipment.
 - 3. Maintenance Instructions for all major equipment.
 - 4. Wiring diagrams for all equipment.
 - 5. Test and Balance Reports.
 - 6. The Mechanical installation to be made under Division 23 is set up for contract bidding as follows:
 - a. Mechanical HVAC Contractor is a sub-contractor to the General Contractor.
 - 1) The Mechanical contractor is responsible for own equipment, such as cranes, lifts, etc. in order to provide a complete installation of mechanical systems.
 - 2) The Mechanical contractor shall be a sub-contractor to the General Contractor and shall include in his bid, prices from sub-contractors for control wiring, and other trades necessary to complete the entire job.

1.04 SPECIFICATIONS COMPLIANCE

- A. The requirements of these specifications shall be complied with in every respect. Therefore, it shall be absolutely mandatory that the job foreman, all lead mechanics, subcontractors and their foreman have completely studied these specifications, be completely knowledgeable as to their entire contents, and maintain a copy at the job-site. Failure to comply with this requirement will be reason to presume the mechanic or subcontractor is not in responsible charge of his work due to ignorance of job requirements, and will be reason for the owner to require dismissal and replacement with approved personnel. Every foreman and lead mechanic shall be provided with a complete copy of this specification.

1.05 INCONSISTENCIES

- A. If there is an inconsistency in the quality and/or quantity of Work required by the Contract Documents, either the greater quality and/or quantity of Work indicated shall be provided in accordance with the Engineer/Architect's interpretation without change in the contract sum.

1.06 WORK NOT INCLUDED

- A. The following work is not included as part of the Contract.
 - 1. The removal and storage of any equipment in the building required to be moved or relocated during the construction process.

1.07 CODES, FEES AND LATERAL COSTS

- A. The Heating, Ventilation and Air Conditioning Installation shall meet all applicable local, state and federal codes and standards.
- B. All permits necessary for a complete heating and ventilation installation shall be paid for by this Contractor.

- C. Except in those municipalities which provide state- approved electrical inspection, all installation of electrical equipment wiring shall be inspected by the State Board of Electricity. Allowance shall be made in the bid and contract for the cost of such inspection.
 - 1. Fees for such inspection will be charged in accordance with the rules and regulations of the State Board of Electricity. Evidence of payment of fees shall be provided by the Contractor with his Request for Payment.

1.08 REFERENCES

- A. All equipment, piping, etc., shall be new and shall be installed to meet the approval of the following additional ordinances: ASME Rules for Pressure Tanks, National Board of Fire Underwriter's Rules, American Waterworks and the American Gas Association.

1.09 SUBMITTALS

- A. Submit under provisions of Division 01 3000.
- B. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.
- C. All documents shall be submitted in .pdf format unless pre-approved by Engineer. The contractor shall not use any equipment or materials that does not have the engineer's stamped approval.
- D. Mark dimensions and values in units to match those specified.

1.10 PROJECT/SITE CONDITIONS

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions.

1.11 SEQUENCING AND SCHEDULING

- A. Construct Work in sequence under provisions of Division 1.

1.12 PRE-CONSTRUCTION COORDINATION AND VERIFICATION

- A. This Contractor shall coordinate his work with other Contractors on this job. Any conflict which cannot be resolved shall be settled by the Architect/Engineer.
- B. Field verification of scale dimensions on plans is directed since actual locations, distances and levels will be governed by actual field conditions.
- C. The Contractors shall check architectural, structural, plumbing, heating, ventilating and electrical plans to avert possible installation conflicts. Should drastic changes from original plans be necessary to resolve such conflicts this Contractor shall notify the Architect/Engineer and secure written approval and agreement on necessary adjustments before the installation is started.
- D. Discrepancies shown on different plans or between plans and actual field conditions or between plans and specifications shall promptly be brought to the attention of the Architect/Engineer for a decision.
- E. The Contractor shall consider and review the complete set of documents, etc., Architectural, Structural, Mechanical, Electrical, etc., (Drawings and Specifications) as his complete set. He will be responsible for any and all mechanical work shown or stated (to be by him), to include this work in his bid and install such items even though they are not specifically shown or stated on the Mechanical section of the plans and specifications.

1.13 COORDINATION

- A. Contractor shall be responsible for continual coordination of the mechanical work with other trades so as to avoid conflicts in installation. Contractor shall cooperate with other trades to assure that construction proceeds in an orderly and timely manner.
- B. Study the civil, structural, electrical, shop and any specialty drawings and specifications to determine required coordination.
 - 1. Anchor bolts, sleeves, inserts and supports that may be required for the mechanical work shall be furnished and installed under the same division of the specifications as the respective items to be supported. Excluded from this requirement are cast in place anchor bolts.
 - 2. Slots, chases, openings and recesses through floors and walls as specified will be provided by the various trades in their respective materials, but the trade requiring them

- shall see that they are properly located in zones provided or otherwise approved by the Engineer or Architect and/or Owner.
3. Locations of pipes, panels, equipment, fixtures, etc., shall be adjusted to accommodate interferences encountered. The Project Coordinator shall determine the exact rerouting and location of each pipe and/or duct encountered prior to fabrication.
 - a. Right-of-Way: Lines which pitch shall have the right of way over those which do not pitch. Lines whose elevations cannot be changed shall have the right of way over lines whose elevations can be changed.
 - b. Offsets, transitions and changes in direction in pipes shall be made as required to maintain proper head room and pitch of sloping lines whether or not indicated on the drawings.
 4. Installation of Arrangement: The contractor shall install all mechanical work to permit removal of, and access to, (without damage to other parts) all parts requiring periodic replacement or maintenance.
- C. Layout Priority:
1. All trades shall understand that other trades will need to work in the same areas during the project. All final decisions as to the right-of-way and runs of utility lines (pipes, ducts, etc.) shall be made by Owner and/or Architect. In general, priority shall be given as follows:
 - a. Process piping which must be drainable
 - b. Sheet metal ductwork
 - c. Light Fixtures
 - d. Plumbing waste lines, downspouts, and vents
 - e. Sprinkler piping
 - f. Gravity water lines
 - g. Ice water or steam lines
 - h. Refrigerant lines
 - i. Gas and air lines
 - j. Plumbing water
 - k. Electrical conduit
 - l. Control air lines
- D. PREPARE DETAILED SHOP DRAWINGS WHERE NECESSARY TO ASSURE PROPER FIT AND NECESSARY CLEARANCE.

1.14 CUTTING, PATCHING, AND FIRESTOPPING

- A. The Mechanical Contractor shall set all sleeves in construction for their Work.
- B. Where cutting is required, it shall be done by the Mechanical Contractor.
- C. All patching shall be done by Mechanical Contractor.
- D. All cutting of any kind must be done with great care so as not to leave unsightly surfaces which may not be entirely concealed by plates, escutcheons, or their normal concealing construction, if such unsightly conditions occur, Mechanical Contractor will be required, at their own expense, to replace the damaged construction.
- E. This Mechanical Contractor shall provide and install firestopping materials per Section 07 8400 - Firestopping.

1.15 ACCESS PANELS REQUIRED BY TRADE

- A. Trade requiring access shall provide and install access panels where not shown or specified.
- B. The finished appearance and function will be subject to approval by the Architect/Owner.
- C. Provide panels that accommodate adjacent finishes in finished spaces.
- D. Access panels shall meet all code requirements for each location they are installed and shall be sized appropriately.

1.16 ELECTRICAL

- A. Electrical Contractor shall furnish all motor starters and motor controls and provide all wiring for motor control operation, except if specified otherwise.

1.17 ADDITIONAL ELECTRICAL COSTS

- A. If the Mechanical Contractor substitutes equipment for specified units, the mechanical contractor shall be responsible for any additional electrical installation costs for this substitution whether the other equipment was listed as equal in the specification or was approved equal after the project was in the bidding process.

1.18 GUARANTEE

- A. This Contractor shall be responsible for the proper installation and working of everything in this contract and shall guarantee to remedy free of charge any defects in workmanship and materials that may appear to give or gives rise to trouble of any kind for a period of one year from date of final substantial completion.

PART 2 PRODUCTS

2.01 NOT USED

PART 3 EXECUTION

3.01 NOT USED

END OF SECTION

SECTION 23 0513

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General construction and requirements.
- B. Applications.
- C. Single phase electric motors.
- D. Three phase electric motors.

1.02 RELATED REQUIREMENTS

- A. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.
- B. Section 26 2913 - Enclosed Controllers.

1.03 REFERENCE STANDARDS

- A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings; 2015.
- B. IEEE 112 - IEEE Standard Test Procedure for Polyphase Induction Motors and Generators; 2004.
- C. NEMA MG 1 - Motors and Generators; 2016.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.
- C. Test Reports: Indicate test results verifying nominal efficiency and power factor for three phase motors larger than 1/2 horsepower.
- D. Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.
- E. Operation Data: Include instructions for safe operating procedures.
- F. Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.05 QUALITY ASSURANCE

- A. Conform to NFPA 70.
- B. Provide certificate of compliance from Authority Having Jurisdiction indicating approval of high efficiency motors.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Regal-Beloit Corporation (Century): www.centuryelectricmotor.com.
- B. Substitutions: See Section 01 6000 - Product Requirements.

2.02 GENERAL CONSTRUCTION AND REQUIREMENTS

- A. Electrical Service: Refer to Section 26 0583 for required electrical characteristics.
- B. Construction:
 - 1. Open drip-proof type except where specifically noted otherwise.

2. Design for continuous operation in 104 degrees F environment.
 3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
- C. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
- D. Wiring Terminations:
1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
 2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

2.03 APPLICATIONS

- A. Exception: Motors less than 250 watts, for intermittent service may be the equipment manufacturer's standard and need not conform to these specifications.
- B. Single phase motors for shaft mounted fans, oil burners, and centrifugal pumps: Split phase type.
- C. Single phase motors for shaft mounted fans or blowers: Permanent split capacitor type.
- D. Single phase motors for fans, pumps, blowers, and air compressors: Capacitor start type.
- E. Single phase motors for fans, blowers, and pumps: Capacitor start, capacitor run type.
- F. Motors located in exterior locations, wet air streams downstream of sprayed coil dehumidifiers, draw through cooling towers, air cooled condensers, humidifiers, direct drive axial fans, roll filters, explosion proof environments, and dust collection systems: Totally enclosed type.
- G. Motors located in outdoors, in wet air streams downstream of sprayed coil dehumidifiers, in draw through cooling towers, and in humidifiers: Totally enclosed weatherproof epoxy-treated type.
- H. Motors located outdoors and in draw through cooling towers: Totally enclosed weatherproof epoxy-sealed type.

2.04 SINGLE PHASE POWER - SPLIT PHASE MOTORS

- A. Starting Torque: Less than 150 percent of full load torque.
- B. Starting Current: Up to seven times full load current.
- C. Breakdown Torque: Approximately 200 percent of full load torque.

2.05 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

- A. Starting Torque: Exceeding one fourth of full load torque.
- B. Starting Current: Up to six times full load current.
- C. Multiple Speed: Through tapped windings.
- D. Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.

2.06 SINGLE PHASE POWER - CAPACITOR START MOTORS

- A. Starting Torque: Three times full load torque.
- B. Starting Current: Less than five times full load current.
- C. Pull-up Torque: Up to 350 percent of full load torque.
- D. Breakdown Torque: Approximately 250 percent of full load torque.

2.07 THREE PHASE POWER - SQUIRREL CAGE MOTORS

- A. Starting Torque: Between 1 and 1-1/2 times full load torque.
- B. Starting Current: Six times full load current.
- C. Power Output, Locked Rotor Torque, Breakdown or Pull Out Torque: NEMA Design B characteristics.

- D. Design, Construction, Testing, and Performance: Conform to NEMA MG 1 for Design B motors.
- E. Insulation System: NEMA Class B or better.
- F. Testing Procedure: In accordance with IEEE 112. Load test motors to determine free from electrical or mechanical defects in compliance with performance data.
- G. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.
- H. Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors embedded in motor windings and epoxy encapsulated solid state control relay for wiring into motor starter; refer to Section 26 2913.
- I. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA STD 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
- J. Sound Power Levels: To NEMA MG 1.
- K. Part Winding Start Where Indicated: Use part of winding to reduce locked rotor starting current to approximately 60 percent of full winding locked rotor current while providing approximately 50 percent of full winding locked rotor torque.
- L. Weatherproof Epoxy Sealed Motors: Epoxy seal windings using vacuum and pressure with rotor and starter surfaces protected with epoxy enamel; bearings double shielded with waterproof non-washing grease.
- M. Nominal Efficiency: As indicated at full load and rated voltage when tested in accordance with IEEE 112.
- N. Nominal Power Factor: As indicated at full load and rated voltage when tested in accordance with IEEE 112.

END OF SECTION

SECTION 23 0516

EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flexible pipe connectors.
- B. Expansion joints and compensators.
- C. Pipe loops, offsets, and swing joints.

1.02 RELATED REQUIREMENTS

- A. Section 23 2113 - Hydronic Piping.
- B. Section 23 2300 - Refrigerant Piping.

1.03 REFERENCE STANDARDS

- A. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015a (Reapproved 2019).
- B. EJMA (STDS) - EJMA Standards; Tenth Edition.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data:
 - 1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
 - 2. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.
- C. Design Data: Indicate selection calculations.
- D. Manufacturer's Instructions: Indicate manufacturer's installation instructions, special procedures, and external controls.
- E. Project Record Documents: Record installed locations of flexible pipe connectors, expansion joints, anchors, and guides.
- F. Maintenance Data: Include adjustment instructions.

PART 2 PRODUCTS

2.01 FLEXIBLE PIPE CONNECTORS - STEEL PIPING

- A. Manufacturers:
 - 1. Mercer Rubber Company: www.mercer-rubber.com.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- B. Inner Hose: Stainless Steel.
- C. Exterior Sleeve: Single braided, stainless steel.
- D. Pressure Rating: 200 psi and 250 degrees F.
- E. Joint: Flanged.
- F. Size: Use pipe sized units.
- G. Maximum offset: 3/4 inch on each side of installed center line.

2.02 FLEXIBLE PIPE CONNECTORS - COPPER PIPING

- A. Manufacturer:
 - 1. Mercer Rubber Company: www.mercer-rubber.com.
 - 2. The Metraflex Company: www.metraflex.com/#sle.
 - 3. Minnesota Flexible
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Inner Hose: Bronze.
- C. Exterior Sleeve: Braided bronze.

- D. Pressure Rating: 125 psi and 450 degrees F.
- E. Joint: Flanged.
- F. Size: Use pipe sized units.
- G. Maximum offset: 3/4 inch on each side of installed center line.
- H. Application: Copper piping.

2.03 EXPANSION JOINTS - STAINLESS STEEL BELLOWS TYPE

- A. Pressure Rating: 125 psi and 400 degrees F.
- B. Maximum Compression: 1-3/4 inches.
- C. Size: Use pipe sized units.
- D. Application: Steel piping 3 inches and under.

2.04 EXPANSION JOINTS - EXTERNAL RING CONTROLLED STAINLESS STEEL BELLOWS TYPE

- A. Pressure Rating: 125 psi and 400 degrees F.
- B. Maximum Compression: 15/16 inch.
- C. Maximum Extension: 5/16 inch.
- D. Maximum Offset: 1/8 inch.
- E. Size: Use pipe sized units.
- F. Accessories: Internal flow liner.
- G. Application: Steel piping over 2 inches.

2.05 EXPANSION JOINTS - SINGLE SPHERE, FLEXIBLE COMPENSATOR

- A. Pressure Rating, Sizes 3/4 Inch to 2 Inch: 150 psi and 210 degrees F.
- B. Pressure Rating, Sizes 1-1/2 Inch to 12 Inch: 150 psi and 250 degrees F.
- C. Pressure Rating, Sizes 14 Inch to 24 Inch: 105 psi and 250 degrees F.
- D. Maximum Compression: 1/2 inch.
- E. Maximum Elongation: 3/8 inch.
- F. Maximum Offset: 3/8 inch.
- G. Maximum Angular Movement: 15 degrees.
- H. Joint: Tapped steel flanges.
- I. Size: Use pipe sized units.
- J. Accessories: Control cables.

2.06 EXPANSION JOINTS - TWO-PLY BRONZE BELLOWS TYPE

- A. Construction: Bronze with anti-torque device, limit stops, internal guides.
- B. Pressure Rating: 125 psi and 400 degrees F.
- C. Maximum Compression: 1-3/4 inches.
- D. Maximum Extension: 1/4 inch.
- E. Size: Use pipe sized units.
- F. Application: Copper piping.

2.07 EXPANSION JOINTS - LOW PRESSURE COMPENSATOR WITH TWO-PLY BRONZE BELLOWS

- A. Working Pressure: 75 psi.
- B. Maximum Temperatures: 250 degrees F.
- C. Maximum Extension: 5/32 inch.
- D. Size: Use pipe sized units.
- E. Application: Copper or steel piping 3 inches and under.

2.08 EXPANSION JOINTS - STEEL WITH PACKED SLIDING SLEEVE

- A. Working Pressure and Temperature: Class 150.
- B. Size: Use pipe sized units.
- C. Application: Steel piping 2 inches and over.

2.09 EXPANSION JOINTS - COPPER WITH PACKED SLIDING SLEEVE

- A. Working Pressure: 125 psi.
- B. Maximum Temperature: 250 degrees F.
- C. Size: Use pipe sized units.
- D. Application: Copper or steel piping 2 inches and over.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with EJMA (Expansion Joint Manufacturers Association) Standards.
- C. Install flexible pipe connectors on pipes connected to vibration isolated equipment. Provide line size flexible connectors.
- D. Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end. Install in horizontal plane unless indicated otherwise.
- E. Anchor pipe to building structure where indicated. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.
- F. Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required.
- G. Substitute grooved piping for vibration isolated equipment instead of flexible connectors. Grooved piping need not be anchored.

END OF SECTION

SECTION 23 0519
METERS AND GAGES FOR HVAC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pressure gages and pressure gage taps.
- B. Thermometers and thermometer wells.
- C. Static pressure gages.
- D. Filter gages.

1.02 RELATED REQUIREMENTS

- A. Section 23 0923 - Direct-Digital Control System for HVAC.
- B. Section 23 0993 - Sequence of Operations for HVAC Controls.
- C. Section 23 2113 - Hydronic Piping.

1.03 REFERENCE STANDARDS

- A. ASME B40.100 - Pressure Gauges and Gauge Attachments; 2013.
- B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers; 2014.
- C. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers; 2014.
- D. UL 393 - Indicating Pressure Gauges for Fire-Protection Service; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.
- C. Project Record Documents: Record actual locations of components and instrumentation.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.

1.05 FIELD CONDITIONS

- A. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports and test plugs.

PART 2 PRODUCTS

2.01 PRESSURE GAGES

- A. Manufacturers:
 - 1. Dwyer Instruments, Inc: www.dwyer-inst.com.
 - 2. Moeller Instrument Company, Inc: www.moellerinstrument.com.
 - 3. Omega Engineering, Inc: www.omega.com.
 - 4. Weiss
 - 5. H.O. Trerice
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Pressure Gages: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
 - 1. Case: Steel with brass bourdon tube.
 - 2. Size: 4-1/2 inch diameter.
 - 3. Mid-Scale Accuracy: One percent.
 - 4. Scale: Psi and KPa.

2.02 PRESSURE GAGE TAPPINGS

- A. Gage Cock: Tee or lever handle, brass for maximum 150 psi.
- B. Needle Valve: Brass, 1/4 inch NPT for minimum 150 psi.
- C. Pulsation Damper: Pressure snubber, brass with 1/4 inch connections.

- D. Syphon: Steel, Schedule 40, 1/4 inch angle or straight pattern.

2.03 STEM TYPE THERMOMETERS

- A. Manufacturers:
 - 1. Dwyer Instruments, Inc: www.dwyer-inst.com.
 - 2. Omega Engineering, Inc: www.omega.com.
 - 3. Weksler Glass Thermometer Corp: www.wekslerglass.com.
 - 4. Weiss
 - 5. H.O. Trerice
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Thermometers - Fixed Mounting: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish.
 - 1. Size: 9 inch scale.
 - 2. Window: Clear Lexan.
 - 3. Stem: 3/4 inch brass.
 - 4. Accuracy: 2 percent, per ASTM E77.
 - 5. Calibration: Degrees F.
- C. Thermometers - Adjustable Angle: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device; adjustable 360 degrees in horizontal plane, 180 degrees in vertical plane.
 - 1. Size: 9 inch scale.
 - 2. Window: Clear Lexan.
 - 3. Stem: 3/4 inch NPT brass.
 - 4. Accuracy: 2 percent, per ASTM E77.
 - 5. Calibration: Degrees F.

2.04 THERMOMETER SUPPORTS

- A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.
- B. Flange: 3 inch outside diameter reversible flange, designed to fasten to sheet metal air ducts, with brass perforated stem.

2.05 TEST PLUGS

- A. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with neoprene core for temperatures up to 200 degrees F.
- B. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with Nordel core for temperatures up to 350 degrees F.
- C. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with Viton core for temperatures up to 400 degrees F.
- D. Test Kit: Carrying case, internally padded and fitted containing one 2-1/2 inch diameter pressure gages, one gage adapters with 1/8 inch probes, two 1 inch dial thermometers.

2.06 STATIC PRESSURE GAGES

- A. Manufacturers:
 - 1. Dwyer Instruments, Inc: www.dwyer-inst.com.
 - 2. Omega Engineering, Inc: www.omega.com.
 - 3. Weksler Glass Thermometer Corp: www.wekslerglass.com.
 - 4. Weiss
 - 5. H.O. Trerice
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. 3-1/2 inch diameter dial in metal case, diaphragm actuated, black figures on white background, front recalibration adjustment, 2 percent of full scale accuracy.
- C. Inclined manometer, red liquid on white background with black figures, front recalibration adjustment, 3 percent of full scale accuracy.

- D. Accessories: Static pressure tips with compression fittings for bulkhead mounting, 1/4 inch diameter tubing.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide one pressure gage per pump, installing taps before strainers and on suction and discharge of pump. Pipe to gage.
- C. Install pressure gages with pulsation dampers. Provide gage cock to isolate each gauge. Provide siphon on gages in steam systems. Extend nipples and siphons to allow clearance from insulation.
- D. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets. Ensure sockets allow clearance from insulation.
- E. Install thermometers in air duct systems on flanges.
- F. Install thermometer sockets adjacent to controls system thermostat, transmitter, or sensor sockets. Refer to Section 23 0943. Where thermometers are provided on local panels, duct or pipe mounted thermometers are not required.
- G. Locate duct mounted thermometers minimum 10 feet downstream of mixing dampers, coils, or other devices causing air turbulence.
- H. Coil and conceal excess capillary on remote element instruments.
- I. Provide instruments with scale ranges selected according to service with largest appropriate scale.
- J. Install gages and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- K. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate to zero.
- L. Locate test plugs adjacent thermometers and thermometer sockets.

3.02 SCHEDULE

- A. Pressure Gages, Location and Scale Range:
 - 1. Pumps, 0 to 100 psi.
- B. Pressure Gage Tappings, Location:
 - 1. Control valves 3/4 inch & larger - inlets and outlets.
 - 2. Major coils - inlets and outlets.
 - 3. Boiler - inlets and outlets.
- C. Stem Type Thermometers, Location and Scale Range:
 - 1. Headers to central equipment, 0 to 250 degrees F.
 - 2. Coil banks - inlets and outlets, 0 to 250 degrees F.
 - 3. Boilers - inlets and outlets, 0 to 250 degrees F.

END OF SECTION

SECTION 23 0553
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Pipe markers.

1.02 RELATED REQUIREMENTS

- A. Section 09 9123 - Interior Painting: Identification painting.

1.03 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2015.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- F. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Air Handling Units: Nameplates.
- B. Control Panels: Nameplates.
- C. Piping: Pipe markers.
- D. Pumps: Nameplates.
- E. Valves: Tags

2.02 MANUFACTURERS

- A. Brady Corporation: www.bradycorp.com.
- B. Champion America, Inc: www.Champion-America.com.
- C. Seton Identification Products: www.seton.com/aec.
- D. Substitutions: See Section 01 6000 - Product Requirements.

2.03 NAMEPLATES

- A. Manufacturers:
 - 1. Seton Identification Products, a Tricor Direct Company: www.seton.com.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: Laminated three-layer plastic with engraved letters.
 - 1. Letter Color: White.
 - 2. Letter Height: 1/2 inch.
 - 3. Background Color: Black.

2.04 TAGS

- A. Manufacturers:
 - 1. Brady Corporation: www.bradycorp.com.
 - 2. Seton Identification Products, a Tricor Company: www.seton.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

- C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.05 PIPE MARKERS

- A. Manufacturers:
 - 1. Brady Corporation: www.bradycorp.com.
 - 2. Seton Identification Products, a Tricor Company: www.seton.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.
- B. Color: Conform to ASME A13.1.
- C. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.
- F. Color code as follows:
 - 1. Heating, Cooling, and Boiler Feedwater: Green with white letters.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 09 9123 for stencil painting.

3.02 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- F. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.
- G. Identify control panels and major control components outside panels with plastic nameplates.
- H. Identify thermostats relating to terminal boxes or valves with nameplates.
- I. Identify valves in main and branch piping with tags.
- J. Identify air terminal units and radiator valves with numbered tags.
- K. Tag automatic controls, instruments, and relays. Key to control schematic.
- L. Identify piping, concealed or exposed, with plastic pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- M. Install ductwork with plastic nameplates. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.
- N. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 23 0593
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.
- B. Testing, adjustment, and balancing of hydronic systems.
- C. Measurement of final operating condition of HVAC systems.

1.02 RELATED REQUIREMENTS

- A. Section 01 4000 - Quality Requirements: Employment of testing agency and payment for services.
- B. Section 01 9113 - General Commissioning Requirements: Commissioning requirements that apply to all types of work.
- C. Section 23 0800 - Commissioning of HVAC.

1.03 REFERENCE STANDARDS

- A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.
- B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008.
- C. NEBB (TAB) - Procedural Standards for Testing Adjusting and Balancing of Environmental Systems; 2015, Eighth Edition.
- D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2002.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
 - 1. Include certification that the plan developer has reviewed the contract documents, the equipment and systems, and the control system with the Engineer/Architect and other installers to sufficiently understand the design intent for each system.
 - 2. Include at least the following in the plan:
 - a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
 - b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
 - c. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
 - d. Final test report forms to be used.
 - e. Detailed step-by-step procedures for TAB work for each system and issue, including:
 - 1) Terminal flow calibration (for each terminal type).
 - 2) Diffuser proportioning.
 - 3) Branch/submain proportioning.
 - 4) Total flow calculations.
 - 5) Rechecking.
 - 6) Diversity issues.
 - f. Expected problems and solutions, etc.
 - g. Criteria for using air flow straighteners or relocating flow stations and sensors; analogous explanations for the water side.
 - h. Details of how TOTAL flow will be determined; for example:
 - 1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
 - 2) Water: Pump curves, circuit setter, flow station, ultrasonic, etc.

- i. Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and methods to verify this.
 - j. Confirmation of understanding of the outside air ventilation criteria under all conditions.
 - k. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).
 - l. Method of checking building static and exhaust fan and/or relief damper capacity.
 - m. Proposed selection points for sound measurements and sound measurement methods.
 - n. Methods for making coil or other system plant capacity measurements, if specified.
 - o. Time schedule for TAB work to be done in phases (by floor, etc.).
 - p. Description of TAB work for areas to be built out later, if any.
 - q. Time schedule for deferred or seasonal TAB work, if specified.
 - r. False loading of systems to complete TAB work, if specified.
 - s. Exhaust fan balancing and capacity verifications, including any required room pressure differentials.
 - t. Interstitial cavity differential pressure measurements and calculations, if specified.
 - u. Procedures for field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
 - v. Procedures for formal progress reports, including scope and frequency.
 - w. Procedures for formal deficiency reports, including scope, frequency and distribution.
- C. Field Logs: Submit at least twice a week to the Commissioning Authority and Construction Manager.
- D. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.
- E. Progress Reports.
- F. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- 1. Submit under provisions of Section 01 4000.
 - 2. Submit to the the Commissioning Authority and Construction Manager within two weeks after completion of testing, adjusting, and balancing.
 - 3. Revise TAB plan to reflect actual procedures and submit as part of final report.
 - 4. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Engineer/Architect and for inclusion in operating and maintenance manuals.
 - 5. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
 - 6. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
 - 7. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
 - 8. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.
 - 9. Include the following on the title page of each report:
 - a. Name of Testing, Adjusting, and Balancing Agency.
 - b. Address of Testing, Adjusting, and Balancing Agency.
 - c. Telephone number of Testing, Adjusting, and Balancing Agency.
 - d. Project name.
 - e. Project location.
 - f. Project Engineer/Architect.
 - g. Project Engineer.
 - h. Project Contractor.
 - i. Project altitude.
 - j. Report date.

- G. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
 - 1. AABC (NSTSB), AABC National Standards for Total System Balance.
 - 2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
 - 3. SMACNA (TAB).
 - 4. Maintain at least one copy of the standard to be used at project site at all times.
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
- D. TAB Agency Qualifications:
 - 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
 - 2. Having minimum of three years documented experience.
 - 3. Certified by one of the following:
 - a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
 - b. NEBB, National Environmental Balancing Bureau: www.nebb.org/#sle.
 - c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.
- E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.
- F. Pre-Qualified TAB Agencies:
 - 1. TAB Systems, Sioux Falls, SD.
 - 2. Systems Management & Balancing of Minnesota, Minneapolis, MN.
 - 3. MTB, Maple Plain, MN..
 - 4. Substitutions: See Section 01 6000 - Product Requirements.

3.02 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Proper thermal overload protection is in place for electrical equipment.
 - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - 5. Duct systems are clean of debris.
 - 6. Fans are rotating correctly.
 - 7. Fire and volume dampers are in place and open.
 - 8. Air coil fins are cleaned and combed.
 - 9. Access doors are closed and duct end caps are in place.
 - 10. Air outlets are installed and connected.
 - 11. Duct system leakage is minimized.
 - 12. Hydronic systems are flushed, filled, and vented.
 - 13. Pumps are rotating correctly.
 - 14. Proper strainer baskets are clean and in place.
 - 15. Service and balance valves are open.
- B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

- C. Beginning of work means acceptance of existing conditions.

3.03 PREPARATION

- A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
 - 1. Require attendance by all installers whose work will be tested, adjusted, or balanced.
- B. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Engineer/Architect to facilitate spot checks during testing.
- C. Provide additional balancing devices as required.

3.04 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
- C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.05 RECORDING AND ADJUSTING

- A. Field Logs: Maintain written logs including:
 - 1. Running log of events and issues.
 - 2. Discrepancies, deficient or uncompleted work by others.
 - 3. Contract interpretation requests.
 - 4. Lists of completed tests.
- B. Ensure recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. Mark on drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.
- E. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- G. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.
- H. Check and adjust systems approximately six months after final acceptance and submit report.

3.06 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- F. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- G. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- H. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- I. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

- J. Adjust speed of supply and exhaust fans to achieve a positive pressure in the head works pump chamber with respect to the wet well.

3.07 WATER SYSTEM PROCEDURE

- A. Adjust water systems to provide required or design quantities.
- B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gages to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.
- C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
- D. Effect system balance with automatic control valves fully open to heat transfer elements.
- E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.
- F. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

3.08 SCOPE

- A. Test, adjust, and balance the following:
 - 1. HVAC Pumps.
 - 2. Packaged Steel Fire Tube Boilers.
 - 3. Air Cooled Water Chillers.
 - 4. Computer Room Air Conditioning Units.
 - 5. Fans.
 - 6. Air Inlets and Outlets.

3.09 MINIMUM DATA TO BE REPORTED

- A. Electric Motors:
 - 1. Manufacturer.
 - 2. Model/Frame.
 - 3. HP/BHP.
 - 4. Phase, voltage, amperage; nameplate, actual, no load.
 - 5. RPM.
 - 6. Service factor.
 - 7. Starter size, rating, heater elements.
 - 8. Sheave Make/Size/Bore.
- B. V-Belt Drives:
 - 1. Identification/location.
 - 2. Required driven RPM.
 - 3. Driven sheave, diameter and RPM.
 - 4. Belt, size and quantity.
 - 5. Motor sheave diameter and RPM.
 - 6. Center to center distance, maximum, minimum, and actual.
- C. Pumps:
 - 1. Identification/number.
 - 2. Manufacturer.
 - 3. Size/model.
 - 4. Impeller.
 - 5. Service.
 - 6. Design flow rate, pressure drop, BHP.
 - 7. Actual flow rate, pressure drop, BHP.
 - 8. Discharge pressure.
 - 9. Suction pressure.
 - 10. Total operating head pressure.
 - 11. Shut off, discharge and suction pressures.
 - 12. Shut off, total head pressure.

- D. Air Moving Equipment:
 - 1. Location.
 - 2. Manufacturer.
 - 3. Model number.
 - 4. Serial number.
 - 5. Arrangement/Class/Discharge.
 - 6. Air flow, specified and actual.
 - 7. Return air flow, specified and actual.
 - 8. Outside air flow, specified and actual.
 - 9. Total static pressure (total external), specified and actual.
 - 10. Inlet pressure.
 - 11. Discharge pressure.
 - 12. Sheave Make/Size/Bore.
 - 13. Number of Belts/Make/Size.
 - 14. Fan RPM.
- E. Exhaust Fans:
 - 1. Location.
 - 2. Manufacturer.
 - 3. Model number.
 - 4. Serial number.
 - 5. Air flow, specified and actual.
 - 6. Total static pressure (total external), specified and actual.
 - 7. Inlet pressure.
 - 8. Discharge pressure.
 - 9. Sheave Make/Size/Bore.
 - 10. Number of Belts/Make/Size.
 - 11. Fan RPM.
- F. Duct Traverses:
 - 1. System zone/branch.
 - 2. Duct size.
 - 3. Area.
 - 4. Design velocity.
 - 5. Design air flow.
 - 6. Test velocity.
 - 7. Test air flow.
 - 8. Duct static pressure.
 - 9. Air temperature.
 - 10. Air correction factor.
- G. Duct Leak Tests:
 - 1. Description of ductwork under test.
 - 2. Duct design operating pressure.
 - 3. Duct design test static pressure.
 - 4. Duct capacity, air flow.
 - 5. Maximum allowable leakage duct capacity times leak factor.
 - 6. Test apparatus:
 - a. Blower.
 - b. Orifice, tube size.
 - c. Orifice size.
 - d. Calibrated.
 - 7. Test static pressure.
 - 8. Test orifice differential pressure.
 - 9. Leakage.

3.10 APPROVAL

- A. The commissioning authority shall provide comments to the engineer.

- B. The engineer shall review the final test and balance report and the commissioning authority report. The engineer will confirm that the test and balance meets design and will have final say on the approval of the test and balance report.

END OF SECTION

SECTION 23 0713
DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Duct insulation.
- B. Insulation jackets.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 09 9123 - Interior Painting: Painting insulation jackets.
- C. Section 22 0553 - Identification for Plumbing Piping and Equipment.
- D. Section 23 0553 - Identification for HVAC Piping and Equipment.

1.03 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2017.
- D. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.
- E. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014.
- F. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2012.
- G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- H. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- I. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- J. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Samples: Submit two samples of any representative size illustrating each insulation type.
- D. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of experience and approved by manufacturer.
 - 1. Applicator to be manufacturer certified in the installation of product.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather, sunlight, and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.07 FIELD CONDITIONS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, RIGID

- A. Manufacturer:
 - 1. Johns Manville: www.jm.com/#sle.
 - 2. Knauf Insulation: www.knaufinsulation.com/#sle.
 - 3. Owens Corning Corp: www.owenscorning.com.
 - 4. CertainTeed Corporation: www.certainteed.com/#sle.
- B. Insulation: ASTM C612; rigid, noncombustible blanket.
 - 1. 'K' Value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
 - 2. Maximum Service Temperature: 450 degrees F.
 - 3. Maximum Water Vapor Absorption: 5.0 percent.
 - 4. Maximum Density: 8.0 lb/cu ft.
- C. Vapor Barrier Jacket:
 - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
 - 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
 - 3. Secure with pressure sensitive tape.
- D. Vapor Barrier Tape:
 - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive acrylic based adhesive.

2.03 JACKETS

- A. Aluminum Jacket: ASTM B209 (ASTM B209M).
 - 1. Thickness: 0.016 inch sheet.
 - 2. Finish: Smooth.
 - 3. Joining: Longitudinal slip joints and 2 inch laps.
 - 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
 - 5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.
 - 6. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that ducts have been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. External Duct Insulation Application:
 - 1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
 - 2. Secure insulation without vapor barrier with staples, tape, or wires.
 - 3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
 - 4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
 - 5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

6. Taper insulation or duct at the top to maintain slope 1" per foot.
7. Finish with smooth aluminum jacketing.

3.03 SCHEDULES

- A. Exterior Ducts:
 1. Rigid glass fiber: 3 inches thick

END OF SECTION

SECTION 23 0719
HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping insulation.
- B. Flexible removable and reusable blanket insulation.
- C. Jackets and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 07 8400 - Firestopping.
- C. Section 09 9123 - Interior Painting: Painting insulation jacket.
- D. Section 23 2113 - Hydronic Piping: Placement of hangers and hanger inserts.
- E. Section 23 2300 - Refrigerant Piping: Placement of inserts.

1.03 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- C. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.
- D. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2013).
- E. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2015.
- F. ASTM C591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation; 2015.
- G. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).
- H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.
- I. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.07 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER

- A. Manufacturers:
 - 1. Johns Manville Corporation: www.jm.com/#sle.
 - 2. Knauf Insulation: www.knaufinsulation.com
 - 3. Owens Corning Corp: www.owenscorning.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
 - 1. 'K' Value: ASTM C177, 0.24 at 75 degrees F.
 - 2. Maximum Service Temperature: 850 degrees F.
 - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- C. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
 - 1. Maximum Service Temperature: 650 degrees F.
 - 2. Maximum Moisture Absorption: 0.2 percent by volume.
- D. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- E. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- F. Vapor Barrier Lap Adhesive: Compatible with insulation.
- G. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
- H. Fibrous Glass Fabric:
 - 1. Cloth: Untreated; 9 oz/sq yd weight.
 - 2. Blanket: 1.0 lb/cu ft density.
 - 3. Weave: 5 by 5.
- I. Indoor Vapor Barrier Finish:

2.03 CELLULAR GLASS

- A. Manufacturers:
 - 1. Pittsburgh Corning Corporation: www.foamglasinsulation.com.
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- B. Insulation: ASTM C552, Type II.
 - 1. 'K' Value: Grade 6, 0.35 at 100 degrees F.
 - 2. Service Temperature: Up to 800 degrees F.
 - 3. Water Vapor Permeability: 0.005 perm inch.
 - 4. Water Absorption: 0.5 percent by volume, maximum.

2.04 JACKETS

- A. PVC Plastic.
 - 1. Manufacturers:
 - a. Johns Manville Corporation: www.jm.com/#sle.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum Service Temperature: 0 degrees F.
 - b. Maximum Service Temperature: 350 degrees F.
 - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 - d. Thickness: 10 mil.
 - e. Connections: Brush on welding adhesive.
- B. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.

1. Thickness: 0.016 inch sheet.
2. Finish: Smooth.
3. Joining: Longitudinal slip joints and 2 inch laps.
4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Insulated pipes conveying fluids above or below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.
- E. For all systems, provide and install removable blanket insulation jackets on all fittings and accessories not limited to, but including; valves, unions, flanges, strainers, flexible connections, and expansion joints, that require regular maintenance. Insulation shall be encased in an inner and outer jacket of Teflon impregnated fiberglass fabric rated at a temperature exceeding the pipe system design temperature. Manufacturer: Newtex, Zetex Plus or approved equal.
- F. All elbows and fittings shall be pre-formed or mitered fitting and the same materials and thickness as the pipe insulation. Butt joints and seams are to be sealed with the manufacturer's recommended adhesive. No substitution allowed. Failure to provide the same insulation thickness at elbows and fittings will require replacement by the contractor at no cost to the Owner.
- G. All insulation ends shall be sealed waterproof, and end covers shall be stainless steel on systems over 140° F.
- H. Elbows, Tees, and Fittings.
 1. Provide mitered or nesting preformed insulation, wired in place with 20 gauge stainless wire.
 2. Insulation shall be of the same type and thickness as required for the pipe. No substitution allowed. Failure to provide the same insulation at elbows and fittings will require replacement by the contractor at no cost to the Owner.
 3. Joints or voids shall be filled and smoothed with insulating cement or tape as recommended by the manufacturer.
 4. Deformation of insulation jackets by voids is not allowed and subject to replacement by the contractor at no cost to the owner.
- I. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- J. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- K. Glass fiber insulated pipes conveying fluids above ambient temperature.
 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- L. Inserts and Shields:
 1. Application: Piping 1-1/2 inches diameter or larger.
 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 3. Insert location: Between support shield and piping and under the finish jacket.
 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.

5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
 6. ArmaFix EcoLight Pipe Supports: Pipe supports with a load-bearing PET core to support and protect the insulation from crushing or damage, maintaining the thermal integrity of the system and preventing thermal bridging. Armacell insulation is located on the outer part for connection to Armacell's Armaflex insulations. Matches all wall thickness and ID dimensions of Armacell's tube insulation offerings.
- M. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 8400.
- N. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces : Finish with PVC jacket and fitting covers.to 10ft above finished floor.
- O. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping. Provide two coats of UV resistant finish for flexible elastomeric cellular insulation without jacketing.

3.03 SCHEDULE

- A. Heating Systems:
1. Heating Water Supply and Return (141°F to 200°F):
 - a. Glass Fiber Insulation
 - 1) Pipe Size Range: 0 - 1-1/4 inch
 - (a) Thickness: 1.5 inch
 - 2) Pipe size Range: 1-1/2 inch and up
 - (a) Thickness: 2 inch
 - b. Cellular Glass Insulation
 - 1) Pipe Size Range: 0 - 1-1/4 inch
 - (a) Thickness: 1.5 inch
 - 2) Pipe size Range: 1-1/2 inch and up
 - (a) Thickness: 2 inch

END OF SECTION

SECTION 23 2113
HYDRONIC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Hydronic system requirements.
- B. Heating water and glycol piping, above grade.
- C. Pipe and pipe fittings for:
 - 1. Heating water piping system.
 - 2. Equipment drains and overflows.
 - 3. Pipe hangers and supports.
 - 4. Unions, flanges, mechanical couplings, and dielectric connections.
- D. Valves:
 - 1. Ball valves.
 - 2. Butterfly valves.
 - 3. Check valves.
- E. Flow controls.

1.02 RELATED REQUIREMENTS

- A. Section 08 3100 - Access Doors and Panels.
- B. Section 09 9123 - Interior Painting.
- C. Section 22 0516 - Expansion Fittings and Loops for Plumbing Piping.
- D. Section 22 0719 - Plumbing Piping Insulation.
- E. Section 23 0516 - Expansion Fittings and Loops for HVAC Piping.
- F. Section 23 0553 - Identification for HVAC Piping and Equipment.
- G. Section 23 0719 - HVAC Piping Insulation.
- H. Section 23 2114 - Hydronic Specialties.
- I. Section 23 2500 - HVAC Water Treatment: Pipe cleaning.
- J. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. ASME BPVC-IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators - Welding Brazing and Fusing Qualifications; 2019.
- B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.
- C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
- D. ASME B31.9 - Building Services Piping; 2014.
- E. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- F. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2016.
- G. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- H. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2016.
- I. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2018.
- J. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2008).
- K. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications; 2007 (Reapproved 2013).
- L. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2011-AMD 1.
- M. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.

- N. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings; 2012.
- O. AWWA C606 - Grooved and Shouldered Joints; 2015.
- P. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

1.04 SYSTEM DESCRIPTION

- A. Where more than one piping system material is specified, ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
- B. Use grooved mechanical couplings and fasteners in accessible locations.
- C. Use unions, flanges, and couplings downstream of valves and at equipment or apparatus connections. Do not use direct welded or threaded connections to valves, equipment or other apparatus.
- D. Use non-conducting dielectric connections whenever jointing dissimilar metals.
- E. Provide pipe hangers and supports in accordance with ASME B31.9 unless indicated otherwise.
- F. Use ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- G. Use spring loaded check valves on discharge of pumps.
- H. Use 3/4 inch ball valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment. Pipe to nearest floor drain.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.
- C. Welders Certificate: Include welders certification of compliance with ASME BPVC-IX.
- D. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.
- E. Project Record Documents: Record actual locations of valves.
- F. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.
- B. Welder Qualifications: Certify in accordance with ASME BPVC-IX.

1.07 REGULATORY REQUIREMENTS

- A. Conform to ASME B31.9 code for installation of piping system.
- B. Welding Materials and Procedures: Conform to ASME (BPV IX) and applicable state labor regulations.
- C. Provide certificate of compliance from authority having jurisdiction, indicating approval of welders.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.09 FIELD CONDITIONS

PART 2 PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS

- A. Comply with ASME B31.9 and applicable federal, state, and local regulations.
- B. Piping: Provide piping, fittings, hangers and supports as required, as indicated, and as follows:
 - 1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
 - 2. Use non-conducting dielectric connections whenever joining dissimilar metals.
 - 3. Grooved mechanical joints may be used in accessible locations only.
 - a. Accessible locations include those exposed on interior of building, in pipe chases, and in mechanical rooms, aboveground outdoors, and as approved by Engineer/Architect.
 - b. Use rigid joints unless otherwise indicated.
 - 4. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.
- C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.
- D. Valves: Provide valves where indicated:
 - 1. Provide drain valves where indicated, and if not indicated provide at least at main shut-off, low points of piping, bases of vertical risers, and at equipment. Use 3/4 inch ball valves with cap; pipe to nearest floor drain.
 - 2. For throttling, bypass, or manual flow control services, use ball valves.
 - 3. For shut-off and to isolate parts of systems or vertical risers, use ball or butterfly valves.

2.02 HEATING WATER AND GLYCOL PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M, Schedule 40, black, using one of the following joint types:
 - 1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D1.1/D1.1M welded.
 - 2. Grooved Joints:
 - a. Victaulic Standard Mechanical Couplings, 2 inch (DN50) through 12 inch (DN300): Manufactured in two segments of cast ductile iron, conforming to ASTM A-536, Grade 65-45-12. Gaskets shall be pressure-responsive synthetic rubber, grade to suit the intended service, conforming to ASTM D-2000. (Gaskets used for potable water applications shall be UL classified in accordance with ANSI/NSF-61 for potable water service.) Mechanical Coupling bolts shall be zinc plated (ASTM B-633) heat treated carbon steel track head conforming to ASTM A-449 and ASTM A-183, minimum tensile strength 110,000 psi (758450 kPa) as provided standard Victaulic.
- B. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn, using one of the following joint types:
 - 1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings.
 - a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
 - b. Braze: AWS A5.8M/A5.8 BCuP copper/silver alloy.
 - 2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.
 - 3. Mechanical Press Sealed Fittings: Double pressed type complying with ASME B16.22, utilizing EPDM, nontoxic synthetic rubber sealing elements.
 - a. Manufacturers:
 - 1) Apollo Valves; _____: www.apollovalves.com/#sle.
 - 2) Grinnell Products; _____: www.grinnell.com/#sle.
 - 3) Viega LLC; _____: www.viega.us/#sle.
 - 4. PRO PRESS or ANVIL International are acceptable alternates to solder joints

2.03 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.

1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
- B. Conform to ASME B31.9.
- C. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.
- D. Hangers for Cold Pipe Sizes 2 Inches and Greater: Carbon steel, adjustable, clevis.
- E. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
- F. Hangers for Hot Pipe Sizes 6 Inches and Greater: Adjustable steel yoke, cast iron roll, double hanger.
- G. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- H. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Greater: Steel channels with welded spacers and hanger rods, cast iron roll.
- I. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
- J. Wall Support for Pipe Sizes 4 Inches and Greater: Welded steel bracket and wrought steel clamp.
- K. Wall Support for Hot Pipe Sizes 6 Inches and Greater: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
- L. Vertical Support: Steel riser clamp.
- M. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- N. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- O. Floor Support for Hot Pipe Sizes 6 Inches and Greater: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
- P. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- Q. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
- R. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.
- S. In grooved installations, use rigid couplings with offsetting angle-pattern bolt pads or with wedge shaped grooves in header piping to permit support and hanging in accordance with ASME B31.9.

2.04 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

- A. Unions for Pipe 2 Inches and Less:
 1. Ferrous Piping: 150 psig malleable iron, threaded.
 2. Copper Pipe: Bronze, soldered joints.
- B. Flanges for Pipe 2 Inches and Greater:
 1. Ferrous Piping: 150 psig forged steel, slip-on.
 2. Copper Piping: Bronze.
 3. Gaskets: 1/16 inch thick preformed neoprene.
- C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
 1. Dimensions and Testing: In accordance with AWWA C606.
 2. Mechanical Couplings: Comply with ASTM F1476.
 3. Housing Clamps: Malleable iron galvanized to engage and lock, designed to permit some angular deflection, contraction, and expansion.
 4. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
 5. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
 6. When pipe is field grooved, provide coupling manufacturer's grooving tools.
 7. Manufacturers:

- a. Victaulic Company: www.victaulic.com.

2.05 BALL VALVES

- A. Manufacturers:
 - 1. Tyco Flow Control: www.tycoflowcontrol.com.
 - 2. Nibco, Inc: www.nibco.com.
 - 3. Milwaukee Valve Company: www.milwaukeevalve.com.
 - 4. Victaulic Company: www.victaulic.com.
 - 5. Anvil International
 - 6. Substitutions: See Section 01 6000 - Product Requirements.
- B. Up To and Including 2 Inches:
 - 1. Bronze one piece body, chrome plated brass ball, teflon seats and stuffing box ring, lever handle with balancing stops, solder ends with union.
- C. Over 2 Inches:
 - 1. Cast steel body, chrome plated steel ball, teflon seat and stuffing box seals, lever handle, flanged.

2.06 BUTTERFLY VALVES

- A. Manufacturers:
 - 1. Hammond Valve: www.hammondvalve.com.
 - 2. Milwaukee Valve Company: www.milwaukeevalve.com.
 - 3. Victaulic Company: www.victaulic.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Body: Cast or ductile iron with resilient replaceable EPDM seat, wafer, lug, or grooved ends, extended neck.
- C. Disc: Construct of aluminum bronze or stainless steel.
- D. Stem: Stainless steel with stem offset from the centerline to provide full 360 degree circumferential setting.
- E. Operator: 10 position lever handle.

2.07 SWING CHECK VALVES

- A. Manufacturers:
 - 1. Apollo Valves; _____: www.apollovalves.com/#sle.
 - 2. Victaulic Company; _____: www.victaulic.com/#sle.
- B. Up To and Including 2 Inches:
 - 1. Bronze body, bronze trim, bronze rotating swing disc, with composition disc, solder ends.

2.08 FLOW CONTROLS

- A. Manufacturers:
 - 1. Tyco Flow Control: www.tycoflowcontrol.com.
 - 2. ITT Bell & Gossett: www.bellgossett.com.
 - 3. Griswold Controls: www.griswoldcontrols.com.
 - 4. Taco, Inc: www.taco-hvac.com.
 - 5. Victaulic
 - 6. Anvil International
 - 7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Prepare pipe for grooved mechanical joints as required by coupling manufacturer.
- C. Remove scale and dirt on inside and outside before assembly.
- D. Prepare piping connections to equipment using jointing system specified.

- E. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- F. After completion, fill, clean, and treat systems. Refer to Section 23 2500 for additional requirements.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and to avoid interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Slope piping and arrange to drain at low points.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 23 0516.
- G. Inserts:
 - 1. Provide inserts for placement in concrete formwork.
 - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- H. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.
 - 2. Support horizontal piping as scheduled.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.
 - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 - 6. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
 - 7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - 8. Provide copper plated hangers and supports for copper piping.
 - 9. Prime coat exposed steel hangers and supports. Refer to Section 09 9123. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- I. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 23 0719.
- J. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 08 3100.
- K. Use eccentric reducers to maintain top of pipe level.
- L. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.
- M. Prepare unfinished pipe, fittings, supports, and accessories, ready for finish painting. Refer to Section 09 9123.
- N. Install valves with stems upright or horizontal, not inverted.
- O. Install pressure independant control valve on all coils 15 GPM and greater.

3.03 SCHEDULES

- A. Hanger Spacing for Copper Tubing.
 - 1. 1/2 inch and 3/4 inch: Maximum span, 5 feet; minimum rod size, 1/4 inch.
 - 2. 1 inch: Maximum span, 6 feet; minimum rod size, 1/4 inch.

3. 1-1/2 inch and 2 inch: Maximum span, 8 feet; minimum rod size, 3/8 inch.
 4. 2-1/2 inch: Maximum span, 9 feet; minimum rod size, 3/8 inch.
 5. 3 inch: Maximum span, 10 feet; minimum rod size, 3/8 inch.
 6. 4 inch: Maximum span, 12 feet; minimum rod size, 1/2 inch.
 7. 6 inch: Maximum span, 14 feet; minimum rod size, 1/2 inch.
 8. 8 inch: Maximum span, 16 feet; minimum rod size, 5/8 inch.
- B. Hanger Spacing for Steel Piping.
1. 1/2 inch, 3/4 inch, and 1 inch: Maximum span, 7 feet; minimum rod size, 1/4 inch.
 2. 1-1/4 inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
 3. 1-1/2 inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
 4. 2 inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
 5. 2-1/2 inches: Maximum span, 11 feet; minimum rod size, 3/8 inch.
 6. 3 inches: Maximum span, 12 feet; minimum rod size, 3/8 inch.
 7. 4 inches: Maximum span, 14 feet; minimum rod size, 1/2 inch.
 8. 6 inches: Maximum span, 17 feet; minimum rod size, 1/2 inch.
 9. 8 inches: Maximum span, 19 feet; minimum rod size, 5/8 inch.

END OF SECTION

SECTION 23 2114
HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Expansion tanks.
- B. Air vents.
- C. Air separators.
- D. Strainers.
- E. Suction diffusers.
- F. Pump connectors.
- G. Combination pump discharge valves.
- H. Pressure-temperature test plugs.
- I. Balancing valves.
- J. Relief valves.
- K. Boiler Emergency Shut-off Button
- L. Glycol fill system.
- M. Glycol system maintenance.

1.02 RELATED REQUIREMENTS

- A. Section 22 1006 - Plumbing Piping Specialties: Backflow preventers.
- B. Section 23 2113 - Hydronic Piping.
- C. Section 23 2500 - HVAC Water Treatment: Pipe cleaning.

1.03 REFERENCE STANDARDS

- A. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. ASME (BPV VIII, 1) - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; The American Society of Mechanical Engineers; 2007.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description and model.
- C. Certificates: Inspection certificates for pressure vessels from authority having jurisdiction.
- D. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.
- E. Maintenance Contract.
- F. Project Record Documents: Record actual locations of flow controls.
- G. Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 EXPANSION TANKS

- A. Manufacturers:
 - 1. Amtrol Inc: www.amtrol.com.
 - 2. ITT Bell & Gossett: www.bellgossett.com.
 - 3. Taco, Inc: www.taco-hvac.com.
 - 4. Grundfos: www.grundfos.com.
 - 5. Substitutions: See Section 01 6000 - Product Requirements.
- B. Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1, rated for working pressure of 125 psi, with flexible EPDM diaphragm or bladder sealed into tank, and steel support stand.
- C. Accessories: Pressure gauge and air-charging fitting, tank drain; precharge to 12 psi.
- D. Automatic Cold Water Fill Assembly: Pressure reducing valve, reduced pressure double check back flow preventer, test cocks, strainer, vacuum breaker, and valved by-pass.

2.02 AIR VENTS

- A. Manufacturers:
 - 1. Armstrong International, Inc: www.armstronginternational.com.
 - 2. ITT Bell & Gossett: www.bellgossett.com.
 - 3. Taco, Inc: www.taco-hvac.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.
- C. Float Type:
 - 1. Brass or semi-steel body, copper, polypropylene, or solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.
 - 2. Cast iron body and cover, float, bronze pilot valve mechanism suitable for system operating temperature and pressure; with isolating valve.
- D. Washer Type:
 - 1. Brass with hygroscopic fiber discs, vent ports, adjustable cap for manual shut-off, and integral spring loaded ball check valve.

2.03 AIR SEPARATORS

- A. Dip Tube Fitting (Where Not Provided By Boiler Manufacturer):
 - 1. Manufacturers:
 - a. ITT Bell & Gossett: www.bellgossett.com.
 - b. Armstrong Pumps
 - c. Amtrol.
 - d. Substitutions: See Section 01 6000 - Product Requirements.
 - 2. For 125 psi operating pressure; to prevent free air collected in boiler from rising into system.
- B. Centrifugal Air Separators/Strainers:
 - 1. Manufacturers:
 - a. Armstrong International, Inc: www.armstronginternational.com.
 - b. ITT Bell & Gossett: www.bellgossett.com.
 - c. Taco, Inc: www.taco-hvac.com.
 - d. Amtrol.
 - e. Substitutions: See Section 01 6000 - Product Requirements.

2. Steel, tested and stamped in accordance with ASME BPVC-VIII-1; for 125 psi operating pressure, with integral bronze strainer, tangential inlet and outlet connections, and internal stainless steel air collector tube.

2.04 STRAINERS

- A. Manufacturers:
 1. Armstrong International, Inc: www.armstronginternational.com.
 2. Green Country Filtration: greencountryfiltration.com.
 3. WEAMCO: www.weamco.com.
 4. Anvil International, Inc: www.anvilintl.com.
 5. Titan Flow Control
 6. Victaulic; Model Series 732: www.victaulic.com
 7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Size 2 inch and Under:
 1. Screwed brass or iron body for 175 psi working pressure, Y pattern with 1/32 inch stainless steel perforated screen.
- C. Size 2-1/2 inch to 4 inch:
 1. Flanged iron body for 175 psi working pressure, Y pattern with 3/64 inch stainless steel perforated screen.
- D. Size 5 inch and Larger:
 1. Flanged iron body for 175 psi working pressure, basket pattern with 1/8 inch stainless steel perforated screen.

2.05 SUCTION DIFFUSERS

- A. Manufacturers:
 1. ITT Bell & Gossett: www.bellgossett.com.
 2. Anvil International, Inc: www.anvilintl.com.
 3. Victaulic Company of America: www.victaulic.com.
 4. Armstrong Pumps
 5. TACO
 6. Titan Flow Control
 7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Fitting: Angle pattern, cast-iron body, threaded for 2 inch and smaller, flanged for 2-1/2 inch and larger, rated for 175 psi working pressure, with inlet vanes, cylinder strainer with 3/16 inch diameter openings, disposable 5/32 inch mesh strainer to fit over cylinder strainer, 20 mesh start up screen, and permanent magnet located in flow stream and removable for cleaning.
- C. Fitting: Angle pattern, cast-iron body, threaded for 2 inch and smaller, flanged for 2-1/2 inch and larger, rated for 175 psi working pressure, with inlet vanes, cylinder strainer with 3/16 inch diameter openings, disposable fine mesh strainer to fit over cylinder strainer, and permanent magnet located in flow stream and removable for cleaning.
- D. Accessories: Adjustable foot support, blowdown tapping in bottom, gauge tapping in side.

2.06 PUMP CONNECTORS

2.07 COMBINATION PUMP DISCHARGE VALVES

- A. Manufacturers:
 1. Taco, Inc: www.taco-hvac.com.
 2. Victaulic Company of America: www.victaulic.com.
 3. Titan Flow Control
 4. ITT Bell & Gossett: www.bellgossett.com.
 5. Anvil International, Inc: www.anvilintl.com.
 6. Armstrong Pumps
 7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Valves: Straight or angle pattern, flanged cast-iron valve body with bolt-on bonnet for 175 psi operating pressure, non-slam check valve with spring-loaded bronze disc and seat, stainless steel stem, and calibrated adjustment permitting flow regulation.

2.08 PRESSURE-TEMPERATURE TEST PLUGS

- A. Construction: Brass body designed to receive temperature or pressure probe with removable protective cap, and Neoprene rated for minimum 200 degrees F.
- B. Application: Use extended length plugs to clear insulated piping.

2.09 BALANCING VALVES

- A. Manufacturers:
 - 1. Armstrong International, Inc: www.armstronginternational.com.
 - 2. ITT Bell & Gossett: www.bellgossett.com.
 - 3. Taco, Inc: www.taco-hvac.com.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Size 2 inch and Smaller:
 - 1. Provide ball or globe style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and NPT threaded or soldered connections.
 - 2. Metal construction materials consist of bronze or brass.
 - 3. Non-metal construction materials consist of Teflon, EPDM, or engineered resin.
- C. Size 2.5 inch and Larger:
 - 1. Provide ball or globe style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and flanged, grooved, or weld end connections.
 - 2. Valve body construction materials consist of cast iron, carbon steel, or ductile iron.
 - 3. Internal components construction materials consist of brass, aluminum bronze, bronze, Teflon, EPDM, NORYL, or engineered resin.

2.10 RELIEF VALVES

- A. Manufacturers:
 - 1. Armstrong International, Inc: www.armstronginternational.com.
 - 2. ITT Bell & Gossett: www.bellgossett.com.
 - 3. Substitutions: See Section 01 6000 - Product Requirements.
- B. Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.

2.11 BOILER EMERGENCY SHUT-OFF BUTTON

- A. Manufacturer:
 - 1. Pilla Electrical Products
 - 2. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: Push button emergency shut-off switch with 40 mm mushroom operator, inscription of "Emergency Boiler Shutdown" and Pull to Reset operation.
- C. Accessories:
 - 1. Clear hinged cover with inscription "Raise Lid - Push Button".

2.12 GLYCOL FILL SYSTEM

- A. Tank Pumping System
 - 1. Manufacture
 - a. Neptune Chemical Pump Co., Inc:
 - b. Axiom
 - c. ITT
 - d. Wessels
 - 2. Pump mounted under the 18 gal tank, tank lid hinged, stand, PVC suction valve, Poly "Y" strainer with plug in cord.
 - 3. Pipe system to air separator. Include ball valve, check valve, pressure reducing valve and pressure gauge.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install specialties in accordance with manufacturer's instructions.

- B. Where large air quantities can accumulate, provide enlarged air collection standpipes.
- C. Provide manual air vents at system high points and as indicated.
- D. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.
- E. Provide air separator on suction side of system circulation pump and connect to expansion tank.
- F. Provide valved drain and hose connection on strainer blow down connection.
- G. Provide pump suction fitting on suction side of base mounted centrifugal pumps. Remove temporary strainers after cleaning systems.
- H. Provide combination pump discharge valve on discharge side of base mounted centrifugal pumps.
- I. Support pump fittings with floor mounted pipe and flange supports.
- J. Provide radiator balancing valves on water outlet from terminal heating units such as radiation, unit heaters, and fan coil units.
- K. Provide relief valves on pressure tanks, low pressure side of reducing valves, heat exchangers, and expansion tanks.
- L. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.
- M. Pipe relief valve outlet to nearest floor drain.
- N. Where one line vents several relief valves, make cross sectional area equal to sum of individual vent areas.
- O. Clean and flush glycol system before adding glycol solution. Refer to Section 23 2500.
- P. Feed glycol solution to system through glycol fill system, venting system high points. Set to fill at 12 psi.
- Q. Perform tests determining strength of glycol and water solution and submit written test results.
- R. Install pressure independant control valve on all coils 15 GPM and greater.

3.02 MAINTENANCE

- A. See Section 01 7000 - Execution Requirements, for additional requirements relating to maintenance service.
- B. Provide service and maintenance of glycol system for one year from date of Substantial Completion at no extra charge to Owner.

3.03 SCHEDULES

- A. See Schedules on Plans.

END OF SECTION

SECTION 23 2300
REFRIGERANT PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping.
- B. Valves.
- C. Pressure relief valves.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 08 3100 - Access Doors and Panels.
- C. Section 23 0719 - HVAC Piping Insulation.
- D. Section 23 6313 - Air Cooled Refrigerant Condensers.
- E. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. AHRI 710 - Performance Rating of Liquid-Line Driers; 2009.
- B. AHRI 730 (I-P) - Flow Capacity Rating of Suction-Line Filters and Suction-Line Filter-Driers; 2013.
- C. ASHRAE Std 15 - Safety Standard for Refrigeration Systems and Designation and Classification of Refrigerants ; 2019.
- D. ASHRAE Std 34 - Designation and Safety Classification of Refrigerants; 2019.
- E. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.
- F. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2013.
- G. ASME B31.5 - Refrigeration Piping and Heat Transfer Components; 2013.
- H. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service; 2013.
- I. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2011-AMD 1.
- J. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

1.04 SYSTEM DESCRIPTION

- A. Where more than one piping system material is specified ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
- B. Provide pipe hangers and supports in accordance with ASME B31.5 unless indicated otherwise.
- C. Liquid Indicators:
 - 1. Use line size liquid indicators in main liquid line leaving condenser.
 - 2. If receiver is provided, install in liquid line leaving receiver.
 - 3. Use line size on leaving side of liquid solenoid valves.
- D. Valves:
 - 1. Use service valves on suction and discharge of compressors.
- E. Refrigerant Charging (Packed Angle) Valve: Use in liquid line between receiver shut-off valve and expansion valve.
- F. Pressure Relief Valves: Use on ASME receivers and pipe to outdoors.
- G. Filter-Driers:
 - 1. Use a filter-drier immediately ahead of liquid-line controls, such as thermostatic expansion valves, solenoid valves, and moisture indicators.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

PART 2 PRODUCTS

2.01 PIPING

- A. Copper Tube: ASTM B280, H58 hard drawn or O60 soft annealed.
 - 1. Fittings: ASME B16.22 wrought copper.
 - 2. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.
- B. Pipe Supports and Anchors:
 - 1. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron adjustable swivel, split ring.
 - 2. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 - 3. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
 - 4. Vertical Support: Steel riser clamp.
 - 5. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 - 6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
 - 7. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
 - 8. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.02 VALVES

- A. Service Valves:
 - 1. Forged brass body with copper stubs, brass caps, removable valve core, integral ball check valve, flared or solder ends, for maximum pressure of 500 psi.

2.03 STRAINERS

- A. Straight Line or Angle Line Type:
 - 1. Brass or steel shell, steel cap and flange, and replaceable cartridge, with screen of stainless steel wire or monel reinforced with brass; for maximum working pressure of 430 psi.

2.04 PRESSURE RELIEF VALVES

- A. Straight Through or Angle Type: Brass body and disc, neoprene seat, factory sealed and stamped with ASME UV and National Board Certification NB, selected to ASHRAE Std 15, with standard setting of 235 psi.

2.05 FILTER-DRIERS

- A. Performance:
 - 1. Flow Capacity - Liquid Line: As indicated in schedule, minimum, rated in accordance with AHRI 710.
 - 2. Pressure Drop: 2 psi, maximum, when operating at full connected evaporator capacity.
 - 3. Design Working Pressure: 350 psi, minimum.
- B. Cores: Molded or loose-fill molecular sieve desiccant compatible with refrigerant, activated alumina, activated charcoal, and filtration to 40 microns, with secondary filtration to 20 microns; of construction that will not pass into refrigerant lines.
- C. Construction: UL listed.
 - 1. Connections: As specified for applicable pipe type.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

- A. Install refrigeration specialties in accordance with manufacturer's instructions.

- B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and avoid interference with use of space.
- D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- E. Pipe Hangers and Supports:
 - 1. Install in accordance with ASME B31.5.
 - 2. Support horizontal piping as indicated.
 - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 - 4. Place hangers within 12 inches of each horizontal elbow.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Test refrigeration system in accordance with ASME B31.5.
- C. Pressure test system with dry nitrogen to 200 psi. Perform final tests at 27 inches vacuum and 200 psi using halide torch. Test to no leakage.

END OF SECTION

SECTION 23 2500
HVAC WATER TREATMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Materials.
 - 1. System cleaner.
 - 2. Closed system treatment (water).

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Owner furnished treatment equipment.
- B. Section 01 6000 - Product Requirements: Owner furnished treatment equipment.
- C. Section 23 2113 - Hydronic Piping.
- D. Section 23 2114 - Hydronic Specialties.
- E. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide chemical treatment materials, chemicals, and equipment including electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Indicate placement of equipment in systems, piping configuration, and connection requirements.
- D. Manufacturer's Field Reports: Indicate start-up of treatment systems when completed and operating properly. Indicate analysis of system water after cleaning and after treatment.
- E. Certificate: Submit certificate of compliance from Authority Having Jurisdiction indicating approval of chemicals and their proposed disposal.
- F. Project Record Documents: Record actual locations of equipment and piping, including sampling points and location of chemical injectors.
- G. Operation and Maintenance Data: Include data on chemical feed pumps, agitators, and other equipment including spare parts lists, procedures, and treatment programs. Include step by step instructions on test procedures including target concentrations.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Sufficient chemicals for treatment and testing during required maintenance period.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience. Company shall have local representatives with water analysis laboratories and full time service personnel.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. AmSolv-Amrep, Inc; _____: www.amsolv.com/#sle.
- B. GE Water & Process Technologies; _____: www.gewater.com/#sle.
- C. Nalco, an Ecolab Company; _____: www.nalco.com/#sle.

2.02 REGULATORY REQUIREMENTS

- A. Comply with applicable codes for addition of non-potable chemicals to building mechanical systems and to public sewage systems.
- B. Perform work in accordance with local health department regulations.

2.03 MATERIALS

- A. System Cleaner:
 - 1. Manufacturers:

2. Liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products; sodiumtripoly phosphate and sodium molybdate.
- B. Closed System Treatment (Water):
 1. Sequestering agent to reduce deposits and adjust pH; polyphosphate.
 2. Corrosion inhibitors; boron-nitrite, sodium nitrite and borax, sodium totyltriazole, low molecular weight polymers, phosphonates, sodium molybdate, or sulphites.
 3. Conductivity enhancers; phosphates or phosphonates.

PART 3 EXECUTION

3.01 PREPARATION

- A. Systems shall be operational, filled, started, and vented prior to cleaning. Use water meter to record capacity in each system.
- B. Place terminal control valves in open position during cleaning.
- C. Verify that electric power is available and of the correct characteristics.

3.02 CLEANING SEQUENCE

- A. Concentration:
 1. 50% ethylene glycol
- B. Hot Water Heating Systems:
 1. Refer to section 23 2114 Paragraph 3.01 Q through V for clarification of cleaning required before adding glycol
- C. Flush open systems and glycol filled closed systems with clean water for one hour minimum. Drain completely and refill.
- D. Remove, clean, and replace strainer screens.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.04 CLOSED SYSTEM TREATMENT

- A. Provide one side stream filter on each system. Install isolating and drain valves and necessary piping. Install around balancing valve downstream of circulating pumps unless indicated otherwise.
- B. Introduce closed system treatment through side stream filter when required or indicated by test.

3.05 CLOSEOUT ACTIVITIES

- A. Training: Train Owner's personnel on operation and maintenance of chemical treatment system.
 1. Provide minimum of two hours of instruction for two people.
 2. Have operation and maintenance data prepared and available for review during training.
 3. Conduct training using actual equipment after treated system has been put into full operation.

3.06 MAINTENANCE

- A. Perform maintenance work using competent and qualified personnel under the supervision and in the direct employ of the equipment manufacturer or original installer.
- B. Provide service and maintenance of treatment systems for one year from Date of Substantial Completion.
- C. Provide laboratory and technical assistance services during this maintenance period.
- D. Provide on-site inspections of equipment during scheduled or emergency shutdown to properly evaluate success of water treatment program, and make recommendations in writing based upon these inspections.

END OF SECTION

SECTION 23 3100
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal ductwork.

1.02 RELATED REQUIREMENTS

- A. Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.
- B. Section 23 0713 - Duct Insulation: External insulation and duct liner.
- C. Section 23 3300 - Air Duct Accessories.
- D. Section 23 3700 - Air Outlets and Inlets.

1.03 REFERENCE STANDARDS

- A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals; Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- D. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2018a.
- E. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- F. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- G. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- H. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).
- I. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; 2012, 2nd Edition.

1.04 PERFORMANCE REQUIREMENTS

- A. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA (LEAK).
- C. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of documented experience.

1.07 REGULATORY REQUIREMENTS

- A. Construct ductwork to NFPA 90A standards.

1.08 FIELD CONDITIONS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Aluminum Ducts: ASTM B 209 (ASTM B 209M); aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T651 or of equivalent strength.
- B. Stainless Steel for Ducts: ASTM A666, Type 304.
- C. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 - 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 - 2. VOC Content: Not more than 250 g/L, excluding water.
 - 3. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
- D. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
- E. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
 - 1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
 - 2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
 - 3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
 - 4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
 - 5. Other Types: As required.
- F. Supply and exhaust systems: 2 inch w.g. pressure class.

2.02 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- C. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).
- D. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Joints shall be minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.
- E. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.
- F. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. Install in accordance with manufacturer's instructions.
- C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- D. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- E. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- F. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

- G. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
- H. Use double nuts and lock washers on threaded rod supports.
- I. Connect terminal units to supply ducts
- J. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp.
- K. Connect flexible ducts to metal ducts with draw bands.

3.02 SCHEDULES

- A. Ductwork Material:
 - 1. All ducts: aluminum or stainless steel

END OF SECTION

SECTION 23 3300
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Backdraft dampers - metal.
- B. Backdraft dampers - fabric.
- C. Backdraft dampers.
- D. Duct test holes.
- E. Flexible duct connections.
- F. Volume control dampers.

1.02 RELATED REQUIREMENTS

- A. Section 23 3100 - HVAC Ducts and Casings.
- B. Section 23 3600 - Air Terminal Units: Pressure regulating damper assemblies.
- C. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers.
- D. Manufacturer's Installation Instructions: Provide instructions for fire dampers.
- E. Project Record Drawings: Record actual locations of access doors and test holes.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Fusible Links: One of each type and size.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 BACKDRAFT DAMPERS - METAL

2.02 BACKDRAFT DAMPERS

- A. Manufacturers:
 - 1. Louvers & Dampers, Inc: www.louvers-dampers.com.
 - 2. Nailor Industries Inc: www.nailor.com.
 - 3. PCI Industries, Inc; Pottorff Brand : www.pottorff.com.
 - 4. Ruskin Company: www.ruskin.com.
 - 5. Greenheck.
 - 6. Price
 - 7. Pottorff
 - 8. Substitutions: See Section 01 6000 - Product Requirements.
- B. Gravity Backdraft Dampers, Size 18 by 18 inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.

2.03 BACKDRAFT DAMPERS - FABRIC

- A. Fabric Backdraft Dampers: Factory-fabricated.
 - 1. Blades: Neoprene coated fabric material.
 - 2. Birdscreen: 1/2 inch nominal mesh of galvanized steel or aluminum.
 - 3. Maximum Velocity: 1000 fpm (5 mps) face velocity.

2.04 DUCT TEST HOLES

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.05 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Flexible Duct Connections: Fabric crimped into metal edging strip.
 - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.
 - a. Net Fabric Width: Approximately 2 inches wide.
 - 2. Metal: 3 inches wide, 24 gage, 0.0239 inch thick galvanized steel.
- C. Maximum Installed Length: 6 inch.

2.06 VOLUME CONTROL DAMPERS

- A. Manufacturers:
 - 1. Louvers & Dampers, Inc: www.louvers-dampers.com.
 - 2. Nailor Industries Inc: www.nailor.com.
 - 3. PCI Industries, Inc; Pottorff Brand : www.pottorff.com.
 - 4. Ruskin Company: www.ruskin.com.
 - 5. Greenheck.
 - 6. Metal Aire
 - 7. Substitutions: See Section 01 6000 - Product Requirements.
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.
- C. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.
- D. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
- E. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 3100 for duct construction and pressure class.
- B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- C. Maximum damper leakage rate to meet applicable state Energy Code requirements
- D. Provide duct test holes where indicated and required for testing and balancing purposes.
- E. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
- F. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- G. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.

- H. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.
- I. Max flex duct length of 5'-0".

END OF SECTION

SECTION 23 3416
CENTRIFUGAL HVAC FANS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Backward inclined centrifugal fans.
- B. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 23 0548 - Vibration and Seismic Controls for HVAC.
- B. Section 23 0713 - Duct Insulation.
- C. Section 23 3300 - Air Duct Accessories: Backdraft dampers.
- D. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. AMCA (DIR) - [Directory of] Products Licensed Under AMCA International Certified Ratings Program; <http://www.amca.org/certified/search/company.aspx>.
- B. AMCA 300 - Reverberant Room Method for Sound Testing of Fans; 2014.
- C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on centrifugal fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate assembly of centrifugal fans and accessories including fan curves with specified operating point clearly plotted, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.
- D. Manufacturer's Instructions: Include complete installation instructions.
- E. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect motors, shafts, and bearings from weather and construction dust.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Do not operate fans for any purpose until ductwork is clean, filters are in place, bearings have been lubricated, and fan has been test run under observation.

1.08 EXTRA MATERIALS

- A. See Section 01 6000 - Product Requirements, for additional provisions.
- B. Supply two sets of belts for each fan.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ACME Engineering and Manufacturing Corporation; _____: www.acmefan.com/#sle.
- B. Greenheck
- C. CaptiveAire
- D. Loren Cook Company: www.lorencook.com.

E. Substitutions: See Section 01 6000 - Product Requirements.

2.02 WHEEL AND INLET

- A. Backward Inclined: Steel or aluminum construction with smooth curved inlet flange, heavy back plate, backwardly curved blades welded or riveted to flange and back plate; cast iron or cast steel hub riveted to back plate and keyed to shaft with set screws.

2.03 HOUSING

- A. Heavy gage steel, spot welded for AMCA 99 Class I and II fans, and continuously welded for Class III, adequately braced, designed to minimize turbulence with spun inlet bell and shaped cut
- B. Provide bolted construction with horizontal flanged split housing, where indicated.
- C. Fabricate plug fans without volute housing, in lined steel cabinet. Refer to Section 23 0713.

2.04 ACCESSORIES

- A. Access Doors: Shaped to conform to scroll, with quick opening latches and gaskets.
- B. Scroll Drain: 1/2 inch steel pipe coupling welded to low point of fan scroll.
- C. See schedules for additional accessories.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install fans with resilient mountings and flexible electrical leads. Refer to Section 23 0548.
- C. Install flexible connections between fan inlet and discharge ductwork; refer to Section 23 3300. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.
- D. Provide backdraft dampers on discharge of exhaust fans and as indicated; refer to Section 23 3300.

3.02 SCHEDULES: SEE SCHEDULES ON PLANS

END OF SECTION

SECTION 23 3700
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Duct-mounted supply and return registers/louvers.

1.02 RELATED REQUIREMENTS

- A. Section 09 9123 - Interior Painting: Painting of ducts visible behind outlets and inlets.

1.03 REFERENCE STANDARDS

- A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2012.
- B. ARI 890 - Standard for Air Diffusers and Air Diffuser Assemblies; Air-Conditioning and Refrigeration Institute; 2001.
- C. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets; 2006 (R2011).
- D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.
 - 1. Include complete performance data and descriptive literature including finish and accessory items.
- C. Samples: Submit two of each required air outlet and inlet type.
- D. Project Record Documents: Record actual locations of air outlets and inlets.

1.05 QUALITY ASSURANCE

- A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.
- B. Test and rate louver performance in accordance with AMCA 500-L.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hart & Cooley, Inc: www.hartandcooley.com.
- B. Krueger: www.krueger-hvac.com.
- C. Price Industries: www.price-hvac.com.
- D. Titus: www.titus-hvac.com.
- E. Halton; www.haltoncompany.com
- F. Nailor
- G. Metal Aire
- H. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DUCT-MOUNTED SUPPLY AND RETURN REGISTERS/LOUVERS

- A. Type: Duct-mounted, rectangular register for round-spiral duct with adjustable pivot-ended blades, end caps, built-in volume damper, and dual cover flanges to lay flush on duct surface regardless of diameter. Performance to match manufacturer's catalog data.
- B. Material: 22 gage, 0.0299 inch.
- C. Color: unpainted aluminum.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The contractor shall inspect all equipment for damage upon delivery and shall immediately report damage to the owner and replace or repair such damage to the satisfaction of the owner. Install in accordance with manufacturer's instructions.

- B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.
- C. All diffusers and grilles shall be installed tight on their respective mounting surfaces, installed plumb and true with room dimensions, and accurately centered on projections, recesses, windows, ceiling grids, light fixtures, or doors. Provide appropriate frame wherever necessary to adapt to mounting surface.
- D. Install items in accordance with manufacturer's instructions.
- E. Install diffusers to ductwork with air tight connection.
- F. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 09 9123.

3.02 ADJUSTING AND CLEANING

- A. All installed materials shall have debris removed and shall be vacuumed clean of dust. Remove any strippable protective coating using manufacturer's recommended method.

END OF SECTION

SECTION 23 5100

BREECHINGS, CHIMNEYS, AND STACKS

THIS SECTION IS DESIGNATED N.I.C. AND IS FOR REFERENCE

PART 1 GENERAL

2.01 SECTION INCLUDES

- A. Type B double wall gas vents.

2.02 RELATED REQUIREMENTS

- A. Section 23 0716 - HVAC Equipment Insulation.
- B. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

2.03 REFERENCE STANDARDS

- A. ANSI Z21.66 - American National Standard for Automatic Damper Devices for Use with Gas-Fired Appliances; 2015.
- B. NFPA 31 - Standard for the Installation of Oil Burning Equipment; 2016.
- C. NFPA 211 - Guide for Smoke and Heat Venting; 2016.

2.04 DEFINITIONS

- A. Breeching: Vent Connector.
- B. Chimney: Primarily vertical shaft enclosing at least one vent for conducting flue gases outdoors.
- C. Vent: That portion of a venting system designed to convey flue gases directly outdoors from a vent connector or from an appliance when a vent connector is not used.
- D. Vent Connector: That part of a venting system that conducts the flue gases from the flue collar of an appliance to a chimney or vent, and may include a draft control device.

2.05 DESIGN REQUIREMENTS

- A. Factory built vents and chimneys used for venting natural draft appliances shall comply with NFPA 211 and be UL listed and labeled.

2.06 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating factory built chimneys, including dimensional details of components and flue caps, dimensions and weights, electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate general construction, dimensions, weights, support and layout of breechings. Submit layout drawings indicating plan view and elevations where factory built units are used.
- D. Manufacturer's Instructions: Include installation instructions, and indicate assembly, support details, and connection requirements.
- E. Manufacturer's Certificate: Certify that refractory lined metal stacks meet or exceed specified requirements.

2.07 QUALITY ASSURANCE

- A. Designer Qualifications: Design stacks under direct supervision of a Professional Structural Engineer experienced in design of the type of work specified and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

2.08 REGULATORY REQUIREMENTS

- A. Conform to applicable code for installation of natural gas burning appliances and equipment.
- B. Conform to applicable code for installation of oil burning appliances and equipment.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

3.01 MANUFACTURERS

- A. DuraVent; DuraStack Pro (DIS2): www.duravent.com/#sle.
- B. Schebler
- C. Heatfab by Commercial Products Group of Hart & Cooley, Inc:
www.selkirkcorp.com/heatfab.Simpson Duravent
- D. Metal-Fab, Inc: www.mtlfab.com.
- E. Selkirk Corporation; Model PS: www.selkirkcommercial.com/#sle.
- F. Substitutions: See Section 01 6000 - Product Requirements.

3.02 BREECHINGS, CHIMNEYS, AND STACKS - GENERAL REQUIREMENTS

3.03 TYPE B DOUBLE WALL GAS VENTS

- A. Electrically Actuated Vent Dampers: Same size as draft hood collar, constructed of stainless steel or galvanized steel, with corrosion-resistant components, in compliance with ANSI Z21.66.

PART 3 EXECUTION

4.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. For Type B double wall gas vents, maintain UL listed minimum clearances from combustibles. Assemble pipe and accessories as required for complete installation.

4.02 SCHEDULES

- A. Refer to plans for sizing

END OF SECTION

SECTION 23 7433
PACKAGED OUTDOOR MAKE-UP AIR UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Controls.

1.02 RELATED REQUIREMENTS

- A. Section 23 1123 - Facility Natural-Gas Piping: Natural gas connections.
- B. Section 23 3300 - Air Duct Accessories: Flexible duct connections.
- C. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. AHRI 270 - Sound Performance Rating of Outdoor Unitary Equipment; 2015.
- B. ASHRAE Std 90.2 - Energy-Efficient Design of Low-Rise Residential Buildings; 2007, Including All Addenda.
- C. NEMA MG 1 - Motors and Generators; 2016.
- D. NFPA 54 - National Fuel Gas Code; 2015.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data with dimensions, duct and service connections, accessories, controls, electrical nameplate data, and wiring diagrams.
- C. Shop Drawings: Indicate dimensions, duct and service connections, accessories, controls, electrical nameplate data, and wiring diagrams.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to NFPA 70.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. CaptiveAire
- B. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FABRICATION

- A. Casing and Components: Steel panels, 18 gage, 0.0478 reinforced with structural angles and channels to ensure rigidity; access panels to burner and blower motor assemblies from either side of unit.
- B. Observation Port: On burner section for observing main and pilot flames.
- C. Insulation: Neoprene faced glass fiber insulation 1 inch thick on complete unit.
- D. Finish: Galvanized steel
- E. Outdoor Installation: Weatherproofed casing, with intake louver or hood.

2.03 FILTERS

- A. Units to have louvered weatherhood with 2" aluminum mesh filters.

2.04 BURNERS

- A. Assembly: For natural gas, capable of modulating turn down ratio of 25:1, including electric modulating main gas valve, motorized shut down valve, main and pilot gas regulators, pilot electric gas valve, manual shut-off valve and pilot adjustment valve.
- B. Regulator: Required for initial gas pressure of 2 psi.
- C. Pilot: Electrically ignited by spark rod through high voltage ignition transformer.
- D. Damper: Motorized with end switch to prove position before burner will fire.

2.05 FAN

- A. Fan: Statically and dynamically balanced centrifugal fan mounted on solid steel shaft with heavy duty self-aligning pre-lubricated ball bearings and V-belt drive with matching motor sheaves and belts.
- B. Electrical Characteristics: See plans.

2.06 CONTROLS

- A. Controls: Pre-wire unit for connection of power supply. Field wiring from unit to remote control panel makes unit operative.
- B. Remote Control Panel: On-off-auto switch, indicating lights for supply fan, pilot operation, burner operation, lockout indication, NEMA 1 enclosure and clogged filter indication.
- C. Interlocks: Unit to start exhaust fan through manufacturer provided circuitry on damper end switch closure.
- D. Fan Discharge Thermostat: Controls modulating gas valve to maintain supply air temperature.
- E. Safety Controls:
 - 1. Sense correct air flow before energizing pilot and sense pilot ignition before activating main gas valve.
 - 2. Smoke detection: unit shall shut down on detection of smoke. Smoke detector shall be remote-mounted in exhaust ductwork.
 - 3. Airflow sensors in supply and exhaust ductwork shall alert building alarm panel of loss of airflow.
- F. Manual Reset Low and High Limit Controls: Maintain supply air temperature between set points and shut fan down if temperatures are exceeded.
- G. Unit and associated exhaust fan shall be balanced to achieve a 0.01" positive pressure with respect to the wet well.

2.07 ACCESSORIES

- A. 115V GFCI Outlet
- B. Factory mounted VFD for balancing purposes only. Motor to have shaft grounding.
- C. Contact to start exhaust fan
- D. Factory mounted disconnect switch
- E. Unit mounted DX cooling system condensing units

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install to NFPA 54. Provide connection to natural gas system; refer to Section 23 1123.
- C. Provide flexible duct connections on inlet and outlet from unit; refer to Section 23 3300.

3.02 SCHEDULES: SEE PLANS

END OF SECTION

SECTION 23 8126.13
SMALL-CAPACITY SPLIT-SYSTEM AIR CONDITIONERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air cooled condensing units.
- B. Indoor air handling (fan and coil) units for ductless systems.
- C. Controls.

1.02 RELATED REQUIREMENTS

- A. Section 772 - 772: Includes indoor coil condensate drain.
- B. Section 23 1123 - Facility Natural-Gas Piping.
- C. Section 23 3100 - HVAC Ducts and Casings.
- D. Section 26 0583 - Wiring Connections: Electrical characteristics and wiring connections and installation and wiring of thermostats and other controls components.

1.03 REFERENCE STANDARDS

- A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2008, Including All Addenda.
- B. AHRI 520 - Performance Rating of Positive Displacement Condensing Units; 2004.
- C. ASHRAE Std 15 - Safety Standard for Refrigeration Systems and Designation and Classification of Refrigerants ; 2019.
- D. ASHRAE Std 23.1 - Methods of Testing for Rating the Performance of Positive Displacement Refrigerant Compressors and Condensing Units that Operate at Subcritical Temperatures of the Refrigerant; 2010.
- E. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. NFPA 54 - National Fuel Gas Code; 2015.
- G. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.
- H. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2015.
- I. NFPA 211 - Guide for Smoke and Heat Venting; 2016.
- J. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
- C. Shop Drawings: Indicate assembly, required clearances, and location and size of field connections.
- D. Design Data: Indicate refrigerant pipe sizing.
- E. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.
- F. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.
- G. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Filters: One for each unit.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Carrier Corporation: www.carrier.com.
- B. Daikin: www.daikin.com
- C. Mitsubishi
- D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 INDOOR AIR HANDLING UNITS FOR DUCTLESS SYSTEMS

- A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, evaporator coil, and controls; wired for single power connection with control transformer.
 - 1. Location: Ceiling.
- B. Evaporator Coils: Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve.
 - 1. Construction and Ratings: In accordance with AHRI 210/240 and UL 207.
 - 2. Manufacturer: System manufacturer.
- C. Remote Actuators:

2.03 OUTDOOR UNITS

- A. Outdoor Units: Self-contained, packaged, pre-wired unit consisting of cabinet, with compressor and condenser.
 - 1. Construction and Ratings: In accordance with AHRI 210/240 with testing in accordance with ASHRAE Std 23.1 and UL 207.
- B. Compressor: Hermetic, two speed 1800 and 3600 rpm, AHRI 520 resiliently mounted integral with condenser, with positive lubrication, crankcase heater, high pressure control, motor overload protection, service valves and drier. Provide time delay control to prevent short cycling and rapid speed changes.
- C. Air Cooled Condenser: Aluminum fin and copper tube coil, AHRI 520 with direct drive axial propeller fan resiliently mounted, galvanized fan guard.
- D. Accessories: Filter drier, high pressure switch (manual reset), low pressure switch (automatic reset), service valves and gage ports, thermometer well (in liquid line).
 - 1. Provide thermostatic expansion valves.
 - 2. Provide kit for wall mounting outdoor unit.
- E. Operating Controls:
 - 1. Control by room thermostat to maintain room temperature setting.

2.04 ACCESSORY EQUIPMENT

- A. Room Thermostat (Honeywell TH8321U): Wall-mounted, electric solid state microcomputer based room thermostat with remote sensor to maintain temperature setting; low-voltage; with following features:
 - 1. Automatic switching from heating to cooling.
 - 2. Preferential rate control to minimize overshoot and deviation from setpoint.
 - 3. Thermostat Display:
 - a. Time of day.
 - b. Actual room temperature.
 - c. Programmed temperature.
 - d. Day of week.
 - e. System Mode Indication: Heating, Cooling, Auto or On, Off.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.
- B. Verify that proper power supply is available and in correct location.
- C. Verify that proper fuel supply is available for connection.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.
- B. Install in accordance with NFPA 90A and NFPA 90B.
- C. Install gas fired furnaces in accordance with NFPA 54.
- D. Provide vent connections in accordance with NFPA 211.

3.03 SCHEDULE: SEE SCHEDULE ON PLANS.

END OF SECTION

DIVISION 26: Electrical

SECTION 26 0010
BASIC ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES:

- A. Basic Electrical Requirements specifically applicable to Division 26 Sections, in addition to Division 01 - General Requirements.

1.02 SCOPE OF WORK:

- A. The Electrical Contract Installation shall include a complete Electrical Installation for the project. All conduit, fixtures and equipment herein specified, mentioned or shown on Drawings, shall be furnished and installed in place, connected up and ready for normal operation except for such items as are specifically mentioned to be furnished by others.

1.03 WORK INCLUDED:

- A. The Electrical Contract shall include all work under the listed Sections of the Specifications Index and all related Electrical work as shown on the Drawings for the project.
- B. A Complete table of Electrical Reference Symbols is shown on the plans.
- C. Under this Contract the Electrical Contractor shall furnish the Owner with two 3-ring binders of all pertinent systems related documents. Submit manuals to the Engineer for his review. The Engineer will then turn books over to the Owner. The books shall contain the following items:
 - 1. Shop drawings on all major equipment.
 - 2. Operating Instructions for all major equipment.
 - 3. Maintenance Instructions for all major equipment.
 - 4. Wiring diagrams for all equipment.
 - 5. Control drawings for any systems not furnished under other contracts.
- D. The Electrical contractor is responsible for own equipment, such as cranes, lifts, etc. in order to provide a complete installation of Electrical systems.
- E. The Electrical Contractor is responsible for contacting the utility company and coordinating the power connection for the building service. Include all costs in bid.
- F. Coordinate utility service outages and reconnections with Utility Company and Owner.
- G. Branch feeders, branch wiring, receptacles, special outlets, switches, light fixtures, dimmers, contactors, starters, timers, etc., as shown on the plans or required for operation of the electrical system.
- H. Repair of all damage done to the premises as a result of the installation and removal of all debris or surplus material left by those engaged in the work.
- I. All new outside building lighting and sign lighting, including wiring, timers, photocells, switches and circuit breakers.

1.04 SPECIFICATIONS COMPLIANCE

- A. The requirements of these specifications shall be complied with in every respect. Therefore, it shall be absolutely mandatory that the job foreman, all lead electricians, subcontractors and their foreman have completely studied these specifications, be completely knowledgeable as to their entire contents, and maintain a copy at the job-site. Failure to comply with this requirement will be reason to presume the electrician or subcontractor is not in responsible charge of his work due to ignorance of job requirements, and will be reason for the owner to require dismissal and replacement with approved personnel. Every foreman and lead mechanic shall be provided with a complete copy of this specification.

1.05 INCONSISTENCIES

- A. If there is an inconsistency in the quality and/or quantity of Work required by the Contract Documents, either the greater quality and/or quantity of Work indicated shall be provided in accordance with the Engineer/Architect's interpretation without change in the contract sum.

1.06 CODES, FEES AND LATERAL COSTS:

- A. The Electrical Installation shall meet all applicable local, state and federal codes and standards. All permits necessary for a complete electrical installation shall be paid for by this Contractor.

- B. Except in those municipalities which provide state-approved electrical inspection, all installation of electrical equipment wiring shall be inspected by the State Board of Electricity. Allowance shall be made in the bid and contract for the cost of such inspection.
- C. Fees for such inspection will be charged in accordance with the rules and regulations of the State Board of Electricity. Evidence of payment of fees shall be provided by the Contractor with his Request for Payment.

1.07 REGULATORY REQUIREMENTS:

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed by Underwriters Laboratories, Inc. or other testing firm acceptable to authority having jurisdiction.

1.08 SUBMITTALS:

- A. Submit under provisions of Division 01.
- B. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.
- C. The contractor shall submit four (4) copies of shop drawings on all equipment and materials to the engineer for approval. The contractor shall not use any equipment or materials that does not have the engineer's stamped approval.
- D. Mark dimensions and values in units to match those specified.

1.09 PROJECT/SITE CONDITIONS:

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions.

1.10 SEQUENCING AND SCHEDULING:

- A. Construct Work in sequence under provisions of Division 1.

1.11 PRE-CONSTRUCTION COORDINATION AND VERIFICATION:

- A. This Contractor shall coordinate his work with other Contractors on this job. Any conflict which cannot be resolved shall be settled by the Architect/Engineer.
- B. Field verification of scale dimensions on plans is directed since actual locations, distances and levels will be governed by actual field conditions.
- C. The Contractors shall check architectural, structural, plumbing, heating, ventilating and electrical plans to avert possible installation conflicts. Should drastic changes from original plans be necessary to resolve such conflicts this Contractor shall notify the Architect/Engineer and secure written approval and agreement on necessary adjustments before the installation is started.
- D. Discrepancies shown on different plans or between plans and actual field conditions or between plans and specifications shall promptly be brought to the attention of the Architect/Engineer for a decision.
- E. The Contractor shall consider and review the complete set of documents, etc., Architectural, Structural, Mechanical, Electrical, etc., (Drawings and Specifications) as his complete set. He will be responsible for any and all electrical work shown or stated (to be by him), to include this work in his bid and install such items even though they are not specifically shown or stated on the Electrical section of the plans and specifications.
- F. The drawings are indicative of the work to be installed, but do not show all bends, fittings, boxes and specialties required to complete the installation.
- G. All conduits, wires, outlets boxes, switches, receptacles, devices and fixtures shall be included in the work.
- H. Where it is stated that the contractor shall "provide" a device or piece of equipment, it shall mean that such a device or equipments are finished and installed.

1.12 CUTTING, PATCHING, AND FIRESTOPPING:

- A. The Electrical Contractor shall set all sleeves in construction for their Work.
- B. Where cutting is required, it shall be done by the Electrical Contractor.
- C. All patching shall be done by Electrical Contractor.

- D. All conduit and outlet installations and cutting of any kind must be done with great care so as not to leave unsightly surfaces which may not be entirely concealed by plates, escutcheons, or their normal concealing construction, if such unsightly conditions occur, Electrical Contractor will be required, at their own expense, to replace the damaged construction.
- E. This Electrical Contractor shall provide and install firestopping materials per Section 07 8400 - Firestopping.

1.13 SCAFFOLDING:

- A. Furnish and erect all scaffolding, ladders, etc., required in the installation of wiring, equipment and fixtures.

1.14 ADDITIONAL ELECTRICAL COSTS:

- A. If the Mechanical Contractor substitutes equipment for specified units, the mechanical contractor shall be responsible for any additional electrical installation costs for this substitution whether the other equipment was listed as equal in the specification or was approved equal after the project was in the bidding process.

1.15 GUARANTEE:

- A. This Contractor shall be responsible for the proper installation and working of everything in this contract and shall guarantee to remedy free of charge any defects in workmanship and materials that may appear to give or gives rise to trouble of any kind for a period of one year from the time of final acceptance of his work by the Owner.
- B. This Contractor shall be responsible for the proper installation and working of everything in this contract and shall guarantee to remedy free of charge any defects in workmanship and materials that may appear to give or gives rise to trouble of any kind for a period of one year from date of final substantial completion.

PART 2 NOT USED

PART 3 EXECUTION

3.01 EQUIPMENT CONNECTIONS:

- A. Provide necessary power wiring for equipment furnished by others. Verify requirements with the Contractors responsible to supply each piece of equipment. Provide heavy duty disconnect switches as indicated.

3.02 AS-BUILT DRAWINGS:

- A. Contractor shall keep an accurate record of all deviations from contract drawings and specifications. He shall neatly and correctly enter in colored crayon any deviations on drawings affected, and shall keep drawings available for inspection. Extra set of drawings will be furnished for this purpose.
- B. At the completion of the job, and before final acceptance, the Contractor shall provide a complete set of as-built drawings. The Contractor shall show locations for all major electrical devices, including panelboards and all major runs of conduit, the circuiting of each fixture, outlet, etc., shall be shown. Certify to the accuracy of each print, by signature thereon, and deliver same to Architect.

END OF SECTION

SECTION 26 0505
SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical demolition.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify field measurements and circuiting arrangements are as indicated.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition drawings are based on casual field observation and existing record documents.
- D. Report discrepancies to Engineer/Architect before disturbing existing installation.
- E. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

- A. Disconnect electrical systems in walls, floors, and ceilings to be removed.
- B. Coordinate utility service outages with utility company.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
- D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.
 - 1. Obtain permission from Owner at least 24 hours before partially or completely disabling system.
 - 2. Make temporary connections to maintain service in areas adjacent to work area.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Remove, relocate, and extend existing installations to accommodate new construction.
- B. Remove abandoned wiring to source of supply.
- C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces. Use materials to match fire rating of wall.
- D. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.
- E. Disconnect and remove abandoned panelboards and distribution equipment.
- F. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- G. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- H. Repair adjacent construction and finishes damaged during demolition and extension work.
- I. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
- J. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

3.04 CLEANING AND REPAIR

- A. See Section 01 7419 - Construction Waste Management and Disposal for additional requirements.
- B. Clean and repair existing materials and equipment that remain or that are to be reused.
- C. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

END OF SECTION

SECTION 26 0519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single conductor building wire.
- B. Power and control tray cable.
- C. Wiring connectors.
- D. Electrical tape.
- E. Heat shrink tubing.
- F. Wire pulling lubricant.
- G. Cable ties.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).
- E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2010.
- F. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2013.
- G. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- H. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2009.
- I. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
- L. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
- M. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
- N. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.
- O. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.
- P. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.
- Q. UL 1277 - Electrical Power and Control Tray Cables with Optional Optical-Fiber Members; Current Edition, Including All Revisions.
- R. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
 - 3. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Engineer/Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
- C. Nonmetallic-sheathed cable is not permitted.
- D. Underground feeder and branch-circuit cable is not permitted.
- E. Service entrance cable is not permitted.
- F. Armored cable is not permitted.
- G. Metal-clad cable is not permitted.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductor Material:
 - 1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
 - 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 - 3. Tinned Copper Conductors: Comply with ASTM B33.
- H. Minimum Conductor Size:

1. Branch Circuits: 12 AWG.
 - a. Exceptions:
 - 1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
 - 2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
 - 3) 20 A, 277 V circuits longer than 150 feet: 10 AWG, for voltage drop.
 2. Control Circuits: 14 AWG.
- I. Conductor Color Coding:
1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 2. Color Coding Method: Integrally colored insulation.
 - a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
 3. Color Code:
 - a. 480Y/277 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - 4) Neutral/Grounded: Gray.
 - b. 208Y/120 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral/Grounded: White.
 - c. Equipment Ground, All Systems: Green.
 - d. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.

2.03 SINGLE CONDUCTOR BUILDING WIRE

- A. Description: Single conductor insulated wire.
- B. Conductor Stranding:
 1. Feeders and Branch Circuits:
 - a. Size 10 AWG and Smaller: Stranded.
 - b. Size 8 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation:
 1. Copper Building Wire: Type THHN/THWN-2, except as indicated below.
 - a. Size 4 AWG and Larger: Type XHHW-2.
 - b. Installed Underground: Type XHHW-2.

2.04 METAL-CLAD CABLE

- A. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
- B. Conductor Stranding:
 1. Size 10 AWG and Smaller: Stranded.
 2. Size 8 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.
- E. Grounding: Full-size integral equipment grounding conductor.
- F. Armor: Steel, interlocked tape.

2.05 POWER AND CONTROL TRAY CABLE

- A. Description: NFPA 70, Type TC cable listed and labeled as complying with UL 1277.

- B. Where exposed run cable is indicated between cable tray and utilization equipment in qualifying industrial establishments as determined by authorities having jurisdiction, provide tray cable marked as Type TC-ER in accordance with NFPA 70.
- C. Conductor Stranding: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation: Type XHHW or XHHW-2.
- F. Jacket: PVC or Chlorinated Polyethylene (CPE).

2.06 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Wiring Connectors for Splices and Taps:
 - 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
 - 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
- C. Wiring Connectors for Terminations:
 - 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
 - 2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
 - 3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
 - 4. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
 - 5. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
- D. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
- E. Mechanical Connectors: Provide bolted type.
- F. Compression Connectors: Provide circumferential type or hex type crimp configuration.

2.07 ACCESSORIES

- A. Electrical Tape:
 - 1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
 - 2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
 - 3. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.
 - 4. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
 - 5. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.
- B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
- C. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
- D. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that field measurements are as indicated.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

- A. Circuiting Requirements:
 - 1. Unless dimensioned, circuit routing indicated is diagrammatic.
 - 2. When circuit destination is indicated without specific routing, determine exact routing required.
 - 3. Arrange circuiting to minimize splices.
 - 4. Include circuit lengths required to install connected devices within 10 ft of location indicated.
 - 5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
 - 6. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is permitted, under the following conditions:
 - a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.
 - b. Increase size of conductors as required to account for ampacity derating.
 - c. Size raceways, boxes, etc. to accommodate conductors.
 - 7. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Installation in Raceway:
 - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 - 2. Pull all conductors and cables together into raceway at same time.
 - 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 - 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- E. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- F. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
- G. Terminate cables using suitable fittings.
 - 1. Metal-Clad Cable (Type MC):
 - a. Use listed fittings.
 - b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
- H. Install conductors with a minimum of 12 inches of slack at each outlet.

- I. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- J. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- K. Make wiring connections using specified wiring connectors.
 - 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 - 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 - 3. Do not remove conductor strands to facilitate insertion into connector.
 - 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
 - 5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- L. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
 - 1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
 - 2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
 - a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
 - b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
 - 3. Wet Locations: Use heat shrink tubing.
- M. Insulate ends of spare conductors using vinyl insulating electrical tape.
- N. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.
- O. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- P. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

SECTION 26 0526

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground bars.
- E. Ground rod electrodes.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2007.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verify exact locations of underground metal water service pipe entrances to building.
 - 2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
 - 3. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install ground rod electrodes until final backfill and compaction is complete.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

- A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
- B. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- E. Grounding Electrode System:
 - 1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.

- a. Provide continuous grounding electrode conductors without splice or joint.
 - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
2. Metal Underground Water Pipe(s):
 - a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
 - b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
 - c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
3. Metal In-Ground Support Structure:
 - a. Provide connection to metal in-ground support structure that is in direct contact with earth in accordance with NFPA 70.
4. Concrete-Encased Electrode:
 - a. Provide connection to concrete-encased electrode consisting of not less than 20 feet of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
5. Ground Rod Electrode(s):
 - a. Provide two electrodes unless otherwise indicated or required.
 - b. Space electrodes not less than 10 feet from each other and any other ground electrode.
 - c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
6. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
7. Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
 - a. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.
 - b. Where ground bar location is not indicated, locate in accessible location as near as possible to service disconnect enclosure.
 - c. Ground Bar Mounting Height: 18 inches above finished floor unless otherwise indicated.
8. Ground Riser: Provide common grounding electrode conductor not less than 3/0 AWG for tap connections to multiple separately derived systems as permitted in NFPA 70.
- F. Service-Supplied System Grounding:
 1. For each service disconnect, provide grounding electrode conductor to connect neutral (grounded) service conductor to grounding electrode system. Unless otherwise indicated, make connection at neutral (grounded) bus in service disconnect enclosure.
 2. For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed. Do not make any other connections between neutral (grounded) conductors and ground on load side of service disconnect.
- G. Bonding and Equipment Grounding:
 1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
 2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.

3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
 4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
 6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
 7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
 - a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
 - b. Metal gas piping.
- H. Communications Systems Grounding and Bonding:
1. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
 - a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
 - b. Raceway Size: 3/4 inch trade size unless otherwise indicated or required.
 - c. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.

2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
1. Provide products listed, classified, and labeled as suitable for the purpose intended.
 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 0526:
1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.
 - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
 2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
- D. Ground Bars:
1. Description: Copper rectangular ground bars with mounting brackets and insulators.
 2. Holes for Connections: As indicated or as required for connections to be made.
- E. Ground Rod Electrodes:
1. Comply with NEMA GR 1.
 2. Material: Copper-bonded (copper-clad) steel.
 3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that field measurements are as indicated.
- C. Verify that conditions are satisfactory for installation prior to starting work.
- D. Verify that final backfill and compaction has been completed before driving rod electrodes.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.

- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
 - 1. Outdoor Installations: Unless otherwise indicated, install with top of rod 6 inches below finished grade.
- D. Make grounding and bonding connections using specified connectors.
 - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 - 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 - 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 - 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- E. Identify grounding and bonding system components in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- C. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION

SECTION 26 0529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 26 0533.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.
- C. Section 26 0533.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2013.
- D. MFMA-4 - Metal Framing Standards Publication; 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 5. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 3000.

1.05 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Comply with applicable building code.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.

2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
 - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
- D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
 1. Comply with MFMA-4.
 2. Channel Material:
 - a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
- E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
- F. Anchors and Fasteners:
 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
 2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
 3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
 4. Hollow Masonry: Use toggle bolts.
 5. Hollow Stud Walls: Use toggle bolts.
 6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
 7. Sheet Metal: Use sheet metal screws.
 8. Wood: Use wood screws.
 9. Plastic and lead anchors are not permitted.
 10. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
 - a. Comply with MFMA-4.
 - b. Channel Material: Use galvanized steel.
 - c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.
 11. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that mounting surfaces are ready to receive support and attachment components.
- B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.

- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- D. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- E. Unless specifically indicated or approved by Engineer/Architect, do not provide support from suspended ceiling support system or ceiling grid.
- F. Unless specifically indicated or approved by Engineer/Architect, do not provide support from roof deck.
- G. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- H. Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 - 4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 3 inch high concrete pad constructed in accordance with Section 03 3000.
 - 5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- I. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.
- J. Secure fasteners according to manufacturer's recommended torque settings.
- K. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect support and attachment components for damage and defects.
- C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- D. Correct deficiencies and replace damaged or defective support and attachment components.
- E. Install hangers and supports as required to adequately and securely support electrical system components, in a neat and workmanlike manner, as specified in NECA 1.
 - 1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
 - 2. Obtain permission from Engineer/Architect before drilling or cutting structural members.
- F. Rigidly weld support members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- G. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- H. In wet and damp locations use steel channel supports to stand cabinets and panelboards 1 inch off wall.
- I. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

END OF SECTION

SECTION 26 0533.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Galvanized steel rigid metal conduit (RMC).
- B. Aluminum rigid metal conduit (RMC).
- C. Intermediate metal conduit (IMC).
- D. Flexible metal conduit (FMC).
- E. Liquidtight flexible metal conduit (LFMC).
- F. Electrical metallic tubing (EMT).
- G. Rigid polyvinyl chloride (PVC) conduit.
- H. Conduit fittings.
- I. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
 - 1. Includes additional requirements for fittings for grounding and bonding.
- C. Section 26 0529 - Hangers and Supports for Electrical Systems.
- D. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.
- B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.
- C. ANSI C80.5 - American National Standard for Electrical Rigid Aluminum Conduit (ERAC); 2005.
- D. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit (EIMC); 2005.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- F. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.
- G. NECA 102 - Standard for Installing Aluminum Rigid Metal Conduit; 2004.
- H. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2003.
- I. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.
- J. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; 2005.
- K. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2013.
- L. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2015.
- M. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- N. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.
- O. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.
- P. UL 6A - Electrical Rigid Metal Conduit-Aluminum, Red Brass, and Stainless Steel; Current Edition, Including All Revisions.
- Q. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.
- R. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

- S. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.
- T. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.
- U. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.
- V. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
 - 4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
 - 5. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittals procedures.
- B. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs, and conduits 2 inch (53 mm) trade size and larger.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, implies all applications are acceptable. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
 - 1. Under Slab on Grade: Use galvanized steel rigid metal conduit or rigid PVC conduit.
 - 2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit or rigid PVC conduit.
 - 3. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
 - 4. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit elbows for bends.
 - 5. Where steel conduit is installed in direct contact with earth where soil has a resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape to provide supplementary corrosion protection or use PVC-coated galvanized steel rigid metal conduit.

- D. Embedded Within Concrete:
 - 1. Within Slab on Grade: Not permitted.
 - 2. Within Slab Above Ground: Not permitted.
 - 3. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from concrete.
- E. Interior, Damp or Wet Locations: Use aluminum rigid metal conduit.
- F. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), aluminum rigid metal conduit, or electrical metallic tubing (EMT).
- G. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or aluminum rigid metal conduit.
 - 1. Locations subject to physical damage include, but are not limited to:
 - a. Where exposed below 6 feet, except within electrical and communication rooms or closets.
- H. Exposed, Exterior: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or PVC-coated galvanized steel rigid metal conduit.
- I. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit, intermediate metal conduit (IMC), or Schedule 40 PVC.
- J. Corrosive Locations Above Ground: Use aluminum rigid metal conduit.
- K. Hazardous (Classified) Locations: Use aluminum rigid metal conduit.
- L. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
 - 1. Maximum Length: 6 feet.
- M. Connections to Vibrating Equipment:
 - 1. Dry Locations: Use flexible metal conduit.
 - 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
 - 3. Maximum Length: 6 feet unless otherwise indicated.
 - 4. Vibrating equipment includes, but is not limited to:
 - a. Motors.

2.02 CONDUIT REQUIREMENTS

- A. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Minimum Conduit Size, Unless Otherwise Indicated:
 - 1. Branch Circuits: 3/4 inch (21 mm) trade size.
 - 2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
 - 3. Control Circuits: 3/4 inch (21 mm) trade size.
 - 4. Flexible Connections to Luminaires: 1/2 inch (16 mm) trade size.
 - 5. Underground, Interior: 1 inch (27 mm) trade size.
 - 6. Underground, Exterior: 1 inch (27 mm) trade size.
- D. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
 - 1. Allied Tube & Conduit: www.alliedeg.com/#sle.
 - 2. Republic Conduit: www.republic-conduit.com/#sle.
 - 3. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com/#sle.
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- C. Fittings:
 - 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.

2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.
4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 ALUMINUM RIGID METAL CONDUIT (RMC)

- A. Manufacturers:
 1. Allied Tube & Conduit: www.alliedeg.com/#sle.
 2. Republic Conduit: www.republic-conduit.com/#sle.
 3. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com/#sle.
- B. Description: NFPA 70, Type RMC aluminum rigid metal conduit complying with ANSI C80.5 and listed and labeled as complying with UL 6A.
- C. Fittings:
 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 3. Hazardous (Classified) Locations: Use fittings listed and labeled as complying with UL 1203 for the classification of the installed location.
 4. Material: Use aluminum.
 5. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.05 INTERMEDIATE METAL CONDUIT (IMC)

- A. Manufacturers:
 1. Allied Tube & Conduit: www.alliedeg.com/#sle.
 2. Republic Conduit: www.republic-conduit.com/#sle.
 3. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com/#sle.
- B. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- C. Fittings:
 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.
 2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 3. Material: Use steel or malleable iron.
 4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.06 FLEXIBLE METAL CONDUIT (FMC)

- A. Manufacturers:
 1. AFC Cable Systems, Inc: www.afcweb.com/#sle.
 2. Electri-Flex Company: www.electriflex.com/#sle.
 3. International Metal Hose: www.metalhose.com/#sle.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.
- C. Fittings:
 1. Manufacturers:
 - a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
 - b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
 - c. Thomas & Betts Corporation: www.tnb.com/#sle.

2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.

2.07 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Manufacturers:
 1. AFC Cable Systems, Inc: www.afcweb.com/#sle.
 2. Electri-Flex Company: www.electriflex.com/#sle.
 3. International Metal Hose: www.metalhose.com/#sle.
 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- C. Fittings:
 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 2. Material: Use steel or malleable iron.

2.08 ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
 1. Allied Tube & Conduit: www.alliedeg.com/#sle.
 2. Wheatland Tube, a Division of Zekelman Industries: www.wheatland.com/#sle.
- B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- C. Fittings:
 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 2. Material: Use steel or malleable iron.
 3. Connectors and Couplings: Use compression (gland) or set-screw type.
 - a. Do not use indenter type connectors and couplings.

2.09 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- B. Fittings:
 1. Manufacturer: Same as manufacturer of conduit to be connected.
 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.10 ACCESSORIES

- A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil.
- B. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.
- C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- D. Modular Seals for Conduit Penetrations: Rated for minimum of 40 psig; Suitable for the conduits to be installed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install aluminum rigid metal conduit (RMC) in accordance with NECA 102.
- E. Install intermediate metal conduit (IMC) in accordance with NECA 101.
- F. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- G. Conduit Routing:
 - 1. Unless dimensioned, conduit routing indicated is diagrammatic.
 - 2. When conduit destination is indicated without specific routing, determine exact routing required.
 - 3. Conceal all conduits unless specifically indicated to be exposed.
 - 4. Conduits in the following areas may be exposed, unless otherwise indicated:
 - a. Electrical rooms.
 - b. Mechanical equipment rooms.
 - c. Within joists in areas with no ceiling.
 - 5. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
 - 6. Arrange conduit to maintain adequate headroom, clearances, and access.
 - 7. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
 - 8. Route conduits above water and drain piping where possible.
 - 9. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
 - 10. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
 - 11. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
 - a. Heaters.
 - b. Hot water piping.
 - c. Flues.
 - 12. Group parallel conduits in the same area together on a common rack.
- H. Conduit Support:
 - 1. Secure and support conduits in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
 - 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
 - 3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
 - 4. Use conduit strap to support single surface-mounted conduit.
 - a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
 - 5. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
 - 6. Use conduit clamp to support single conduit from beam clamp or threaded rod.
 - 7. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
 - 8. Use of wire for support of conduits is not permitted.
- I. Connections and Terminations:
 - 1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
 - 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
 - 3. Use suitable adapters where required to transition from one type of conduit to another.

4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
 5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
 6. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
 7. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- J. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
 3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
 4. Conceal bends for conduit risers emerging above ground.
 5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
 6. Provide suitable modular seal where conduits penetrate exterior wall below grade.
 7. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- K. Underground Installation:
1. Minimum Cover, Unless Otherwise Indicated or Required:
 - a. Underground, Exterior: 24 inches.
 - b. Under Slab on Grade: 12 inches to bottom of slab.
 2. Provide underground warning tape in accordance with Section 26 0553 along entire conduit length for service entrance where not concrete-encased.
- L. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
 2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
 3. Where conduits are subject to earth movement by settlement or frost.
- M. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
 2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- N. Provide grounding and bonding in accordance with Section 26 0526.

3.03 CLEANING

- A. Clean interior of conduits to remove moisture and foreign matter.

END OF SECTION

SECTION 26 0533.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.
- C. Boxes for hazardous (classified) locations.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping.
- B. Section 08 3100 - Access Doors and Panels: Panels for maintaining access to concealed boxes.
- C. Section 26 0529 - Hangers and Supports for Electrical Systems.
- D. Section 26 2726 - Wiring Devices:
 - 1. Wall plates.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.
- D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- I. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.
- J. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.
- K. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
 - 4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
 - 5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
 - 6. Coordinate the work with other trades to preserve insulation integrity.
 - 7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
 - 8. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.
- B. Products: Provide products listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 BOXES

- A. General Requirements:
 - 1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
 - 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 - 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
 - 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
 - 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
 - 1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
 - 2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
 - 3. Use suitable concrete type boxes where flush-mounted in concrete.
 - 4. Use suitable masonry type boxes where flush-mounted in masonry walls.
 - 5. Use raised covers suitable for the type of wall construction and device configuration where required.
 - 6. Use shallow boxes where required by the type of wall construction.
 - 7. Do not use "through-wall" boxes designed for access from both sides of wall.
 - 8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 - 9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 - 10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
 - 11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
 - 12. Wall Plates: Comply with Section 26 2726.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
 - 1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
 - 2. NEMA 250 Environment Type, Unless Otherwise Indicated:
 - a. Indoor Clean, Dry Locations: Type 1, painted steel.
 - b. Outdoor Locations: Type 3R, painted steel.
 - c. Indoor Damp or Wet Locations: Type 4X stainless steel..
 - 3. Junction and Pull Boxes Larger Than 100 cubic inches:
 - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
 - 4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
 - a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
 - b. Back Panels: Painted steel, removable.

5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
- D. Boxes for Hazardous (Classified) Locations: Listed and labeled as complying with UL 1203 for the classification of the installed location.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive boxes.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- E. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
- F. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
- G. Box Locations:
 1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 3100 as required where approved by the Architect.
 2. Unless dimensioned, box locations indicated are approximate.
 3. Locate boxes so that wall plates do not span different building finishes.
 4. Locate boxes so that wall plates do not cross masonry joints.
 5. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
 6. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
- H. Box Supports:
 1. Secure and support boxes in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
 3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
- I. Install boxes plumb and level.
- J. Flush-Mounted Boxes:
 1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
- K. Install boxes as required to preserve insulation integrity.
- L. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

- M. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
- N. Close unused box openings.
- O. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- P. Provide grounding and bonding in accordance with Section 26 0526.
- Q. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.03 CLEANING

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

END OF SECTION

SECTION 26 0553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Underground warning tape.
- E. Warning signs and labels.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES:
Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

1.03 REFERENCE STANDARDS

- A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2011.
- B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.04 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

- A. Existing Work: Unless specifically excluded, identify existing elements to remain that are not already identified in accordance with specified requirements.
- B. Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - a. Motor Control Centers:
 - 1) Identify ampere rating.
 - 2) Identify voltage and phase.
 - 3) Use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
 - b. Panelboards:
 - 1) Identify voltage and phase.
 - 2) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
 - 3) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Identify spares and spaces.
 - c. Transformers:
 - 1) Identify kVA rating.
 - 2) Identify voltage and phase for primary and secondary.
 - d. Enclosed switches, circuit breakers, and motor controllers:
 - 1) Identify voltage and phase.
 - 2) Identify voltage power source and circuit number. Include location when not within sight of equipment.
 - 3) Identify load(s) served. Include location.
 - e. Transfer Switches:
 - 1) Identify voltage and phase.
 - 2) Identify short circuit current rating based on the specific overcurrent protective device type and settings protecting the transfer switch.
 - 2. Service Equipment:

- a. Use identification nameplate to identify each service disconnecting means.
- 3. Use identification nameplate to identify equipment utilizing series ratings, where permitted, in accordance with NFPA 70.
- 4. Use identification label or handwritten text using indelible marker on inside of door at each fused switch to identify required NEMA fuse class and size.
- 5. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".
- 6. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70, including but not limited to the following.
 - a. Service equipment.
 - b. Industrial control panels.
 - c. Motor control centers.
 - d. Elevator control panels.
 - e. Industrial machinery.
- 7. Use warning signs to identify electrical hazards for entrances to all rooms and other guarded locations that contain exposed live parts operating at 600 V nominal or less with the word message "DANGER; Electrical hazard; Authorized personnel only" or approved equivalent.
- C. Identification for Conductors and Cables:
 - 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 0519.
 - 2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
- D. Identification for Devices:
 - 1. Use identification label to identify fire alarm system devices.
 - 2. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.
 - 3. Use identification label to identify receptacles protected by upstream GFI protection, where permitted.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
 - 1. Materials:
 - a. Indoor Clean, Dry Locations: Use plastic nameplates.
 - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
 - 2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
 - 3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
 - 4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
 - 5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.
- B. Identification Labels:
 - 1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
 - 2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.
- C. Format for Equipment Identification:
 - 1. Minimum Size: 1 inch by 2.5 inches.
 - 2. Legend:
 - a. Equipment designation or other approved description.
 - 3. Text: All capitalized unless otherwise indicated.

4. Minimum Text Height:
 - a. Equipment Designation: 1/2 inch.
5. Color:
 - a. Normal Power System: White text on black background.

2.03 WIRE AND CABLE MARKERS

- A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
- B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- C. Legend: Power source and circuit number or other designation indicated.
- D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
- E. Minimum Text Height: 1/8 inch.
- F. Color: Black text on white background unless otherwise indicated.

2.04 UNDERGROUND WARNING TAPE

- A. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
- B. Non-detectable Type Tape: 6 inches wide, with minimum thickness of 4 mil.
- C. Legend: Type of service, continuously repeated over full length of tape.
- D. Color:
 1. Tape for Buried Power Lines: Black text on red background.

2.05 WARNING SIGNS AND LABELS

- A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- B. Warning Signs:
 1. Materials:
 - a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
 2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
 3. Minimum Size: 7 by 10 inches unless otherwise indicated.
- C. Warning Labels:
 1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
 2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
 3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
 1. Surface-Mounted Equipment: Enclosure front.
 2. Flush-Mounted Equipment: Inside of equipment door.
 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
 4. Elevated Equipment: Legible from the floor or working platform.
 5. Branch Devices: Adjacent to device.
 6. Interior Components: Legible from the point of access.
 7. Conductors and Cables: Legible from the point of access.

- 8. Devices: Outside face of cover.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.
- G. Secure rigid signs using stainless steel screws.
- H. Mark all handwritten text, where permitted, to be neat and legible.

END OF SECTION

SECTION 26 0583
WIRING CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

- A. Section 26 0519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.
- B. Section 26 0533.13 - Conduit for Electrical Systems.
- C. Section 26 0533.16 - Boxes for Electrical Systems.
- D. Section 26 2726 - Wiring Devices.

1.03 REFERENCE STANDARDS

- A. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2015).
- B. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2016.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
 - 1. Colors: Comply with NEMA WD 1.
 - 2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
 - 3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Wiring Devices: As specified in Section 26 2726.
- C. Flexible Conduit: As specified in Section 26 0533.13.
- D. Wire and Cable: As specified in Section 26 0519.
- E. Boxes: As specified in Section 26 0533.16.

2.02 EQUIPMENT CONNECTIONS

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

- A. Make electrical connections in accordance with equipment manufacturer's instructions.

- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to accommodate connection with attachment plug.
- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.
- J. Coolers and Freezers: Cut and seal conduit openings in freezer and cooler walls, floor, and ceilings.

END OF SECTION

SECTION 26 0914
MONITORING AND CONTROL INSTRUMENTATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sensors, analyzers, transmitters, and accessory components.
- B. Parshall flume flow measurement device.

1.02 REFERENCE STANDARDS

- A. ASME B1.20.1 - Pipe Threads, General Purpose (Inch); 2013 (Reaffirmed 2018).
- B. ASME B1.20.2M - Pipe Threads, 60 Deg. General Purpose (Metric); 2006; R 2011.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements,
- B. Product Data: Manufacturer's data sheets on each item of equipment, showing compliance with specified requirements and detailed technical characteristics; where multiple components are shown on the same data sheet, mark the specific component referred to.
- C. Shop Drawings: Provide make, model, power requirements, calibration range, and operating specifications.
- D. Operation and Maintenance Manuals.

1.04 QUALITY ASSURANCE

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 INSTRUMENTATION - GENERAL

- A. In addition to devices indicated, provide all transformers, field preamplifiers, signal conditioners, offset and span adjustments, amplifiers, transducers, transmitters, control devices, signal transmission, and control and power wiring suitable for the application, as necessary to provide complete end-to-end process control loop accuracy from sensor to display and final control element.
- B. Where necessary provide devices that make engineering units conversions and have specific algorithms for applications.
- C. Power Supply: 24 volts DC.
- D. Transmitters: Provide a transmitter for each sensor unless otherwise indicated; transmitter selected to match sensor, with following characteristics unless otherwise indicated:
 - 1. Display: Four digit or analog visual display of measured parameter.
 - 2. Output Signal: 4 to 20 mA DC, proportional to level of measured parameter.
 - 3. Accuracy: Plus/minus 0.5 percent of full scale reading with output error not exceeding Plus/minus 0.25 percent of the calibrated measurement.
 - 4. Mounting: Integral with sensor, pipe mounted, wall mounted or installed in control panel.
 - 5. Location, if Not Integral with Sensor: Where indicated; if not indicated, not more than the distance from the sensor recommended by manufacturer.

2.03 LEVEL INSTRUMENTATION

- A. Manufacturers:
 - 1. Siemens Automation: www.siemens.com/#sle.
 - 2. Endress Hauser.
 - 3. Rosemount.
- B. Level Instrumentation - General:
 - 1. For measurement of hazardous contents, provide relays and housings that are intrinsically safe or explosion proof as defined by NFPA 70 hazard rating for type of contents.
 - 2. Mounting: Easily removed for periodic maintenance.

- C. Parshall Flume Level/Flow Sensor, Ultrasonic Type: Microprocessor based, providing continuous, non-contact level measurement of liquids and solids utilizing microwave pulsed time of flight measurement method, operating in a frequency band approved for industrial use; capable of distinguishing between real echoes, reflections and background noise; automatic compensation for temperature changes.
 - 1. Sensor Range: Estimated Zero to 10 feet. Field verify required distance in existing Parshall Flume structure.
 - 2. Accuracy: Plus/minus one percent of full scale.
 - 3. Temperature Range: Minus 15 degrees F to 105 degrees F.
 - 4. Mounting: Installed vertically above flume. Furnish and install stainless steel mounting bracket fixed to floor.
 - a. Size mounting to eliminate echoing.
 - b. Position sensor to maximize return echo signal and minimize vessel obstructions in sensor line of sight.
- D. Level Switches, Conductivity Type: Detect presence of fluid by measuring electrical resistance between sensor and ground electrode.
 - 1. Electrodes: TP316 stainless steel; lengths as necessary based on application and to meet requirements of control sequence.
 - a. Pump Room. One electrode shall be longer than the other by a maximum of 0.125".
 - 2. Electrode Cladding: Polyolefin.
 - 3. Ground Electrode: Provide a separate ground electrode.
 - 4. Set Points: 1 separate level set points.
 - 5. Relays: Provide a relay switching point for each sensor.
 - 6. Contacts: Rated for maximum 240 volts AC, 5 A.
 - 7. Response Time: Not more than 2 seconds.
 - 8. Mounting: Switch installed vertically; easily accessible for maintenance and calibration.
 - a. Provide stainless steel bracket and secure to wall. Provide sensor with NPT male threads and secure to wall bracket.
 - b. Longest electrode shall be installed 0.0625" above finished floor.
- E. Level Switches, Mercury Float Type: Two normally open mercury switches, encapsulated in epoxy resin with polypropylene casing; suitable for hazardous locations, with explosion proof and corrosion resistant housing, and intrinsically safe relays.
 - 1. Switch Cable: Oil resistant thermoplastic cable with 4 No.18 gage stranded copper conductors, rated for 600 Volt application.
 - 2. Mounting: Wall bracket or mounting plate, stainless steel rods, stainless steel bolts.

2.04 TEMPERATURE INSTRUMENTATION

- A. Temperature Instrumentation:
 - 1. Temperature Ranges: As indicated.
 - 2. Do not use mercury in thermometers.
 - 3. Do not use strap-on temperature sensing devices unless specifically indicated.
 - 4. Provide thermowell for each sensing device installed in liquid systems.
 - 5. For space temperature sensing, include housing suitable for wall mounting.
 - 6. For outside air sensing, provide instrument shelter or sun shield to minimize solar effects and mounting location to minimize building effects.
- B. Temperature Sensors, Resistance Temperature Detector, Continuous Averaging Type: Bendable copper sheath; sufficient length to ensure that resistance represents average over cross-section in which installed.
 - 1. Accuracy: Plus/minus 0.9 degrees F at reference temperature.
 - 2. Mounting: Readily accessible and installed to allow easy replacement.
 - 3. 3 wire, 100 ohm.
 - 4. NEMA 4,4X enclosure for damp or wet locations.
 - 5. NEMA 1 enclosure for dry locations.
 - 6. Outside air temperature sensing elements shall be shielded from direct sunlight.
 - 7. 24 VDC loop powered transmitter with 0-150F range/4-20mA output.
 - 8. Wall mounted for space temperature sensors.

- C. Thermowells: Sized for accurate fit to temperature sensing device and calibrated to compensate for thermal transmission delay.
 - 1. Material: Stainless steel, TP316, unless otherwise indicated.
 - 2. Immersion Length: As indicated on drawings.
 - 3. Connection box sized to accommodate device and transmitter.
 - 4. For insulated pipe, provide lagging extension sufficient to protrude through insulation.
 - 5. Threaded attachment unless otherwise indicated.
 - 6. Fixed Hex Nipples: Male threaded sockets; ASME B1.20.1 (ASME B1.20.2M) threads.
 - 7. Thermowells Used with RTDs and Thermocouples: Provide terminal connection heads rated NEMA 250 Type 4X.

2.05 PROCESS INSTRUMENTATION

- A. Manufacturers:
 - 1. Honeywell Process: www.honeywellprocess.com/en-US/#sle.
 - 2. SMC Sierra Corporation.
- B. Combustible Gas Sensors: Means of collecting representative continuous samples and measuring for presence of explosive vapors; poison resistant.
 - 1. Range: From 0 percent of lower explosive limit (LEL) to 100 percent of lower explosive limit (LEL).
 - 2. Response Time: Less than 10 seconds to indicate 50 percent LEL when exposed to 100 percent LEL.
 - 3. Zero Drift: Less than 3 percent per year.
 - 4. Operational Life: One year, minimum.
 - 5. Provide 90 days of zero and calibration gas.
 - 6. Sample Inlet Location: Representative of area monitored.
 - 7. Housing: Rated for hazardous location Class I, Division 1 or 2.
 - 8. Mounting: Wall mount, provide all necessary stainless steel brackets.
 - 9. Provide remote sensor option. Transmitter to be mounted 60" above finished floor.
 - 10. Ability to test and calibrate at transmitter height.
 - 11. Where sample tube is used, provide size and maximum length as recommended by manufacturer; tubing not crimped or kinked.
 - 12. Location: Sensor shall be located as indicated on drawings or as recommended by manufacturer and representative of area monitored, allowing access to sensor for periodic maintenance and replacement.
- C. Hydrogen Sulfide Gas Sensors: Rated for continuous monitoring of hydrogen sulfide level.
 - 1. Range: from 0 to 0 to 10 ppmv.
 - 2. Accuracy: Plus/minus one percent of full scale reading.
 - 3. Response Time: 90 percent in maximum of 60 seconds.
 - 4. Sample Inlet Location: Representative of area monitored.
 - 5. Housing: Rated for hazardous location Class I, Division 1 or 2.
 - 6. Mounting: Wall mount, provide all necessary stainless steel brackets.
 - 7. Provide remote sensor option. Transmitter to be mounted 60" above finished floor.
 - 8. Ability to test and calibrate at transmitter height.
 - 9. Where sample tube is used, provide size and maximum length as recommended by manufacturer; tubing not crimped or kinked.
 - 10. Location: Sensor shall be located as indicated on drawings or as recommended by manufacturer and representative of area monitored, allowing access to sensor for periodic maintenance and replacement.
- D. Oxygen Gas Sensors: Rated for continuous monitoring of oxygen gas level.
 - 1. Range: 5-25 percent.
 - 2. Accuracy: Plus/minus one percent of full scale reading.
 - 3. Response Time: 90 percent in maximum of 60 seconds.
 - 4. Automatic zeroing, requiring no normal maintenance or periodic recalibration.
 - 5. Housing: Rated for hazardous location Class I, Division 1 or 2.
 - 6. Mounting: Wall mount, provide all necessary stainless steel brackets.
 - 7. Transmitter and sensor to be mounted 60" above finished floor.

8. Location: Sensor shall be located as indicated on drawings or as recommended by manufacturer and representative of area monitored, allowing access to sensor for periodic maintenance and replacement.

2.06 SIGNALING DEVICES

- A. Alarm Signaling Devices.
 1. Manufacturers:
 - a. Allen-Bradley or approved equal.
 - 1) #855H-BCD series combination horn/strobe for use in non hazardous areas.
 - 2) #855XM-CGM series combination horn/strobe for use in Class I Division 2 hazardous locations.
 - b. Federal Signal or approved equal.
 - 1) #27XST series strobe light for use in Class I, Division 1 and 2 hazardous locations.
 - 2) #31X or #41X series vibrating horn for use in Class I, Division 1 and 2 hazardous locations.
 2. Provide red lens for combustible gas alarm.
 3. Provide amber lens for ventilation alarm.
 4. Provide protective lens cover.
 5. Mounting: Wall.
 6. NEMA 4/4X/13 in damp or wet environments.
 7. LED strobe light with single flash.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions and as indicated on drawings.
- B. Provide the services of a qualified technician experienced in installation and operation of type of equipment provided, to supervise installation, calibration, start-up, demonstration, and testing.
- C. Install devices with adequate clearance for maintenance.
- D. Do not obstruct access to or clearances required for maintenance of other equipment and systems.
- E. Local Indicators: Install direct-reading indicator devices, thermometers, and pressure gauges so that they can be easily read from floor level and are readily accessible for maintenance and service.
- F. Adjust or replace devices not complying with specified requirements; except factory sealed devices must be replaced, rather than adjusted.

3.02 FIELD QUALITY CONTROL - SENSOR CALIBRATION - PRIOR TO STARTUP

- A. Calibrate monitoring and control instrumentation; devices with factory calibration certification need not be field calibrated.
- B. Calibrate using methods described below; alternate methods may be used, if approved by Owner beforehand.
- C. Make reports of calibrations performed, documenting methods, and initial, intermediate, and final results.
- D. Calibration Accuracy and Tolerances: As indicated for each device.
- E. Calibration Equipment: Provide equipment of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified. If not otherwise noted, the following minimum equipment calibration requirements apply:
 1. Temperature Sensors and Digital Thermometers: Certified calibration within past year to accuracy of 0.5 degree F and resolution of plus/minus 0.1 degree F.
 2. Pressure Sensors: Accuracy of plus/minus 2.0 percent of the value range being measured (not full range of meter), calibrated within the last year.
 3. Equipment Calibration: According to the manufacturer's recommended intervals and when dropped or damaged; affix calibration tags or keep certificates readily available for inspection.
- F. All Sensors:

1. Verify that sensor location is appropriate and away from potential causes of erratic operation.
 2. Verify that sensors with shielded cable are grounded only at one end.
 3. For sensor pairs that are used to determine a temperature or pressure difference, for temperature make sure they are reading within 0.2 degree F of each other, and for pressure, within tolerance equal to 2 percent of the reading, of each other.
 4. Tolerances for critical applications may be tighter.
- G. Sensors Without Transmitters:
1. Make a reading with a calibrated test instrument within 6 inches of the site sensor.
 2. Verify that the sensor reading is within the specified tolerances of the instrument-measured value.
 3. If not, install offset, calibrate or replace sensor.
- H. Sensors With Transmitters:
1. Disconnect sensor.
 2. Connect a signal generator in place of sensor to simulate desired characteristic.
 3. Connect ammeter in series between transmitter and process control panel.
 4. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter.
 5. Repeat for the maximum characteristic matching 20 mA to the potentiometer span or maximum and verify at the process control system.
 6. Record all values and recalibrate controller as necessary to comply with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction.
 7. Reconnect sensor.
 8. Make a reading with a calibrated test instrument within 6 inches of the site sensor.
 9. Verify that the sensor reading, via the permanent local display or the process control system, is within the specified tolerances of the instrument-measured value.
 10. If not, replace sensor and repeat.
- I. After calibration, perform calibration accuracy check:
1. Conduct two-point accuracy check of calibration of each control system sensing element and transmitter by comparing value from test instrument to corresponding sensor/transmitter output variable.
 2. Use digital indicating test instruments at least twice as accurate as specified sensor accuracy, with calibration traceable to National Institute of Standards and Technology standards.
 3. Verify that sensing element-to-control system readout accuracies at two points are within specified product accuracy tolerances.
 4. If not, recalibrate or replace device and repeat calibration check.

3.03 OWNER PERSONNEL TRAINING

- A. Content: Include each type of sensor, meter, analyzer, and transmitter, covering calibration, operation, maintenance, and testing.
- B. Operating and Maintenance Personnel Training:
1. Sessions: One.
 2. Training Hours: 1, minimum, per unique equipment item.

END OF SECTION

SECTION 26 0915
SUPERVISORY AND PROCESS CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General Requirement.
- B. Enclosures.
- C. Programmable Logic Controller (PLC).
- D. Operator Interface.
- E. Control Components.
- F. Sequence of Operation.

1.02 RELATED REQUIREMENTS

- A. The requirements within this section apply to all components of the controls system unless indicated otherwise.
- B. Section 26 2716 - Electrical Cabinets and Enclosures: Cabinets and terminal blocks.

1.03 REFERENCE STANDARDS

- A. NEMA ICS 1 - Industrial Control and Systems General Requirements; 2000 (Reaffirmed 2015).
- B. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000 (R2005), with errata, 2008.
- C. NEMA ICS 6 - Industrial Control and Systems: Enclosures; 1993 (Reaffirmed 2016).
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. NFPA 870 - Standard for Fire Protection in Wastewater Treatment and Collection Facilities; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. Underwriters Laboratories (UL). UL 508 Industrial Control Panel Equipment.

1.04 GENERAL REQUIREMENT

- A. Contractor shall use a Controls System Integrator (CSI) to furnish, install, calibrate, start-up, test, and adjust all required equipment for a complete process control system. Equipment shall be furnished as required to meet the requirements shown on the Plans and include within the Specifications and also include any incidental items necessary for a complete system even though it is not detailed.
- B. It is the intent of the Construction Documents that all control equipment specified be supplied by a single-source supplier. The supplier shall assume full responsibility along with the Contractor for furnishing, installing, and start-up procedures so as to make the system operate per the intent of the Construction Documents.
- C. It is the responsibility of the CSI to examine all new and existing equipment that will be powered from or will receive or send signals from equipment within in the Specifications and Plans. The CSI shall provide all necessary devices to interface with existing and new equipment including but not limited to signal converters, amplifiers, and isolation devices.
- D. Provide safety stop system meeting NFPA 79 requirements.
- E. Major work items include but are not limited to:
 - 1. Process instrumentation, control panels, controllers, programmable controllers, and operator interfaces.
 - 2. Provide all software, programming, and configuration required to implement specifications and control functions as shown on the Drawings.
 - 3. Connection to and integration with Ethernet networks for motor control.
 - a. All network devices shall be powered by uninterruptible power supply with a capacity to sustain load for a minimum of 15 minutes.
 - 1) Provide UPS power to any network switches mounted outside SPCP1 including the motor control center.

4. PLC systems furnished and installed in control panels completely wired, and ready to run specified processes.
5. Complete operating Supervisory Control And Data Acquisition (SCADA) system with all necessary software and hardware.
6. Provide and configure all software to support functions shown and specified.
7. Provide all network drivers, components, and configuration to make a fully functional control network.
8. Provide remote access capability through internet and existing city network to support PLC and HMI systems.
 - a. Provide firewall and security to prevent unauthorized access to control system.
 - b. Coordinate network design with city of Storm Lake technology partner:
 - 1) Rebnord Technologies. 210 Sale Barn Road, Storm Lake, IA 50588
 - 2) Jason Knapton
 - 3) Phone: 712-732-6449
9. Provide new control system to control and monitor lift station equipment.
 - a. SPCP1 Pump Control Panel
 - 1) PLC processor and I/O.
 - 2) Operator interface.
 - b. HMI/SCADA:
 - 1) Control, adjust, monitor, alert, and alarm status of equipment at local operator interface.
 - 2) Provide monitoring and remote control of lift station from existing SCADA system at the waste water treatment facility.
 - (a) Configure systems and network to communicate with existing SCADA system.
 - (1) Utilize existing private network connection between lift station and waste water treatment facility.
 - (2) Coordinate required network settings with Rebnord Technologies.
 - (b) Existing SCADA system is Rockwell Automation Factory Talk View Supervisory Edition (SE).
 - (1) Remove graphical and all other references from demolished lift station control system.
 - (2) Add graphic displays to show all lift station operations, and provide means for operators to make adjustments.

1.05 ADMINISTRATION REQUIREMENTS

- A. Coordination:
 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.

1.06 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 1. Catalog cut sheets for all components and devices.
 2. Dimension drawings, wiring and/or hydraulic drawings for field and pipeline mounted equipment.
 3. System schematic drawings illustrating all components being supplied including elevations, legend, bill of material, construction details, and layout with complete pneumatic and electrical connections. Actual system schematic drawings shall be provided. Manufacturers catalog cuts or standard drawings merely showing "typical" circuitry are not acceptable.
 4. As-built drawings shall be provided upon project completion in CAD and PDF format.
 5. Communications and network diagrams.
 6. Fabrication and nameplate legend drawings.
- C. Operation and maintenance manuals.

1. Manufacturers O&M manuals for all equipment supplied.
2. Recommended maintenance intervals and procedures.
3. Operational manual for operator interface displays, including but not limited to; screen shots, explanation of graphics, navigation, step by step procedures, security, passwords, and alarms.
4. As-built drawings of entire system in CAD and PDF format.
5. Recommended spare parts list.
6. Specific parameter settings of electronic equipment including but not limited to variable frequency drives (VFD's).
7. Final copy of PLC program subroutines with comments in PDF format.
8. USB drive containing final PLC and operator interface programs.
9. PLC I/O point list; identify point tag, description, type, range, location, and point address.
10. All documentation to be provided electronically and two copies in 3-ring binders with labeled tabs separating sections.

1.07 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Control System Integrator (CSI) Qualifications
 1. Company specializing in components and programming of the products specified in this section with service facilities within 200 miles of Project.
 2. The CSI shall have ability to provide 24 hr., 7 day a week emergency services during and after the warranty period.
- C. The control panel shall be built by a registered UL 508 Industrial Control Panel builder. Each control panel shall bear a serialized "Enclosed Industrial Control Panel Label." Panels that utilize intrinsically safe barriers shall be upgraded from standard 508A to standard 698 and bear serialized label to that effect. The control panel submittal shall contain a copy of the front page of the control panel builders UL508A and 698 (if applicable) standard that shows their UL file number. The name on the front page of the UL Standard shall match the name in the title block of the control panel submittal.
- D. Products: Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and indicated.
- E. All equipment shall be furnished by a single supplier. The supplier shall be responsible for the correct operation of the equipment as specified.
- F. Contractor shall guarantee system operation and workmanship for a period of one year from date the system was accepted by the owner.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store components in a clean, dry area; maintain temperature to NEMA ICS 1.

1.09 FIELD CONDITIONS

- A. Maintain temperature above 32 degrees F and below 104 degrees F during and after installation of products.
- B. Maintain area free of dirt and dust during and after installation of products.

1.10 SEQUENCING AND SCHEDULING

- A. Prerequisite activities: Do not start key project activities until prerequisite activities have been completed and satisfied.
 1. Shop drawing reviews by engineer.

PART 2 PRODUCTS

2.01 GENERAL

- A. Devices supplied shall be of the latest field proven models, unless otherwise specified to match existing equipment.
- B. Instruments and devices performing similar operations shall be of the same type and model, and shall be from a single manufacturer.

- C. Analog measurements and control signals shall be 4 to 20 mA DC except as indicated. Signals where required by special devices may be 0 to 5 volts or 0 to 10 volts DC. Standard pneumatic signals shall be 3 to 15 psig.
- D. Electronic components shall be protected from transient voltage.

2.02 ENCLOSURES

- A. Control Station Enclosures: NEMA ICS 6.
- B. Relay Enclosures: NEMA ICS 6.
- C. Fabrication: Shop fabricate control panels to NEMA ICS 1, using cabinets and terminal blocks furnished in accordance with Section 26 0533.16.
- D. All components shall be mounted to the enclosure back panel. Components shall not be mounted to the enclosure sides.
- E. 25% free space shall be maintained within enclosure back panels for future components.
- F. Shall have engraved label identifying panel name on panel door.
- G. PLC and I/O enclosures shall have fused service receptacle within the enclosure.
- H. Panel mounted components shall have matching style and appearance.
- I. Panel mounted components with digital displays installed outdoors shall be protected from direct sunlight.
- J. Panel mounted devices shall be a minimum of 4 feet above finished floor elevation.
- K. Each source of foreign voltage in a control enclosure shall be isolated by providing disconnecting means or pull-apart terminal blocks.
- L. Penetrations through the top of control enclosures is not permissible.
- M. Terminal blocks shall be furnished, installed, and wired to each I/O point of a chassis or rack mounted I/O module. Terminal blocks shall be provided and connected to each unused I/O point. Enclosures shall have 25% spare terminal blocks for future connection.
 - 1. Terminal blocks shall not be installed when distributed I/O modules are used. Field wires shall directly terminated to distributed I/O terminal bases.
 - 2. Terminal blocks shall not be installed when factory wired I/O interface modules (IFM's) are used. Field wires shall directly terminate to the IFM.
- N. Indoor and outdoor control panel and instrument enclosures shall be suitable for operation in the ambient conditions. Heating, cooling, and dehumidifying equipment shall be provided in enclosures to maintain electronic components within manufacturers recommended ambient temperature and humidity operating ranges. All equipment installed in hazardous or classified areas shall be suitable for use in the area.
 - 1. Indoor, dry: NEMA 12 painted steel.
 - 2. Indoor, wet, damp, or corrosive: NEMA 4X, type 316 stainless steel.
 - 3. Outdoor: NEMA 4X, type 316 stainless steel.
- O. Control panel wiring
 - 1. Single conductors shall be flexible stranded copper type MTW, and shall be rated for 600 volts.
 - 2. Signal cables shall be #18 AWG shielded twisted pair or triad cables with copper conductors.
 - 3. Wire numbers shall be marked using plastic coated cloth type labels with black text printed on white background.
 - 4. Incoming power source shall accept 120 VAC single phase.
 - 5. Circuit breaker shall be provided in control panel for incoming power source overcurrent protection and disconnecting means.
 - 6. Individual fuse protection with disconnecting means shall be provided for each I/O module, and each electrical component that consumes power.
 - 7. Individual fuse protection with disconnecting means shall be provided for each field installed device that consumes power.
 - 8. Primary and secondary fuse protection with disconnecting means shall be provided on all power supplies.
 - 9. Fuse blocks and disconnecting means shall be labeled.

P. Protection: Each control panel to be equipped with transient voltage surge suppressor.

2.03 PROGRAMMABLE LOGIC CONTROLLER (PLC)

A. Manufacturer

1. Rockwell Automation, Allen-Bradley; CompactLogix or ControlLogix series.

B. General

1. Furnish and install complete PLC system with all necessary components to make a fully functional system as specified within the Plans and Specifications.
2. PLC shall be configured to perform the specified operations.
3. PLC and related components shall be mounted inside the control panel.
4. I/O design shall be chassis or rack based.
5. All components shall meet UL standards.
6. Processor shall have minimum 2 MB user memory.
7. Primary program language shall be ladder diagram.
8. Digital inputs shall be 120 VAC or 24 VDC as required.
9. Digital outputs shall be relay type, or shall be protected by buffer relays. 120 VAC or 24 VDC as required.
10. Analog outputs shall be 4-20 mA DC, unless otherwise required.
11. Analog inputs shall be 4-20 mA DC, unless otherwise required.
12. Service conditions:
 - a. 32F-140F
 - b. 5-95% relative humidity non-condensing
13. Provide uninterruptible power supply to all chassis, racks, and I/O modules.
 - a. Size to maintain full load for a minimum of 20 minutes.
 - b. Shall have maintenance free, sealed, leak proof battery.
 - c. Shall have audible alarm when on battery, and when battery level is low.
 - d. Shall have dry contact for remote monitoring of alarm state.
14. Controller shall utilize Ethernet communications and shall have ability of communicating with other PLC's, computers, and operator interfaces.
 - a. I/O devices shall communicate on dedicated Ethernet network.
 - b. HMI/SCADA shall communicate on dedicated Ethernet network, and shall communicate to existing SCADA system in wastewater treatment facility over existing network.
 - c. Shall have ability for remote support connection over the internet.
15. Provide minimum spare I/O points:
 - a. 8 digital inputs.
 - b. 8 digital outputs.
 - c. 2 analog outputs.
 - d. 2 analog inputs.

2.04 OPERATOR INTERFACE

A. General

1. Furnish and install complete Human Machine Interface (HMI) system with all necessary components to make a fully functional system including software, hardware, and programming.
2. Operator interface shall be configured to perform the specified operations.
3. Shall use Ethernet as means of communication to PLC.
4. Shall have ability for remote support connection over the internet.
5. Shall be panel mounted in door of control panel SPCP1.
6. Contractor is responsible for ensuring compatibility between specified operator interface and PLC. If compatibility is an issue an alternate device must be submitted for approval.
7. Furnish and install uninterruptible power supply.
 - a. Size to maintain full load for a minimum of 20 minutes.
 - b. Shall have maintenance free, sealed, leak proof battery.
 - c. Shall have audible alarm when on battery, and when battery level is low.

B. HMI terminals

1. Manufacturer

- a. Rockwell Automation, Allen-Bradley; PanelView Plus 7, or PanelView 5000 Series Graphic Terminal.
- b. Maple Systems; P Series Graphic Terminal.
- c. Substitutions: See Section 01 6000 - Product Requirements.
- 2. Color touchpad display.
- 3. 10 inch minimum display size.

2.05 CONTROL COMPONENTS

- A. Manufacturers.
 - 1. Allen-Bradley/Rockwell Automation; www.ab.rockwellautomation.com.
 - 2. Eaton Corporation; www.eaton.com/#sle.
 - 3. Schneider Electric; Square D Products; www.schneider-electric.us/#sle.
 - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. Circuit breakers.
 - 1. Shall be Allen Bradley 1492-SP series or approved equal.
- C. Fuse holders.
 - 1. Shall be Allen Bradley 1492-H series with blown fuse indicator or approved equal.
- D. Push buttons, operators, & signaling devices.
 - 1. All panel mounted push buttons and selector switches shall be heavy duty and oil-tight/water-tight. Dry areas shall use Allen-Bradley Bulletin 800T or approved equal. Wet or damp areas shall use Allen-Bradley Bulletin 800H or approved equal.
 - 2. Rotary switches shall be provided with knob lever operators.
 - 3. Emergency stop switches shall be trigger action two position maintained, twist release, & red.
 - 4. All devices shall have legend plates describing operation.
- E. Control relays.
 - 1. Allen-Bradley Bulletin 700, Type HB, or equal.
 - 2. General purpose control relays shall be provided with dust covers and with plug-in configuration. Sockets to be DIN rail mounted.
 - 3. Minimum rating of 10 amps at 150 volts and 3PDT. If more poles are required, relays shall be paralleled.
 - 4. Mechanical flag indicator to show status of contacts.
- F. Remote Alarm Monitor.
 - 1. Manufacturer: Sensaphone or approved equal.
 - a. Model: SCD-1200-CD Web-Based Monitoring through the Cloud.
 - b. Requirements.
 - 1) Communication method:
 - (a) Ethernet
 - 2) Supervised.
 - 3) 12 digital inputs.
 - 4) 12 alarm status LEDs.
 - 5) Battery backup; 8 hour rechargeable battery to maintain continuous power during power outage.
 - 6) 120 VAC plug in type power supply.
 - 7) Alarm notification methods: E-mail, text messages, and voice phone calls.
 - (a) Multiple contact types per user.
 - 8) Wall mounted NEMA 1 enclosure with clear door.
 - c. Coordinate monthly subscription payment with owner.
 - d. Include 1 year subscription in owners name. Start subscription during startup and commissioning phase.
 - e. Mount inside SPCP-1 enclosure.
- G. Pump Relay.
 - 1. Provide pump over temperature relay for Pump 1 and Pump 2 as recommended by the pump manufacturer.

PART 3 EXECUTION

3.01 FIELD INSTALLATION AND TESTING REPORTS

- A. Complete adjustment, test, calibration, and status reports for all work.
- B. Test electrical grounding in panels.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Furnish a complete working system by a competent manufacturer's representative and include instruction to the Owner on proper operation and maintenance.
- C. Follow manufacturers' installation instructions for all materials and equipment, unless otherwise indicated or directed by Engineer.
- D. Wiring connected to components and assemblies, including power wiring in accordance with requirements of Section 26.
- E. Electrical raceways as specified in Section 26.
- F. Identification as specified in Section 26.

3.03 FIELD QUALITY CONTROL

- A. Field testing may not be done contiguously, and may require multiple trips to the site. The Contractor shall determine the number of testing periods requiring separate trips to the site in order to complete functional and performance testing requirements.
- B. Functional Testing:
 - 1. Prior to facility startup and performance evaluation period, inspect, test, and document that all equipment is ready for operation.
 - 2. Provide equipment calibration testing for all components.
 - 3. Confirm application software and programming is complete and ready for performance testing.
 - 4. Test all control related network media, devices, configuration, and operation.
- C. Correct deficiencies and replace damaged or defective equipment.

3.04 CLOSEOUT ACTIVITIES

- A. Performance Testing:
 - 1. Coordinate performance testing with Owner and Engineer. Notify Owner and Engineer four weeks prior to the start of performance testing.
 - 2. Engineer and Owner may actively participate in tests, and reserve the right to test or retest specified functions and hold final decision-making rights as to whether testing is acceptable and complete.
- B. Demonstration: Demonstrate proper operation of entire system to Owner, and correct deficiencies or make adjustments as directed.
- C. Perform local, manual, remote, and automatic mode tests on all equipment.
- D. Training: Train Owner's personnel on operation, adjustment, and maintenance of all systems.
 - 1. Provide an integrated training program for Owner's personnel to meet the specific needs of the Owner's personnel.
 - 2. Including training sessions in a classroom setting and in the field. Train managers, engineers, operators, and maintenance personnel.
 - 3. The Owner reserves the right to record and reuse training sessions.
 - 4. Location: At project site.

3.05 SEQUENCE OF OPERATION

- A. Overview: Provide control of waste water pumping station primarily consisting of five waste water pumps, wet well level, parshall flume flow, and building HVAC systems.
- B. General:
 - 1. If motor or device is called to run and does not start within 10 seconds, lock out device and alarm.
 - 2. If motor or device fails during operation, lock out device and alarm.
 - 3. Display readings of all instruments on local operator interface.

4. Display readings of all instruments and status of all outputs on existing SCADA interface at wastewater treatment plant.
 5. Provide hand-off-auto operation on operator interface for each output.
 6. Monitor HOA Auto selector switch position of each motor controller within the motor control center. Enable/disable automatic control based on switch position.
 7. Display status of every input and output with description of device connected at operator interface.
 8. Interlock related set-points to prevent corruption of set-points so unexpected operation does not occur.
 9. At operator interface; provide operator adjustable time delays before energizing or de-energizing equipment.
 10. MCC
 - a. Normal automatic control and monitoring shall be done over EtherNet/IP.
 - b. At a minimum monitor running, overload fault, and other available faults of each FVNR starter.
 - c. At a minimum monitor running, fault, amperage, and speed (Hz) for each VFD and soft starter.
- C. Wet well level
1. Level transmitter 0-100%.
 - a. Provide operator adjustable setpoint for Stage 1 target level.
 - b. Provide operator adjustable setpoint for pump off level.
 - c. Provide operator adjustable setpoint for Stage 2 pump on level.
 - d. Provide operator adjustable setpoint for Stage 3 pump on level.
 - e. Provide operator adjustable setpoint for high level warning.
 - f. Provide operator adjustable setpoint for high level alarm.
 2. Float level sensors.
 - a. Pump Off Float - shall override automatic control and de-energize all pumps.
 - b. Backup Mode Low Level Float - shall be used in backup mode to energize pumps.
 - c. Backup Mode High Level Float - shall be used in backup mode to energize pumps.
 - d. High Level Alarm Float - shall indicate alarm.
- D. Lift station pumps.
1. Run pumps for minimum time as recommended by the pump manufacturer.
 2. Limit number of starts per hour as recommended by the pump manufacturer.
 3. Monitor pump 1 and pump 2 over temperature relay; Lockout affected pump from all operation (automatic or manual) and alarm.
 4. Pumps 1 and 2 (60HP)
 - a. Pumps operate on variable frequency drives.
 - b. Provide read only setpoint for pump 1 and 2 minimum pump speed. Pumps shall not be allowed to operate below this speed as recommended by the pump manufacturer.
 - c. Pumps 1 and 2 shall be used as primary pumps to maintain wet well level and shall automatically vary speed to maintain wet well level setpoint.
 - d. When level is at or above the target setpoint; start pumps 1 and 2 simultaneously.
 - e. When pump initially energizes operate pump at 100% speed for recommended duration by manufacturer. Then reduce speed to minimum, and begin automatic adjustment to maintain level setpoint.
 - f. Both pumps shall operate at same speed.
 - g. If level continues to decrease below target setpoint, shut off one pump.
 - 1) If running on one pump, and level continues to increase beyond target setpoint, turn on second pump. Operate both pumps at minimum speed and automatically adjust to maintain level.
 - h. If level is at or below the pump off setpoint shut off all pumps.
 5. Pumps 3, 4, and 5 (300HP).
 - a. Pumps operate on soft starters.
 - b. No more than two of the three pumps shall operate simultaneously.
 - c. Pumps shall be sequenced such that two 300HP pumps can not start at the same time, and a 300HP pump can not start at the same time as Pumps 1 and 2.

- d. Automatically rotate lead and lag pump sequence each time the lead pump shuts off.
- e. Energize one pump when level is at or above Stage 2 pump on level. Shut off pump when level is at or below the Stage 1 target level.
- f. Energize second pump when level is at or above Stage 3 pump on level. Shut off pump when level is at or below the Stage 2 target level.
- 6. Lift station pumps - Backup Mode Control.
 - a. Provide selector switch in door of SPCP1 to select backup mode level control.
 - b. Provide operator enable/disable from operator interface to automatically initiate backup mode if high level alarm float is reached, or if PLC failure is detected.
 - c. Pumps shall operate on backup float sensors in backup mode, and shall operate independent from primary PLC controller. This is to provide backup operation of pumps in the event of level or primary PLC failure.
 - d. All pumps shall stop if level is at the stop pump float.
 - e. Provide operator adjustable time delays before energizing or de-energizing pumps.
 - f. Pumps 1 and 2 (60HP).
 - 1) Energize one pump when level is at or above Backup Mode Low Level Float and operate at fixed speed (100%). Stop pump when level is at or below Pump Stop Float.
 - (a) Start second pump after time delay providing level is at or above Backup Mode Low Level Float and operate at fixed speed (100%).
 - (b) Stop second pump if level is below Backup Mode Low Level Float.
 - g. Pumps 3, 4, and 5 (300HP)
 - 1) Start one pump when level is at or above Backup Mode High Level Float. Stop pump when level is at or below Backup Mode Low Level Float.
 - (a) Start second pump after time delay providing level is at or above Backup Mode High Level Float.
 - (b) Stop second pump if level is at or below Backup Mode High Level Float.
 - 2) Pumps shall be sequenced such that two 300HP pumps can not start at the same time, and a 300HP pump can not start at the same time as Pumps 1 and 2.
- 7. Pump starting shall be staggered after a loss of main power or control power.
 - a. Starting shall be staggered no matter if operating in normal mode, or backup mode.
 - b. No pump shall start until power has been restored for a minimum of 3 seconds.
 - 1) Pumps 1 and 2 can simultaneously start as required.
 - 2) Pumps 3, 4, or 5 can be staggered on after Pumps 1 and 2 are running at speed.
- E. Monitor combustible gas, oxygen, and hydrogen sulfide transmitters in grit room and grit room entrance.
 - 1. Provide alarm setpoints at operator interface for each transmitter. Limit setpoints within required alarm range.
 - 2. Energize horn/strobes in designated areas when alarm condition is present.
 - 3. Initiate alarm dialer to notify personnel of alarm.
 - 4. Transmitters and horn/strobes shall be connected to battery back up power supply with capacity to operate on backup for a minimum of 20 minutes.
- F. Monitor and alert when generator is running.
- G. Monitor generator alarm condition.
- H. Monitor and alert when auto transfer switch is in emergency position.
- I. Monitor SPCP1 control power loss alarm.
- J. Monitor grinder system running.
- K. Monitor grinder system alarm.
- L. Monitor grinder air handler alarm.
- M. Monitor surge protection device alarm and alerts.
- N. Monitor 3 phase power monitor alarm.
 - 1. Provide operator adjustable delay before alarm is initiated.
 - 2. Provide operator enable/disable to lock-out equipment when in alarm state.

- a. Condition must return to normal, and operator must reset/acknowledge condition before equipment can be put back into normal.
- O. Monitor dry well MAU air handler flame failure alarm.
- P. Monitor dry well MAU air handler clogged filter alert.
- Q. Monitor grit room supply and exhaust air flow switches.
 - 1. Energize horn/strobes in designated areas when alarm condition is present.
 - 2. Initiate alarm dialer to notify personnel of alarm.
 - 3. Air flow switches and Horn/strobes shall be connected to battery back up power supply with capacity to operate on backup supply for a minimum of 20 minutes.
- R. Monitor dry well area supply and exhaust air flow switches.
 - 1. Energize horn/strobes in designated areas when alarm condition is present.
 - 2. Initiate alarm dialer to notify personnel of alarm.
 - 3. Air flow switches and Horn/strobes shall be connected to battery back up power supply with capacity to operate on backup supply for a minimum of 20 minutes.
- S. Boiler System
 - 1. Monitor hot water supply and return flow switches.
 - 2. Monitor outside air temperature.
 - 3. Provide operator adjustable setpoint range to enable hot water system when outside temperature is at or below the temperature range:
 - a. Enable boiler.
 - b. Energize one of two hot water pumps.
 - 4. Automatically rotate lead hot water pump after 48 hours of pump operation or after each time the lead pump stops.
 - 5. If one pump fails, automatically rotate lead pump.
 - 6. If either flow switch is not satisfied when a pump is called to run; alarm and lock-out heating system.
- T. Parshall Flume Flow
 - 1. Display flow in gallons per minute on operator interface.
 - 2. Accumulate daily total gallons and display on operator interface.
 - a. Store daily totals in PLC memory for 60 days, and display on operator interface.
 - b. Reset daily total each day at midnight.
- U. Monitor flood sensor in pump room; alarm if liquid is detected.
- V. Monitor MCC room temperature. Provide operator adjustable setpoints for low and high temperature alarm.
- W. Monitor grinder room temperature. Provide operator adjustable setpoints for low and high temperature alarm.
- X. Monitor grinder room high level float sensor; alarm if high level is detected.
- Y. Provide emergency stop button in door of SPCP1. Emergency stop system to disable PLC outputs, and motors operated by SPCP1.
 - 1. Provide battery backup power to emergency stop system to prevent triggering false emergency stop during power outages. Battery backup shall be sized to provide power for a minimum of 20 minutes.
- Z. Alarms
 - 1. Outputs to alarm dialer. Consult with owner before configuring.
 - a. Equipment failure: motor failure failure.
 - b. Power alarm: 3 phase power alarm, generator alarm, emergency stop, PLC control power loss, etc.
 - c. Condition alarm: Temperature alarm, level alarm, ventilation alarm, hazardous gas alarm,
 - 2. Provide means to enable/disable individual alarms from operator interface.
 - 3. Provide operator adjustable time delay (minimum range 0-300 seconds) for each alarm condition.
 - 4. Provide historical alarm record at operator interface.

5. Energize alarm strobe at SPCP1 during alarm condition.

SECTION 26 2100
LOW-VOLTAGE ELECTRICAL SERVICE ENTRANCE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical service requirements.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 DEFINITIONS

- A. Service Point: The point of connection between the facilities of the serving utility and the premises wiring as defined in NFPA 70, and as designated by the Utility Company.

1.04 REFERENCE STANDARDS

- A. IEEE C2 - National Electrical Safety Code; 2012.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. No later than two weeks following date of the Agreement, notify Utility Company of anticipated date of service.
- B. Coordination:
 - 1. Verify the following with Utility Company representative:
 - a. Utility Company requirements, including division of responsibility.
 - b. Exact location and details of utility point of connection.
 - c. Utility easement requirements.
 - d. Utility Company charges associated with providing service.
 - 2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for electrical service and associated equipment.
 - 3. Coordinate arrangement of service entrance equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- C. Arrange for Utility Company to provide permanent electrical service. Prepare and submit documentation required by Utility Company.
- D. Utility Company charges associated with providing permanent service to be paid by Contractor..
- E. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Utility Company representative.
- F. Scheduling:
 - 1. Where work of this section involves interruption of existing electrical service, arrange service interruption with Owner.
 - 2. Arrange for inspections necessary to obtain Utility Company approval of installation.

1.06 QUALITY ASSURANCE

- A. Comply with the following:
 - 1. IEEE C2 (National Electrical Safety Code).
 - 2. NFPA 70 (National Electrical Code).
 - 3. The requirements of the Utility Company.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.
- B. Store products indoors in a clean, dry space having a uniform temperature to prevent condensation (including outdoor rated products which are not weatherproof until completely and properly installed). Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle products carefully to avoid damage to internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 ELECTRICAL SERVICE REQUIREMENTS

- A. Provide new electrical service consisting of all required conduits, conductors, equipment, metering provisions, supports, accessories, etc. as necessary for connection between Utility Company point of supply and service entrance equipment.
- B. Electrical Service Characteristics: As indicated on drawings.
- C. Utility Company: MidAmerican Energy.
- D. Division of Responsibility:
 - 1. Pad-Mounted Utility Transformers:
 - a. Transformer: Existing.
 - b. Transformer Grounding Provisions: Furnished and installed by Contractor per Utility Company requirements.
 - c. Secondary:
 - 1) Trenching and Backfilling: Provided by Contractor.
 - 2) Conduits: Furnished and installed by Contractor.
 - 3) Conductors: Furnished and installed by Contractor (Service Point at transformer).
 - 2. Terminations at Service Point: Provided by Utility Company.
- E. Products Furnished by Contractor: Comply with Utility Company requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that ratings and configurations of service entrance equipment are consistent with the indicated requirements.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Verify and mark locations of existing underground utilities.

3.03 INSTALLATION

- A. Install products in accordance with manufacturer's instructions and Utility Company requirements.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances and required maintenance access.
- D. Provide required support and attachment components in accordance with Section 26 0529.
- E. Provide grounding and bonding for service entrance equipment in accordance with Section 26 0526.
- F. Identify service entrance equipment, including main service disconnect(s) in accordance with Section 26 0553.

END OF SECTION

SECTION 26 2200
LOW-VOLTAGE TRANSFORMERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General purpose transformers.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- C. Section 26 0529 - Hangers and Supports for Electrical Systems.
- D. Section 26 0533.13 - Conduit for Electrical Systems: Flexible conduit connections.

1.03 REFERENCE STANDARDS

- A. 10 CFR 431, Subpart K - Energy Efficiency Program for Certain Commercial and Industrial Equipment - Distribution Transformers; Current Edition.
- B. IEEE C57.94 - IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type General Purpose Distribution and Power Transformers; 1982 (R2006).
- C. IEEE C57.96 - Guide for Loading Dry-Type Distribution and Power Transformers; 2013.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- E. NECA 409 - Standard for Installing and Maintaining Dry-Type Transformers; 2009.
- F. NEMA ST 20 - Dry-Type Transformers for General Applications; 2014.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 506 - Standard for Specialty Transformers; Current Edition, Including All Revisions.
- I. UL 1561 - Standard for Dry-Type General Purpose and Power Transformers; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include voltage, kVA, impedance, tap configurations, insulation system class and rated temperature rise, efficiency, sound level, enclosure ratings, outline and support point dimensions, weight, required clearances, service condition requirements, and installed features.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

1.07 FIELD CONDITIONS

- A. Ambient Temperature: Do not exceed the following maximum temperatures during and after installation of transformers.
 - 1. Greater than 10 kVA: 104 degrees F maximum.
 - 2. Less than 10 kVA: 77 degrees F maximum.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Source Limitations: Furnish transformers produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 TRANSFORMERS - GENERAL REQUIREMENTS

- A. Description: Factory-assembled, dry type transformers for 60 Hz operation designed and manufactured in accordance with NEMA ST 20 and listed, classified, and labeled as suitable for the purpose intended.
- B. Unless noted otherwise, transformer ratings indicated are for continuous loading according to IEEE C57.96 under the following service conditions:
 - 1. Altitude: Less than 3,300 feet.
 - 2. Ambient Temperature:
 - a. Greater than 10 kVA: Not exceeding 104 degrees F.
 - b. Less than 10 kVA: Not exceeding 77 degrees F.
- C. Core: High grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Keep magnetic flux densities substantially below saturation point, even at 10 percent primary overvoltage. Tightly clamp core laminations to prevent plate movement and maintain consistent pressure throughout core length.
- D. Impregnate core and coil assembly with non-hydroscopic thermo-setting varnish to effectively seal out moisture and other contaminants.
- E. Basic Impulse Level: 10 kV.
- F. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.
- G. Isolate core and coil from enclosure using vibration-absorbing mounts.
- H. Nameplate: Include transformer connection data, ratings, wiring diagrams, and overload capacity based on rated winding temperature rise.

2.03 GENERAL PURPOSE TRANSFORMERS

- A. Description: Self-cooled, two winding transformers listed and labeled as complying with UL 506 or UL 1561; ratings as indicated on the drawings.
- B. Primary Voltage: 480 volts delta, 3 phase.
- C. Secondary Voltage: 208Y/120 volts, 3 phase.
- D. Insulation System and Allowable Average Winding Temperature Rise:
 - 1. Less than 15 kVA: Class 180 degrees C insulation system with 115 degrees C average winding temperature rise.
 - 2. 15 kVA and Larger: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.
- E. Coil Conductors: Continuous aluminum windings with terminations brazed or welded.
- F. Winding Taps:
 - 1. Less than 3 kVA: None.
 - 2. 3 kVA through 15 kVA: Two 5 percent full capacity primary taps below rated voltage.
 - 3. 15 kVA through 300 kVA: Two 2.5 percent full capacity primary taps above and four 2.5 percent full capacity primary taps below rated voltage.
 - 4. 500 kVA and Larger: Two 2.5 percent full capacity primary taps above and two 2.5 percent full capacity primary taps below rated voltage.
- G. Energy Efficiency: Comply with 10 CFR 431, Subpart K.
- H. Sound Levels: Standard sound levels complying with NEMA ST 20.
- I. Accessories:
 - 1. Lug Kits: Sized as required for termination of conductors as indicated on the drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that suitable support frames and anchors are installed where required and that mounting surfaces are ready to receive transformers.

- C. Perform pre-installation tests and inspections on transformers per manufacturer's instructions and as specified in NECA 409. Correct deficiencies prior to installation.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install transformers in accordance with NECA 409 and IEEE C57.94.
- D. Use flexible conduit, under the provisions of Section 26 0533.13, 2 feet minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.
- E. Arrange equipment to provide minimum clearances as specified on transformer nameplate and in accordance with manufacturer's instructions and NFPA 70.
- F. Install transformers plumb and level.
- G. Transformer Support:
 - 1. Provide required support and attachment in accordance with Section 26 0529, where not furnished by transformer manufacturer.
 - 2. Use integral transformer flanges, accessory brackets furnished by manufacturer, or field-fabricated supports to support wall-mounted transformers.
 - 3. Unless otherwise indicated, mount floor-mounted transformers on properly sized 3 inch high concrete pad constructed in accordance with Section 03 3000.
 - 4. Use trapeze hangers assembled from threaded rods and metal channel (strut) to support suspended transformers. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- H. Provide grounding and bonding in accordance with Section 26 0526.
- I. Remove shipping braces and adjust bolts that attach the core and coil mounting bracket to the enclosure according to manufacturer's recommendations in order to reduce audible noise transmission.
- J. Where not factory-installed, install lugs sized as required for termination of conductors as indicated.
- K. Where furnished as a separate accessory, install transformer weathershield per manufacturer's instructions.

3.03 ADJUSTING

- A. Measure primary and secondary voltages and make appropriate tap adjustments.
- B. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.04 CLEANING

- A. Clean dirt and debris from transformer components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 2416

PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Lighting and appliance panelboards.
- B. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; Federal Specification; Revision E, 2013.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards; 2009.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- E. NEMA PB 1 - Panelboards; 2011.
- F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; 2013.
- G. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- K. UL 67 - Panelboards; Current Edition, Including All Revisions.
- L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.
- M. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
 - 4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 5. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.
 - 1. Include characteristic trip curves for each type and rating of overcurrent protective device upon request.
- C. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
 - 1. Include dimensioned plan and elevation views of panelboards and adjacent equipment with all required clearances indicated.
 - 2. Include wiring diagrams showing all factory and field connections.
- D. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Panelboard Keys: Two of each different key.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature:
 - a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
- C. Short Circuit Current Rating:
 - 1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
 - 2. Listed series ratings are not acceptable.
- D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- F. Bussing: Sized in accordance with UL 67 temperature rise requirements.
 - 1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.

2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- G. Conductor Terminations: Suitable for use with the conductors to be installed.
- H. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 2. Boxes: Galvanized steel unless otherwise indicated.
 - a. Provide wiring gutters sized to accommodate the conductors to be installed.
 3. Fronts:
 - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
 - b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
- J. Load centers are not acceptable.

2.03 LIGHTING AND APPLIANCE PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
 1. Main and Neutral Lug Material: Copper, suitable for terminating copper conductors only.
 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
 1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
 2. Phase and Neutral Bus Material: Copper.
 3. Ground Bus Material: Copper.
- D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.
- E. Enclosures:
 1. Provide surface-mounted or flush-mounted enclosures as indicated.
 2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.
 3. Provide clear plastic circuit directory holder mounted on inside of door.

2.04 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
 2. Interrupting Capacity:
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
 - 1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
 - 2) 35,000 rms symmetrical amperes at 480 VAC.
 - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 3. Conductor Terminations:
 - a. Lug Material: Copper, suitable for terminating copper conductors only.
 4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
 5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

6. Provide the following circuit breaker types where indicated:
 - a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
7. Do not use tandem circuit breakers.
8. Do not use handle ties in lieu of multi-pole circuit breakers.

2.05 SOURCE QUALITY CONTROL

- A. Factory test panelboards according to NEMA PB 1.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive panelboards.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
- D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required support and attachment in accordance with Section 26 0529.
- F. Install panelboards plumb.
- G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.
- H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.
- I. Provide minimum of three spare 1 inch trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.
- J. Provide grounding and bonding in accordance with Section 26 0526.
- K. Install all field-installed branch devices, components, and accessories.
- L. Provide filler plates to cover unused spaces in panelboards.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers. Tests listed as optional are not required.
- D. Test GFCI circuit breakers to verify proper operation.
- E. Test AFCI circuit breakers to verify proper operation.
- F. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.
- C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

3.05 CLEANING

- A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 2419
MOTOR-CONTROL CENTERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Low-voltage (600 V and less) standard (non-arc-resistant) NEMA motor control centers.
- B. Motor Control Center Units:
 - 1. Combination Magnetic Motor Starter Units.
 - 2. Variable Frequency Drives.
 - 3. Combination Soft Starter Units.
 - 4. Control and Lighting Transformer.
 - 5. Lighting and Power Panelboard.
- C. Overcurrent Protective Devices.
- D. Motor Control Accessories:
 - 1. Auxiliary contacts.
 - 2. Pilot devices.
 - 3. Terminal blocks.
 - 4. Control and timing relays.
 - 5. Control power transformers.

1.02 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- C. Section 26 0529 - Hangers and Supports for Electrical Systems.
- D. Section 26 2200 - Low-Voltage Transformers: For integration into equipment specified in this section, where indicated.
- E. Section 26 2416 - Panelboards: For integration into equipment specified in this section, where indicated.
- F. Section 26 2923 - Variable-Frequency Motor Controllers.

1.03 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; Federal Specification; Revision E, 2013.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- C. NECA 402 - Recommended Practice for Installing and Maintaining Motor Control Centers; 2007.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- E. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000 (R2005), with errata, 2008.
- F. NEMA ICS 2.3 - Instructions for the Handling, Installation, Operation, and Maintenance of Motor Control Centers; 1995 (R2008).
- G. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices; 2000 (R2010).
- H. NEMA ICS 6 - Industrial Control and Systems: Enclosures; 1993 (Reaffirmed 2016).
- I. NEMA ICS 18 - Motor Control Centers; 2001 (R2007).
- J. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- K. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.
- M. UL 845 - Motor Control Centers; Current Edition, Including All Revisions.
- N. ISO 9001 Quality Management Systems.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
 - 2. Coordinate the work to provide motor controllers and associated overload relays suitable for use with the actual motors to be installed.
 - 3. Coordinate the work to provide motor controllers and associated wiring suitable for interface with control devices to be installed.
 - 4. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 5. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 6. Coordinate with manufacturer to provide shipping splits suitable for the dimensional constraints of the installation.
 - 7. Notify Engineer/Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for motor control centers, enclosures, units, overcurrent protective devices, and other installed components and accessories.
- C. Shop Drawings: Indicate dimensions, voltage, bus ampacities, unit arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum twenty years documented experience.
- C. The manufacturer shall have ISO 9001 registered facilities for the design, manufacture, and testing of MCC's.
- D. MCC sections and individual MCC units shall be designed and manufactured in accordance with UL 854 requirements.
- E. MCC sections and individual MCC units shall be UL listed, where possible.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store motor control centers in accordance with manufacturer's instructions, NECA 402, and NEMA ICS 2.3.
- B. Store in a clean, dry space having a uniform temperature to prevent condensation. Where necessary, provide temporary enclosure space heaters or temporary power for permanent factory-installed space heaters.
- C. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- D. Handle carefully to avoid damage to internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Motor Control Centers - Basis of Design: Rockwell Automation, Inc.; Allen-Bradley Products; Centerline 2100 NEMA MCC: ab.rockwellautomation.com.
- B. Substitutions: See Section 01 6000 - Product Requirements.
- C. Products other than basis of design are subject to compliance with specified requirements and prior approval of Engineer. By using products other than basis of design, Contractor accepts

responsibility for costs associated with any necessary modifications to related work, including any design fees.

- D. Source Limitations: Furnish motor control centers and associated components produced by a single manufacturer and obtained from a single supplier.

2.02 MOTOR CONTROL CENTERS

- A. Provide motor control centers consisting of all required components, control power transformers, instrumentation and control wiring, accessories, etc. as necessary for a complete operating system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Description: Dead-front standard (non-arc-resistant) type motor control center assemblies complying with NEMA ICS 18, and listed and labeled as complying with UL 845; ratings, configurations and features as indicated on the drawings.
- D. The contractor shall confirm motor full-load amperage ratings and provide those ratings to the MCC manufacturer to achieve proper sizing of the drives, soft starters, motor branch circuit, and overload protection.
- E. Configuration:
 - 1. Arrangement: Front-mounted units only (no rear-mounted units or back-to-back configuration).
 - 2. NEMA Classification and Wiring Type: NEMA ICS 18, Class I, Type B (B-T for units size 3 or smaller).
- F. Service Conditions:
 - 1. Provide motor control centers and associated components suitable for operation under the following service conditions without derating:
 - a. Altitude:
 - 1) Class 1 Km Equipment (devices utilizing power semiconductors, e.g. variable frequency controllers): Less than 3,300 feet.
 - 2) Class 2 Km Equipment (electromagnetic and manual devices): Less than 6,600 feet.
 - b. Ambient Temperature: Between 32 degrees F and 104 degrees F.
 - 2. Provide motor control centers and associated components suitable for operation at indicated ratings under the service conditions at the installed location.
- G. Ratings
 - 1. The MCC shall be rated for the system voltage as indicated on the contract drawings.
 - 2. The MCC horizontal and vertical power bus bracing shall be rated to meet or exceed the available fault current as shown on the contract drawings, but shall not be less than 42,000 A rms symmetrical.
 - 3. All MCC units shall have a full rated short-circuit rating that meets or exceeds the available fault current as shown on the contract drawings.
 - 4. Listed series short-circuit current ratings are not acceptable.
 - 5. All circuit breakers used in the motor control center shall have full-rated short-circuit current ratings based on the applied MCC voltage.
- H. Enclosures:
 - 1. Comply with NEMA ICS 6.
 - 2. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 2 (drip-proof).
 - 3. Finish: Manufacturer's standard unless otherwise indicated.
 - a. Vertical wireways and unit back plates shall be painted high-visibility gloss white.
 - b. All unpainted parts shall be plated for corrosion resistance.
 - 4. Removable closing plates on each end of the MCC shall cover all horizontal bus and horizontal wireway openings.
- I. Structure
 - 1. The MCC shall be of dead front construction and shall consist of one or more vertical sections bolted together to form a rigid, free-standing assembly. The systems shall be

- designed to allow for the addition of future sections at either end and to permit the interchanging of units.
2. Vertical sections shall be rigid, free-standing structures.
 - a. Vertical sections shall have internal mounting angles running continuously within the shipping block.
 - b. An external mounting channel that is required to maintain structure integrity is not acceptable.
 - c. Vertical sections shall be 90 in. high, 15 deep, and 20 in. wide, except where larger dimensions are required.
 - d. 71 in. high, reduced height sections shall be provided, if specified on the contract drawings.
 - e. Vertical sections shall be provided with a removable steel lifting angle on all shipping blocks. The angle shall run the length of the shipping block.
 - f. Lifting eyes are not acceptable.
 - g. Each standard section shall be capable of being subdivided into 12 usable, unit spaces.
 - h. One unit space shall constitute one-half space factor and shall be 6.5 in. in height.
 - i. Two unit spaces shall constitute one space factor and shall be 13 in. in height.
 3. Horizontal wireways.
 - a. Horizontal wireways shall be located at the top and bottom of the MCC
 - b. Horizontal wireways shall be 6 in. in height and extend the full depth of the vertical section to allow maximum flexibility in locating conduit for MCC feeds and loads.
 - 1) Pull-boxes to extend the height of the top horizontal wireway by 12 in. shall be provided, as required by the contractor.
 - c. Horizontal wireways shall be continuous across the length of the MCC, except where access needs to be denied due to electrical isolation requirements.
 - d. The horizontal wireways shall be isolated from the power bus.
 - e. The horizontal wireways shall have removable covers held in place by captive screws.
 4. Provide a full height vertical wireway, independent of the plug-in units, in each standard vertical section.
 - a. The vertical wireway shall be isolated from the vertical and horizontal buses.
 - b. The vertical wireway shall be covered with a hinged and secured door.
 - c. Wireway tie bars shall be provided.
 - d. Isolation between the wireway and units shall be provided.
- J. Bussing:
1. Horizontal Power Bus
 - a. Size for a maximum temperature rise of 117 degrees F over an ambient temperature of 104 degrees F, in compliance with NEMA ICS 18 and UL 845 requirements.
 - b. The horizontal bus material shall be copper with tin plating.
 - c. The horizontal bus shall be rated as shown on the drawings.
 - d. The horizontal bus shall be supported, braced, and isolated from the vertical bus with a high strength, non-conductive, non-tracking, glass polyester material.
 - e. For standard sections, the horizontal bus shall be continuous within each shipping block and shall be braced within each section.
 - f. Horizontal bus splices shall have at least two bolts on each side.
 2. Vertical Bus.
 - a. The vertical power bus shall have an effective rating of 600 A. If a center horizontal bus construction is utilized, then the rating shall be 300 A above and below the horizontal bus for an effective rating of 600 A. If a top or bottom mounted horizontal bus is utilized, then the full bus must be rated for 600 A.
 - b. The vertical bus material shall be copper with tin plating.
 - c. The vertical bus shall attach to the horizontal bus with at least two bolts.
 - d. The vertical bus shall be continuously braced by a high strength, non-conductive, no-tracking, glass-filled polyester material and isolated from the unit spaces by a non-conductive, polycarbonate molded cover.
 - e. The vertical bus shall be isolated from the horizontal power bus except where necessary to connect the vertical power bus to the horizontal power bus.
 - f. Automatic shutters shall cover the plug-in stab openings when units are removed.

3. Ground Bus.
 - a. Provide a ground bus system consisting of a horizontal ground bus connected to vertical ground buses mounted in each section.
 - b. Provide a tin-plated copper 0.25 x 2 in. horizontal ground bus mounted in the bottom of the MCC unless otherwise specified in the drawings.
 - c. Provide a pressure-type mechanical lug mounted on the ground bus in the incoming line section.
 - d. Provide a unit ground stab on all unit inserts. The ground stab shall establish unit insert grounding to the vertical ground bus before the plug-in power stabs engage the power bus. The grounding shall be maintained until after the plug-in power stabs are disengaged.
 - e. Provide solidly bonded equipment ground bus through full length of motor control center, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
 4. Neutral Bus.
 - a. If neutral loads are specified within the MCC, provide neutral connection plates in sections with horizontal neutral bus as indicated on the contract drawings.
 - b. Horizontal neutral bus shall be provided in all sections.
 - c. Neutral bus rating shall be half of the horizontal power bus rating.
 - d. For neutral loads that are served, Vertical neutral bus in 9 in. wireway shall be provided in sections with plug-in units as defined on the contract drawings.
 5. Phase and Neutral Bus Material: tin-plated copper.
- K. Disconnects
1. Main Disconnect.
 - a. Configure for top or bottom incoming feed as indicated or as required for the installation. Provide top-mounted pullbox as indicated or as required to facilitate installation of incoming feed.
 - b. If no overcurrent protection is indicated, provide a main incoming-line lug compartment.
 2. Feeder Disconnects: Circuit breaker type.
 - a. Minimum frame size shall be 125 A.
- L. Conductor Terminations: Suitable for use with the conductors to be installed.
1. Line Conductor Terminations:
 - a. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - b. Main and Neutral Lug Type: Mechanical.
- M. Metering Compartment
1. MCC's shall include a plug-in metering unit.
 2. Units shall include the following:
 - a. Fusible disconnect with fuses.
 - 1) Disconnect must be operable with the unit door closed.
 - b. Fused control circuit transformer.
 - c. Current transformers shipped loose to be installed by the contractor onto incoming power conductors.
 - d. Solid-state power monitor with door mounted display.
 3. Power Monitor.
 - a. Power Monitors shall be capable of displaying the following:
 - 1) Line current for all three phases with plus or minus 0.2 percent full-scale accuracy.
 - 2) Average three phase current with plus or minus 0.2 percent full-scale accuracy.
 - 3) Line-to-neutral and line-to-line voltage with plus or minus 0.2 percent full-scale accuracy.
 - 4) Current and voltage unbalance.
 - 5) Real, reactive, apparent, and true power with plus or minus 0.4 percent full-scale accuracy.
 - 6) KWh, KVARh, and KVAHnet.
 - 7) True RMS to the 45th harmonic.

- 8) Frequency at plus or minus 0.5%.
 - 9) Power factor at plus or minus 0.4%.
 - b. Power monitors shall include min/max logs and trend logs with up to 45,867 data points.
 - c. Power monitors shall be capable of performing distortion analysis with THD, Crest Factor (I, V) and Distortion power factor.
 - d. The power monitor shall include EtherNet/IP communication module.
 - e. Power monitors shall include two form-C relays.
 - f. Power monitors shall be Allen-Bradley PowerMonitor 5000 unit or approved equal.
- N. Future Provisions:
- 1. Prepare designated spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
 - 2. Arrange and equip horizontal bus and ground bus to accommodate future installation of additional motor control sections.
- O. EtherNet/IP Communication:
- 1. The MCC shall have Ethernet wiring incorporated into its design.
 - a. The MCC shall have factory installed industrial Ethernet cabling incorporated throughout the vertical section across the entire line up.
 - b. Each motor starter, electronic overload relay, power monitor, AC drive, and soft starter unit in the MCC shall be supplied with a means to communicate via EtherNet/IP network.
 - c. Plug-in units should be able to move around without impacting the network.
 - d. Maintenance activities should be able to be performed without impacting the network.
 - 2. Industrial Ethernet Switch.
 - a. The MCC shall have managed industrial Ethernet switch(s) with Ports to connect each EtherNet/IP enabled device. One switch for entire MCC is desired.
 - b. Ethernet Switches shall be provided with spare ports to accommodate network expansion and future plug-in unit inserts.
 - c. The managed industrial Ethernet switch shall deliver optimal network security, network resiliency, and flexibility. The functionality should include port based control/prioritization, switch-level ring support, VLAN segmentation, and other Layer-2 switch features.
 - d. The managed industrial Ethernet switch shall have the ability to include, if needed, Gigabit ports, CIP Sync functionality, Network Address Translation (NAT), and an Industrial SD Card.
 - e. The managed industrial Ethernet switch shall include redundant terminal blocks for customer supplied/connection of an external 24V DC UPS.
 - 3. Industrial Ethernet Switch Layout.
 - a. Layout - Fixed-Mount Switch Unit
 - 1) The managed industrial Ethernet Switch shall be mounted in a fixed-mount, Switch Unit in the top section.
 - 2) If more than one switch is required, the industrial Ethernet cable shall connect each switch to one another in a ring topology.
 - 3) The switch Unit shall be provided with a locking latch.
 - 4) The Switch Unit shall be provided with a door mounted viewing window.
 - 5) The Switch Unit shall be provided with a door mounted external network connector.
 - 4. Industrial Ethernet Cabling
 - a. Industrial Ethernet Cable Ratings.
 - 1) The industrial Ethernet cable shall be 600V UL Category 5e PLTC rated
 - 2) The use of a 300V rated cable is not acceptable.
 - 3) Ethernet Switch-to-Device cable labels shall be located on both ends of the cable to specify where the cable is connected to on both ends.
 - 4) A detailed Ethernet network table and Ethernet network diagram specifying IP addresses, subnet masks, device locations, cable label details and 24V DC capacities shall be included in the MCC documentation.
 - b. Layout - Homerun (direct switch-to-device) Ethernet connections.

- 1) An industrial Ethernet cable shall be routed from the managed industrial Ethernet Switch directly to the EtherNet/IP device in each unit, or to the first and last device in a ring topology.
 - (a) The industrial Ethernet cable shall be routed through the top or bottom horizontal wireway and transition through the vertical wireway directly to the EtherNet/IP device.
 - (b) The industrial Ethernet cable shall be secured to vertical wireway tie bars.
- 2) The EtherNet/IP device within each unit shall be factory connected to the industrial Ethernet switch directly by using a 600V - UL rated Category 5e PLTC rated industrial Ethernet cable.
- c. Power Supplies.
 - 1) Power supplies shall provide 24V DC for the devices that require it.
 - 2) The MCC manufacturer shall check the user's design to confirm that adequate power supplies have been specified to conform with network requirements.
 - 3) Power supply output shall be rated 8 A, 24V DC.
 - 4) Power supplies shall be Allen-Bradley Bulletin 1606-XLS240E or approved equal.
 - 5) Power supply units shall be provided with a buffer module to provide a minimum of 500 ms ride-through at full load (the buffer module is optional for the standard Ethernet power supply).
 - 6) Buffer modules shall be Allen-Bradley Bulletin 1606-XLBUFFER or approved equal.
 - 7) Two (2) 24V DC adapters allowing four (4) power connections shall be provided:
 - (a) In each vertical wireway of standard sections to simplify installation, relocation and addition of plug-in units.
 - (b) Each 24V DC adapter in the vertical wireway shall be connected to the power supply.
 - 8) The power supply units shall be provided with a door mounted external 120V AC connection for laptop power and Ethernet network connection.
 - 9) Redundant 24V DC power shall be provided for all Ethernet enabled devices. Choose one type of 24V DC redundant for the MCC application as they are mutually exclusive:
 - (a) A Redundancy Unit shall be included that provides the capabilities of interconnecting two independent power supplies in a redundant way (N+1) and whose output is connected to the 24 V DC circuit. The Redundancy Unit shall be powered by one of the following options:
 - (1) Two Rockwell Automation-supplied 24VDC power supply units.
 - (2) One Rockwell Automation-supplied 24VDC power supply unit and one external power input provided by the contractor.
 - (3) Two external 24V DC power inputs provided by the contractor.
 - (b) Two 8 A power supply modules shall be placed in the same power supply unit and wired in parallel with blocking diodes whose output is connected to the 24V DC circuit.
5. EtherNet/IP Interface for Motor Starter Units.
 - a. Motor starter units shall have an electronic overload relay that incorporates the following features:
 - 1) Built-in EtherNet/IP communication.
 - 2) Overload relay I/O powered by using 24V DC.
 - 3) Status indicators for status indication.
 - 4) Overload relays shall have a reset button on the outside of the unit door.
 - 5) Selectable trip of NEMA Class 5 to 30. Unless indicated, the trip class shall be set for NEMA Class 20 operation.
 - 6) Up to six (6) inputs and three (3) outputs of direct I/O. Additional I/O can be provided with an add-on module to the overload relay. Input voltage shall match the overload relay power voltage.
 - 7) Protective functions.
 - (a) Functions shall provide a programmable trip level, warning level, time delay, and inhibit window.

- (b) Protective functions shall include Thermal overload, Phase loss, Stall, Jam, Underload, Current imbalance, Remote trip, and PTC thermistor input.
 - (c) Ground fault protection is not required.
 - (1) If ground fault protection is required, the protection range shall be 500 mA to 5 A
 - (d) PTC Thermistor input is required.
 - (e) Voltage protection is required.
 - (1) Input Fusing shall not be used on NEMA 3 and smaller starters.
- 8) Current monitoring functions shall include phase current, average current, full load current, current imbalance percent, percent thermal capacity utilized, and ground fault current (if required).
- 9) Voltage, energy, and frequency measuring capabilities shall be included when voltage protection is required.
- 10) Diagnostic information shall include device status, warning status, time to reset, trip status, time to overload trip, and history of last five trips.
- 11) Preventative maintenance information shall include Allowable starts per hour, required Time between starts, Starts counter, Starts available, Time until next start, total operating hours, and elapsed operating time.
- 12) Overload relay shall include an on-board logic processor to allow basic logic to be performed within the overload relay based on network data and the status of the inputs to the overload relay.
- 13) The overload relay shall support the following CIP messaging types: Polled I/O messaging, Chang-of-state/cyclic messaging, Explicit messaging, Group 4 offline node recovery messaging, and Unconnected Message Manager (UCMM).
- 14) The overload relay shall provide the following functions to minimize network configuration time: Full parameter object support, Configuration consistency value, and Add-on-Profile.
- 15) The overload relay shall include a E300 Control Station connected to the overload relay by a single cable.
- b. The overload relay shall be Allen-Bradley E300 model or approved equal.
- 6. EtherNet/IP Interface for Variable Frequency AC Drives and Solid-State Reduced Voltage Motor Controllers.
 - a. The EtherNet/IP communication interface shall be supplied to allow for communication between the solid-state component and the Ethernet network.
- 7. EtherNet/IP Interface for Other Units.
 - a. Provide an EtherNet/IP interface for other units as indicated on the contract drawings.
 - b. Refer to the contract drawing wiring diagrams for points to be monitored.
- 8. Programming and Testing.
 - a. The MCC manufacturer shall load the IP Address and Subnet Mask into each unit and Ethernet switch.
 - b. The IP Address shall be as indicated on the contract drawings or as provided by the contractor.
 - c. The MCC manufacturer shall test the MCC to ensure that each unit communicates properly prior to shipment.
 - d. The MCC manufacturer shall provide a portable solid-state data storage device containing applicable electronic data sheet (EDS) files for the EtherNet/IP devices.
 - e. The IP Address shall be visible on the unit Nameplate for any units containing an EtherNet/IP enabled device.
 - f. All firmware will be provided with the same revision level of firmware across all similar intelligent electronic devices.
 - 1) E300 overload relays.
 - 2) PowerFlex 523, PowerFlex 525, PowerFlex 527 drives.
 - 3) PowerFlex 753, PowerFlex 755 drives.
 - 4) Stratix 5700 switches.
 - 5) PowerMonitor 5000 energy meters.
 - 6) SMC Flex Starters.

2.03 MOTOR CONTROL CENTER UNITS

- A. The minimum compartment height shall be 6.5 in. and this shall be considered one-half space factor.
- B. NEMA size 5 FVNR starters and below shall be provided as plug-in units.
 - 1. Plug-in units shall consist of a unit assembly, unit support pan, and unit door assembly.
 - 2. Units shall be supplied with removable doors. The unit doors shall be fastened to the structure so that the doors can be closed when the unit is removed.
 - 3. A unit support pan shall be provided for support and guiding units. Unit support pans shall remain in the structure when units are removed to provide isolation between units.
 - 4. A service position shall be provided for plug-in units that allows for the unit to be supported, but disengaged from the bus. The unit shall be capable of being padlocked in the service position. This position is to be used to isolate a unit from the bus to allow service to be performed on the connected load equipment.
- C. Power Stabs.
 - 1. Unit stabs for engaging the power bus shall be tin-plated copper and provided with stainless back-up springs to provide and maintain a high-pressure, 4-point connection to the vertical bus.
 - 2. Wiring from the unit disconnecting means to the plug-in stabs shall not be exposed on the rear of the unit. A separate isolated pathway shall be provided for each phase to minimize the possibility of unit fault conditions reaching the power bus system.
 - 3. Power cable termination at the plug-in stab shall be a maintenance-free crimp type connection.
- D. Withdrawable Power Stabs.
 - 1. Plug-in units shall have the capacity of withdrawing the power stabs, allowing the primary voltage to be disconnected with the unit door closed.
 - 2. The withdrawable assembly shall accept a standard 1/4" hex-style drive socket.
 - a. A complete power engagement shall occur when turning the mechanism 1/4 turn in clockwise direction.
 - b. Complete power disengagement shall occur when turning the mechanism 1/4 turn in counter-clockwise direction.
 - 3. The withdrawable stabs design shall include a set of stab assembly-mounted shutters.
 - a. Shutters shall automatically open before the power stabs can extend and connect to the vertical bus.
 - b. Shutters shall close as soon as the power stabs are disconnected from the vertical bus and are completely inside the stab housing.
 - 4. The withdrawable stabs design shall include interlock mechanisms.
 - a. A through-the-door mechanism shall allow the unit to be locked in the 'Power Stabs Disconnected' position.
 - 1) This mechanism shall be such that it can be padlocked to prevent the connection of the stabs to the vertical bus even when the unit is inserted into the vertical section.
 - 2) Unit door shall be capable of opening with the padlock and lockout engaged.
 - b. Unit disconnect handle must be in the OFF position (load side of the disconnect device removed from the line power) before the stabs can be disconnected from the vertical bus.
 - 1) Mechanism shall also allow the removal of the unit from the vertical section but only after the disconnect handle has been turned OFF and the power stabs have been disconnected from the vertical bus.
 - 2) Unit stabs have to be disconnected (withdrawn) before the unit can be re-inserted into the vertical section.
 - 5. The withdrawable stabs design shall include feedback mechanisms that are verifiable with the unit door closed.
 - a. A two-position indication system shall be provided (Power Stabs Connected/Disconnected) and shall be visible from the door.
 - 1) Connected with Red Indication-Primary voltage stabs fully engaged and connected to the vertical bus.

- 2) Disconnected with Green Indication-Primary voltage stabs fully disconnected from the vertical bus.
 - b. A set of test points shall be located on the front of the unit for identification of:
 - 1) Power stabs position: a positive continuity check between these probes shall verify that all three power stabs have been disconnected from the vertical bus and completely withdrawn inside the stab housing.
 - 2) Stab-mounted shutters position: a positive continuity check between these probes shall verify that the shutters are closed, meaning that all three power stabs have been disconnected and withdrawn inside the stab housing.
 - c. Withdrawable power stabs with door closed mechanism shall not increase the original unit height design so total space in the motor control center is optimized.
- E. Disconnect Handle.
1. Plug-in units shall be provided with a heavy-duty, non-conductive, industrial duty, flange mounted handle mechanism for control of each disconnect switch or circuit breaker.
 2. Use of rotary operators is not acceptable.
 3. Disconnect handles may pivot in the vertical or horizontal plane.
 4. On-off condition shall be indicated by the handle position, red and green color indicators with the words ON and OFF, and the international symbols 1 and 0 along with a pictorial indication of the handle position.
 5. Handles shall be capable of being locked in the OFF position with up to three padlocks.
 6. Plug-in units shall be provided with interlocks per NEMA and UL requirements. Interlocks shall be provided for the following:
 - a. Prevention of unit insertion or withdrawal with the disconnect in the ON position.
 - b. Prevention of the unit door from being opened with the disconnect in the ON position.
 - 1) A feature for intentionally defeating this interlock by qualified personnel shall be provided.
 - c. Prevention of the disconnect switch from being moved to the ON position if the unit door is open.
 - 1) A feature for intentionally defeating this interlock by qualified personnel shall be provided.
- F. Doors
1. Each unit shall be provided with a removable door mounted on removable pin-type hinges.
 2. The unit doors shall be capable of being opened at least 110 degrees.
 3. The unit doors shall be removable from any location in the MCC without disturbing any other units doors.
 4. The unit door shall be fastened to the structure so it can be closed to cover the unit space when the unit is removed.
 5. The unit doors shall be held closed with quarter-turn latches.
- G. Combination Magnetic Motor Starter Units:
1. Description: NEMA ICS 2, Class A combination motor controllers with magnetic contactor(s), externally operable disconnect and overload relay(s).
 2. Configuration: As indicated on drawings.
 3. Use of non-standard starter sizes smaller than specified standard NEMA sizes is not permitted.
 - a. Minimum size shall be NEMA size 1.
 4. Disconnects: Circuit breaker type.
 - a. Circuit Breakers: Motor circuit protectors (magnetic-only) unless otherwise indicated or required.
 - b. Provide externally operable handle with means for locking in the OFF position. Provide safety interlock to prevent opening the cover with the disconnect in the ON position with capability of overriding interlock for testing purposes.
 - c. Provide auxiliary interlock for disconnection of external control power sources where applicable.
 5. Motor starter shall be Allen-Bradley Bulletin 500 or 300 or approved equal.
 6. Overload Relays: Solid-state type unless otherwise indicated.
 7. In addition to the hold-in contact, starters shall be provided with one normally open and one normally closed auxiliary contact, and any additional auxiliary contacts shown in the

- contract drawings. The starter shall be capable of accommodating up to six contacts in addition to the hold-in contact.
8. Provide a control power transformer with a rated secondary voltage of 120V AC. The control power transformer shall be provided with primary and secondary fusing.
 9. Overload relays shall have a reset button located on the outside of the unit door.
 10. Provide a door mounted selector switch for Hand-Off-Auto operation. The hand mode shall provide local control at the MCC unit door. In the Auto mode, control shall be provided through a remote contact.
 11. Provide door mounted 120V AC push-to-test pilot lights with LED lamps for ON Green and OFF Red status indication.
- H. Variable Frequency Drives
1. Variable frequency drives shall be PowerFlex 753, or PowerFlex 755 drives.
 2. Refer to Section 26 2923 Variable-Frequency AC Drive Units.
 3. Provide control power transformer with a rated secondary voltage of 120V AC. The control power transformer shall be provided with primary and secondary fusing.
 4. Provide door-mounted pilot devices per the contract drawing wiring diagrams.
 5. Provide door-mounted 120V AC push-to-test pilot lights with LED lamps for OFF Red and AT-SPEED Green status indication.
 6. Provide a door mounted selector switch for Hand-Off-Auto operation. The hand mode shall provide local control at the MCC unit door. In the Auto mode, control shall be provided through a remote contact.
 7. Provide a door-mounted human interface module for programming, display, and control.
 8. Provide one isolated, configurable analog input and output.
 9. Provide an integrated network safety safe-torque-off capable of EtherNet/IP control.
 10. Provide line and load filters per plans and specifications.
 11. Emergency run bypass contactor is required.
 - a. If required, emergency run bypass shall be fully rated for the motor load and be capable of starting the motor at full voltage. The emergency run bypass shall be provided with the same type of solid-state overload relay protection as for the electromechanical starter units.
- I. Combination Soft Starter Units
1. Refer to Section 26 2924 Solid-State Reduced Voltage Controller Unit (Soft Starter).
 2. Disconnect means for solid-state controllers shall be an Inverse Time Circuit Breaker.
 3. Unit short-circuit current rating shall be greater than or equal to the available fault current as shown on the contract drawings.
 4. Provide a control power transformer with a rated secondary voltage of 120V AC. The control power transformer shall be provided with primary and secondary fusing.
 5. The controller shall be Allen-Bradley SMC Flex and shall include the following features:
 - a. Integrated bypass contactor that is closed once the motor is up to full speed.
 - b. Electronic overload protection with adjustable trip class.
 - c. Four programmable auxiliary contacts.
 - d. Selectable control capabilities: soft start, kick start, current limit start, dual ramp, full voltage, linear speed, preset slow speed, soft stop.
 - e. Additional control capabilities: none required.
 - f. LCD display.
 - g. Keypad programming for configuration.
 - h. Built-in selectable protective functions for: overload, jam, stall, excessive starts per hour, underload, over/under voltage, voltage unbalance.
 - i. Metering capabilities for: current, voltage, kW, kWH, power factor, motor thermal capacity utilized, elapsed time.
 - j. Ground fault protection (1 A to 5 A) required
 6. Provide an input isolation contactor.
 7. The SMC unit shall be provided with line side protective modules. The modules shall contain capacitors and metal oxide varistors (MOV's) that protect the internal power circuitry from severe electrical transients and/or high electrical noise.
 8. Provide door-mounted 120V AC push-to-test pilot lights with LED lamps for ON Green and OFF Red status indication.

9. Provide a door mounted selector switch for Hand-Off-Auto operation. The hand mode shall provide local control at the MCC unit door. In the Auto mode, control shall be provided through a remote contact.
- J. Control and Lighting Transformer
 1. Refer to Section 26 2200 Low-Voltage Transformers.
 2. Provide control and lighting transformers as shown on the drawings. The rating shown on the drawings shall be the minimum acceptable rating.
 3. The insulation shall be 180 °C insulation with 80 °C rise.
 4. Provide circuit breaker with thermal magnetic trip for primary protection.
 5. Provide secondary fuse protection for the transformer.
 6. The Primary circuit breaker compartment and transformer compartment shall be interlocked together and factory wired together.
 7. Unit construction is dependent on the MCC NEMA enclosure type.
 - a. Units in a NEMA Type 1 enclosure shall be provided with vented doors.
 - b. Units in a NEMA Type 1 enclosure with gasketed doors shall be provided with filters over the vent openings.
 - c. Units in a NEMA Type 12 enclosure shall be provided with a non-vented door. If transformer derating is required, then the transformer shall be upsized to provide equivalent rating as shown on the contract drawings.
 8. Control and power transformers that are specifically designed for use in motor control centers and for use with motor control circuits are exempt from NEMA TP-1 energy efficient requirements.
 9. Disconnecting means for transformers shall be circuit breakers with thermal-magnetic trip units for 250 A and smaller frames; provide an electronic trip unit for 400 A and larger frames.
- K. Lighting and Power Panelboard
 1. Refer to Section 26 2416 Panelboards.
 2. Provide lighting panel as shown on the drawings.

2.04 OVERCURRENT PROTECTIVE DEVICES

- A. Overload Relays:
 1. Provide overload relays and, where applicable, associated current elements/heaters, selected according to actual installed motor nameplate data, in accordance with manufacturer's recommendations and NFPA 70; include consideration for motor service factor and ambient temperature correction, where applicable.
 2. Inverse-Time Trip Class Rating: Class 20 unless otherwise indicated or required.
 3. Trip-free operation.
 4. Visible trip indication.
 5. Resettable.
 - a. Employ manual reset unless otherwise indicated.
 - b. Employ remote reset where indicated.
 - c. Do not employ automatic reset with two-wire control.
 6. Solid-State Overload Relays:
 - a. Basis of Design: Allen-Bradley E1 Plus or approved equal.
 - b. If EtherNet/IP communication is required, refer to the part of this section titled 'EtherNet/IP Interface for Motor Starter Units', which takes precedence over this overload relay requirement.
 - c. Selectable inverse-time trip class rating; 10, 15, 20, or 30 for E1 overloads, or 5, 10, 15, 20, or 30 for E300 overloads..
 - d. Set for class 20 unless otherwise indicated on the contract drawings.
 - e. Overload protection.
 - f. Trip current adjustment range of 5:1.
 - g. Phase loss protection.
 - h. Phase imbalance protection.
 - i. Ground Fault and Jam protection shall be provided.
 - 1) If ground fault protection is required, it shall have a selectable trip value between 20 mA and 5 A.
 - j. Ambient temperature insensitive.

- k. Thermal memory.
 - l. Repeat Trip Accuracy: Plus/minus 2 percent, minimum.
 - m. Trip test function.
 - n. Bipolar latching relay with one normally open and one normally closed contact, rated NEMA B600 for use in motor contactor control circuits.
- B. Circuit Breakers:
- 1. Interrupting Capacity (not applicable to motor circuit protectors):
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than specified minimum requirements.
 - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 - 2. Motor Circuit Protectors:
 - a. Description: Instantaneous-trip circuit breakers furnished with magnetic instantaneous tripping elements for short circuit protection, but not with thermal inverse time tripping elements for overload protection; UL 489 recognized only for use as part of a listed combination motor controller with overload protection; ratings, configurations, and features as indicated on the drawings.
 - b. Provide field-adjustable magnetic instantaneous trip setting.
 - 3. Molded Case Circuit Breakers:
 - a. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers; listed and labeled as complying with UL 489, and complying with UL 489 where applicable; ratings, configurations, and features as indicated on the drawings.
 - 1) Provide thermal magnetic circuit breakers for circuit breaker frame sizes less than 400 amperes.
 - 2) Provide electronic trip circuit breakers for circuit breaker frame sizes 400 amperes and above.
 - b. Minimum Interrupting Capacity:
 - 1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
 - 2) 35,000 rms symmetrical amperes at 480 VAC.
 - c. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
 - 1) Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 225 amperes and larger.
 - d. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.
 - 1) Provide the following field-adjustable trip response settings:
 - (a) Long time pickup, adjustable by replacing interchangeable trip unit or by setting dial.
 - (b) Long time delay.
 - (c) Short time pickup and delay.
 - (d) Instantaneous pickup.
 - (e) Ground fault pickup and delay where ground fault protection is indicated.

2.05 MOTOR CONTROL ACCESSORIES

- A. Auxiliary Contacts:
 - 1. Comply with NEMA ICS 5.
 - 2. Provide auxiliary contact on Auto position of each selector switch to be monitored by control system.
 - 3. Provide interlocking contact(s) at each motor control bucket for emergency stop circuit.
 - 4. Provide interlocking contact at each motor control bucket for enable/disable.
 - 5. Provide number and type of contacts indicated or required to perform necessary functions, including holding (seal-in) circuit and interlocking, plus one normally open (NO) and one normally closed (NC) spare contact for each starter unit, minimum.
- B. Pilot Devices:
 - 1. Comply with NEMA ICS 5; heavy-duty type.
 - 2. Pilot devices shall be rated NEMA Type 4/13 water tight/oil tight.

3. For units with vertically operated disconnect handles:
 - a. When three or less pilot devices are utilized, they shall be Allen-Bradley Bulletin 800H 30.5mm devices or approved equal.
 - b. When more than three devices are required, the use of Allen-Bradley Bulletin 800F 22.5mm devices or approved equal is permitted.
 - c. For Drives pilot devices:
 - 1) 800H 30.5mm devices or approved equal shall be provided for all PowerFlex 70 drives.
 - 2) 800F 22.5mm devices or approved equal shall be provided for all Power Flex 750 and PowerFlex 520 series drives.
 - d. For units with horizontally operated disconnect handles:
 - 1) The devices shall be Allen-Bradley Bulletin 800F or approved equal.
4. Pushbuttons: Unless otherwise indicated, provide momentary, non-illuminated type with extended button operator; normally open or normally closed as indicated or as required.
5. Selector Switches: Unless otherwise indicated, provide maintained, non-illuminated type with knob operator; number of switch positions as indicated or as required.
6. Indicating Lights: Push-to-test type unless otherwise indicated.
7. Provide LED lamp source for indicating lights and illuminated devices.
- C. Terminal Blocks.
 1. Control terminal blocks shall be provided on all contactor and starter units.
 - a. Control terminal blocks shall be a pull-apart design on all plug-in units for easy removal of the unit from the structure.
 - b. Control terminal blocks on non-plug-in contactor and starter units shall be fixed type.
 - c. Control Terminal Blocks: Include 25 percent spare terminals.
 2. Power terminal blocks shall be provided on all contactor and starter units, rated NEMA size 3 (100 A) and below that utilize vertically operated disconnects.
 - a. Power terminal blocks shall be pull-apart for NEMA size 1 and 2 (30 A and 60 A contactors).
 - b. Power terminal blocks for NEMA size 3 starters (100 A contactors) shall be non-pull-apart.
 3. Terminal blocks shall not be located adjacent to or inside the vertical wireway.
- D. Control and Timing Relays:
 1. Comply with NEMA ICS 5.
 2. Provide number and type of relays indicated or required to perform necessary functions.
- E. Control Power Transformers:
 1. Size to accommodate burden of contactor coil(s) and all connected auxiliary devices, plus 200 VA spare capacity.
 2. Include primary and secondary fuses.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of the motor control centers and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive motor control centers.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install motor control centers in accordance with NECA 1 (general workmanship), NECA 402, and NEMA ICS 2.3.
- C. Arrange equipment to provide required clearances and maintenance access, including accommodations for any drawout devices.
- D. Provide required support and attachment in accordance with Section 26 0529.
- E. Install motor control centers plumb and level.

- F. Unless otherwise indicated, mount motor control centers on properly sized 4 inch high concrete pad constructed in accordance with Section 03 3000.
- G. Provide grounding and bonding in accordance with Section 26 0526.
- H. Install all field-installed devices, components, and accessories.
- I. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.
- J. Set field-adjustable motor controllers and associated components according to installed motor requirements, in accordance with manufacturer's recommendations and NFPA 70.
- K. Set field-adjustable circuit breaker tripping function settings as directed.
- L. Provide filler plates to cover unused spaces.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Before energizing motor control center, perform insulation resistance testing in accordance with NECA 402 and NEMA ICS 2.3.
- C. Inspect and test in accordance with NETA ATS, except Section 4.
- D. Perform inspections and tests listed in NETA ATS, Section 7.16.2.1.
- E. Motor Starters: Perform inspections and tests listed in NETA ATS, Section 7.16.1.1. Tests listed as optional are not required.
- F. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.
 - 1. Perform inspections and tests listed in NETA ATS, Section 7.14. The insulation-resistance test on control wiring listed as optional is not required.
- G. Correct deficiencies and replace damaged or defective motor control centers or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of motor control center covers and doors.

3.05 CLEANING

- A. Clean dirt and debris from motor control center enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred surfaces to match original factory finish.

3.06 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate proper operation of motor controllers to Owner, and correct deficiencies or make adjustments as directed.
- B. Training: Train Owner's personnel on operation, adjustment, and maintenance of motor control center and associated devices.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of two hours of training.
 - 3. Location: At project site.

END OF SECTION

SECTION 26 2726

WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
- B. Wall dimmers.
- C. Receptacles.
- D. Wall plates.

1.02 RELATED REQUIREMENTS

- A. Section 26 0533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for; 2017h.
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); 2017g.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2015).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2016.
- G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- I. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.
- K. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
 - 3. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
 - 4. Notify Engineer/Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
- B. Sequencing:
 - 1. Do not install wiring devices until final surface finishes and painting are complete.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Products: Listed, classified, and labeled as suitable for the purpose intended.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND PROTECTION

- A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

PART 2 PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
- D. Provide GFCI protection for receptacles installed within 6 feet of sinks.
- E. Unless noted otherwise, do not use combination switch/receptacle devices.

2.02 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices, Unless Otherwise Indicated: Gray with stainless steel wall plate.

2.03 WALL SWITCHES

- A. Manufacturers:
 - 1. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 - 2. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
- B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.

2.04 RECEPTACLES

- A. Manufacturers:
 - 1. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 - 2. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.
- B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
 - 2. NEMA configurations specified are according to NEMA WD 6.
- C. Convenience Receptacles:
 - 1. Standard Convenience Receptacles: Commercial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
- D. GFCI Receptacles:
 - 1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
 - a. Provide test and reset buttons of same color as device.
 - 2. Standard GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
 - 3. Weather Resistant GFCI Receptacles: Commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

2.05 WALL PLATES

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell-wiring.com/#sle.
 - 2. Leviton Manufacturing Company, Inc: www.leviton.com/#sle.
 - 3. Lutron Electronics Company, Inc: www.lutron.com.
 - 4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us/#sle.

- B. Wall Plates: Comply with UL 514D.
 - 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 - 2. Size: Standard.
 - 3. Screws: Metal with slotted heads finished to match wall plate finish.
- C. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.
- D. Galvanized Steel Wall Plates: Rounded corners and edges, with corrosion resistant screws.
- E. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.
- F. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- F. Verify that openings in access floor are in proper locations.
- G. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of wiring devices provided under this section.
 - 1. Mounting Heights: Unless otherwise indicated, as follows:
 - a. Wall Switches: 48 inches above finished floor to top of box.
 - b. Wall Dimmers: 48 inches above finished floor to top of box.
 - c. Fan Speed Controllers: 48 inches above finished floor to top of box.
 - d. Receptacles: 20 inches above finished floor to top of box or 6 inches above counter.
 - 2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 - 3. Where multiple receptacles or wall switches are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
 - 4. Locate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Engineer/Architect to obtain direction prior to proceeding with work.
 - 5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.

- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Unless otherwise indicated, GFCI receptacles may be connected to provide feed-through protection to downstream devices. Label such devices to indicate they are protected by upstream GFCI protection.
- I. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- J. Install wall switches with OFF position down.
- K. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.
- L. Do not share neutral conductor on branch circuits utilizing wall dimmers.
- M. Install vertically mounted receptacles with grounding pole on bottom and horizontally mounted receptacles with grounding pole on left.
- N. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- O. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each wiring device for damage and defects.
- C. Operate each wall switch with circuit energized to verify proper operation.
- D. Test each receptacle to verify operation and proper polarity.
- E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- F. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.

3.06 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

SECTION 26 2813

FUSES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fuses.

1.02 RELATED REQUIREMENTS

- A. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- B. Section 26 2816.16 - Enclosed Switches: Fusible switches.

1.03 REFERENCE STANDARDS

- A. NEMA FU 1 - Low Voltage Cartridge Fuses; 2012.
- B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. UL 248-1 - Low-Voltage Fuses - Part 1: General Requirements; Current Edition, Including All Revisions.
- D. UL 248-10 - Low-Voltage Fuses - Part 10: Class L Fuses; Current Edition, Including All Revisions.
- E. UL 248-12 - Low-Voltage Fuses - Part 12: Class R Fuses; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate fuse clips furnished in equipment provided under other sections for compatibility with indicated fuses.
 - 2. Coordinate fuse requirements according to manufacturer's recommendations and nameplate data for actual equipment to be installed.
 - 3. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard data sheets including voltage and current ratings, interrupting ratings, time-current curves, and current limitation curves.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Fuses: One set(s) of three for each type and size installed.
 - 3. Fuse Pullers: One set(s) compatible with each type and size installed.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Bussmann, a division of Eaton Corporation: www.cooperindustries.com/#sle.
- B. Littelfuse, Inc: www.littelfuse.com/#sle.

2.02 APPLICATIONS

- A. Service Entrance:
 - 1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.

- 2. Fusible Switches Larger Than 600 Amperes: Class L, time-delay.
- B. Feeders:
 - 1. Fusible Switches up to 600 Amperes: Class RK1, time-delay.
 - 2. Fusible Switches Larger Than 600 Amperes: Class L, time-delay.
- C. Individual Motor Branch Circuits: Class RK5, time-delay.

2.03 FUSES

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.
- C. Provide fuses of the same type, rating, and manufacturer within the same switch.
- D. Comply with UL 248-1.
- E. Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.
- F. Voltage Rating: Suitable for circuit voltage.
- G. Class R Fuses: Comply with UL 248-12.
- H. Class L Fuses: Comply with UL 248-10.
- I. Selectivity: Where the requirement for selectivity is indicated, furnish products as required to achieve selective coordination.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that fuse ratings are consistent with circuit voltage and manufacturer's recommendations and nameplate data for equipment.
- B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Do not install fuses until circuits are ready to be energized.
- B. Install fuses with label oriented such that manufacturer, type, and size are easily read.

END OF SECTION

SECTION 26 2816.16
ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Enclosed safety switches.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.
- B. Section 26 0529 - Hangers and Supports for Electrical Systems.
- C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 26 2813 - Fuses.

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- C. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013.
- D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- F. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- G. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.
- H. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 4. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.
- C. Shop Drawings: Indicate outline and support point dimensions, voltage and current ratings, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
- D. Project Record Documents: Record actual locations of enclosed switches.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed switch internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. ABB/GE: www.geindustrial.com/#sle.
- B. Eaton Corporation: www.eaton.com/#sle.
- C. Schneider Electric; Square D Products: www.schneider-electric.us/#sle.
- D. Siemens Industry, Inc: www.usa.siemens.com.
- E. Source Limitations: Furnish enclosed switches and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 ENCLOSED SAFETY SWITCHES

- A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature: Between -22 degrees F and 104 degrees F.
- D. Horsepower Rating: Suitable for connected load.
- E. Voltage Rating: Suitable for circuit voltage.
- F. Short Circuit Current Rating:
 - 1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
- G. Enclosed Safety Switches Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- H. Provide with switch blade contact position that is visible when the cover is open.
- I. Fuse Clips for Fusible Switches: As required to accept fuses indicated.
 - 1. Where NEMA Class R fuses are installed, provide rejection feature to prevent installation of fuses other than Class R.
- J. Conductor Terminations: Suitable for use with the conductors to be installed.
- K. Provide insulated, groundable fully rated solid neutral assembly where a neutral connection is required, with a suitable lug for terminating each neutral conductor.
- L. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.
- M. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
 - c. Indoor Wet, Damp Locations Type 4 or 4X.
 - 2. Finish for Painted Steel Enclosures: Manufacturer's standard, factory applied grey unless otherwise indicated.

- N. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.
- O. Heavy Duty Switches:
 - 1. Comply with NEMA KS 1.
 - 2. Conductor Terminations:
 - a. Lug Material: Copper, suitable for terminating copper conductors only.
 - 3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings of the enclosed switches are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive enclosed safety switches.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required support and attachment in accordance with Section 26 0529.
- E. Install enclosed switches plumb.
- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.
- G. Provide grounding and bonding in accordance with Section 26 0526.
- H. Provide fuses complying with Section 26 2813 for fusible switches as indicated or as required by equipment manufacturer's recommendations.

3.03 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.04 CLEANING

- A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 2913
ENCLOSED CONTROLLERS

PART 2 PRODUCTS

1.01 ENCLOSED CONTROLLERS

- A. Provide enclosed controller assemblies consisting of all required components, control power transformers, instrumentation and control wiring, accessories, etc. as necessary for a complete operating system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Description: Enclosed controllers complying with NEMA ICS 2, and listed and labeled as complying with UL 60947-1 and UL 60947-4-1; ratings, configurations and features as indicated on the drawings.
- D. Service Conditions:
 - 1. Provide controllers and associated components suitable for operation under the following service conditions without derating:
 - a. Altitude:
 - 1) Class 1 Km Equipment (devices utilizing power semiconductors, e.g. variable frequency controllers): Less than 3,300 feet.
 - 2) Class 2 Km Equipment (electromagnetic and manual devices): Less than 6,600 feet.
 - b. Ambient Temperature: Between 32 degrees F and 104 degrees F.
 - 2. Provide controllers and associated components suitable for operation at indicated ratings under the service conditions at the installed location.
- E. Short Circuit Current Rating:
- F. Conductor Terminations: Suitable for use with the conductors to be installed.
- G. Enclosures:
 - 1. Comply with NEMA ICS 6.
 - 2. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - 3. Finish: Manufacturer's standard unless otherwise indicated.
- H. Instrument Transformers:
 - 1. Comply with IEEE C57.13.
 - 2. Select suitable ratio, burden, and accuracy as required for connected devices.
 - 3. Current Transformers: Connect secondaries to shorting terminal blocks.
 - 4. Potential Transformers: Include primary and secondary fuses with disconnecting means.

1.02 OVERCURRENT PROTECTIVE DEVICES

- A. Overload Relays:
 - 1. Provide overload relays and, where applicable, associated current elements/heaters, selected according to actual installed motor nameplate data, in accordance with manufacturer's recommendations and NFPA 70; include consideration for motor service factor and ambient temperature correction, where applicable.
 - 2. Inverse-Time Trip Class Rating: Class 20 unless otherwise indicated or required.
 - 3. Trip-free operation.
 - 4. Visible trip indication.
 - 5. Resettable.
 - a. Employ manual reset unless otherwise indicated.
 - b. Do not employ automatic reset with two-wire control.

END OF SECTION

SECTION 26 2923
VARIABLE-FREQUENCY MOTOR CONTROLLERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Variable Frequency Drive Units

1.02 RELATED REQUIREMENTS

- A. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. NEMA ICS 3 - Industrial Control and Systems: Medium Voltage Controllers Rated 2001 to 7200 Volts AC; 2005 (Reaffirmed 2010).
- B. NEMA ICS 7.1 - Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable Speed Drive Systems; 2006.
- C. NEMA ICS 7 - Industrial Control and Systems: Adjustable-Speed Drives; 2006.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- E. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 508 - Underwriters Laboratory Inc.
- H. IEEE 519 - Standard Practices and Requirements for Harmonic Control in Electrical Power Systems.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.
- C. Shop Drawings: Indicate front and side views of enclosures with overall dimensions and weights shown; conduit entrance locations and requirements; and nameplate legends.

1.05 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.
- C. The VFD and all associated optional equipment shall be UL listed or recognized.
- D. The VFD shall contain a UL label attached.
- E. The VFD shall be factory pre-wired, assembled, and tested as a complete package.
- F. All inspection and testing procedures shall be developed and controlled under the guidelines of the Supplier's quality system and must be registered to ISO 9001.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Source Limitations: Furnish variable frequency motor controllers and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 DESCRIPTION

- A. Variable Frequency Controllers: Enclosed controllers suitable for operating the indicated loads, in compliance with requirements of NEMA ICS 7. Select unspecified features and options in accordance with NEMA ICS 3.1.
 - 1. Employ microprocessor-based inverter logic isolated from power circuits.
 - 2. Employ pulse-width-modulated inverter system.
 - 3. Design for ability to operate controller with motor disconnected from output.
- B. Enclosures: NEMA 250, Type 1, suitable for equipment application in places regularly open to the public.
- C. Finish: Manufacturer's standard enamel.

2.03 OPERATING REQUIREMENTS

- A. Rated Input Voltage: 480 volts, three phase, 60 Hertz.
 - 1. The supply input voltage tolerance shall be $\pm 10\%$ of nominal line voltage.
- B. Motor Nameplate Voltage: 460 volts, three phase, 60 Hertz.
- C. Rated Continuous Amperage Output: Output shall be rated at minimum for connected motor Full Load Amps operating at a minimum 1.15 Service Factor.
 - 1. If plans specify a higher drive output then size drive based on plans.
- D. Displacement Power Factor:
 - 1. Six Pulse VFD; Between 1.0 and 0.95, lagging, over entire range of operating speed and load.
- E. Minimum Efficiency at Full Load: 96.5 percent.
- F. Operating Ambient without derating: 0 °C to 40 °C (32 °F to 104 °F) .
- G. Operating relative humidity: 5% to 95% non-condensing.
- H. Operating elevation shall be up to 1000 Meters (3,300 ft) without drating.
- I. Systems rated at Normal Duty loads shall provide 110% overload capability for up to one minute and 150% for up to 3 seconds.
- J. Systems rated at Heavy Duty loads shall provide 150% overload capability for up to one minute and 180% for up to 3 seconds.
- K. Input Control Signal: Communication; EtherNet/IP as primary control means.
 - 1. Shall utilize hardwired Input Control Signals for Hand operation.
 - 2. Shall utilize hardwired Input Control Signals when operating in backup mode.
- L. Safety stop circuit: Hard wired input to disable drive from all operation.

2.04 VARIABLE FREQUENCY DRIVE UNITS

- A. Features
 - 1. Variable Frequency Controllers: Enclosed controllers suitable for operating the indicated loads, in compliance with requirements of NEMA ICS 7. Select unspecified features and options in accordance with NEMA ICS 3.1.
 - 2. Hardware
 - a. Utilize diode bridge or SCR bridge on the input rectifier.
 - b. Utilize DC bus inductor on all six-pulse VFD's only.
 - c. Utilize switching logic power supply operating from the DC bus.
 - d. Incorporate phase to phase and phase to ground MOV protection on the AC input line.
 - e. Microprocessor based inverter logic shall be isolated from power circuits.
 - f. Utilize latest generation IGBT inverter sections.
 - g. Battery receptacle for Lithium battery power to the Real Time Clock.
 - h. Ethernet port for direct network cable connections.
 - i. Additional DPI port for handheld and remote HIM options.
 - j. Dedicated Digital Input for hardware enable.
 - k. Conformal coated printed circuit boards.
 - 3. Control Logic
 - a. Ability to operate controller with motor disconnected from output.

- b. Design to attempt five automatic restarts following fault condition before locking out and requiring manual restart.
 - c. Provide a controlled shut down, when properly protected, with no component failure in the event of an output phase to phase or phase to ground short circuit. Provide annunciation of the fault condition.
 - d. Provide multiple programmable stop modes including Ramp, Coast, DC-Brake, Ramp-to-Hold, Fast Braking, and Current Limit Stop.
 - e. Provide multiple acceleration and deceleration rates.
 - f. Adjustable output frequency up to 650Hz.
4. DeviceLogix Control
- a. Ability to control outputs and manage status information locally within the VFD.
 - b. Ability to function stand-alone or complimentary to supervisory control.
 - c. Ability to speed reaction time by processing in the VFD.
 - d. Ability to provide scaling, selector switches, or other data manipulations not already built into the VFD.
 - e. Ability to read inputs/write outputs and exclusively control the VFD.
 - f. Ability to provide an option for decision making if communications is lost with main controller.
 - g. Ability to control other VFD's via a peer-to-peer EtherNet/IP network.
 - h. Ability to write programs off-line.
5. Motor Control Modes
- a. Selectable Sensorless Vector, Flux Vector, V/Hz, and Adjustable Voltage Control modes selectable through programming.
 - b. The drive shall be supplied with a Start-up and Auto-tune mode.
 - c. The V/Hz mode shall be programmable for fan curve or full custom patterns.
 - d. Capable of Open Loop V/Hz.
6. Current Limit
- a. Programmable current limit from 20 to 160% of rated output current.
 - b. Current limit shall be active for all drive states: accelerating, constant speed, and decelerating.
 - c. The drive shall employ PI regulation with an adjustable gain for smooth transition in and out of current limit.
7. Acceleration / Deceleration
- a. Accel/Decel settings shall provide separate adjustments to allow either setting to be adjusted from 0-3600 seconds.
 - b. A second set of remotely selectable accel/decel settings shall be accessible through digital inputs.
8. Speed Profiles
- a. Programming capability shall allow the user to produce speed profiles with linear acceleration/deceleration or "S Curve" profiles that provide changing accel/decel rates.
 - b. S Curve profiles shall be adjustable.
9. Adjustments
- a. A digital interface can be used for all set-up, operation and adjustment settings.
 - b. All adjustments shall be stored in nonvolatile memory (EEPROM).
 - c. No potentiometer adjustments shall be required.
 - d. EEPROM memory for factory default values shall be provided.
 - e. Software must be available for trending and diagnostics, as well as online and offline programming functionality.
10. Process PID Control
- a. The drive shall incorporate an internal process PI regulator with proportional and integral gain adjustments as well as error inversion and output clamping functions.
 - b. The feedback shall be configurable for normal or square root functions. If the feedback indicates that the process is moving away from the set-point, the regulator shall adjust the drive output until the feedback equals the reference.
 - c. Process control shall be capable of being enabled or disabled with a hardwire input. Transitioning in and out of process control shall be capable of being tuned for faster response by preloading the integrator.

- d. Protection shall be provided for a loss of feedback or reference signal.
- 11. Skip Frequencies
 - a. Three adjustable set points that lock out continuous operation at frequencies which may produce mechanical resonance shall be provided.
 - b. The set points shall have a bandwidth adjustable from Maximum Reverse Speed to Maximum Forward Speed.
- 12. Fault Reset / Run
 - a. The drive shall provide up to nine automatic fault reset and restarts following a fault condition before locking out and requiring manual restart.
 - b. The automatic mode shall not be applicable to a ground fault, shorted output faults and other internal microprocessor faults.
 - c. The time between restarts shall be adjustable from 0.5 seconds to 30 seconds.
- 13. Run on Power Up
 - a. A user programmable restart function shall be provided to allow restart of the equipment after restoration of power after long duration power outages. Restart time dependent on presence of incoming signal.
- 14. Fault Memory
 - a. The last 32 fault codes shall be stored and time stamped in a fault buffer.
 - b. Information about the drive's condition at the time of the last fault such as operating frequency, output current, dc bus voltage and twenty-seven other status conditions shall be stored.
 - c. A power-up marker shall be provided at each power-up time to aid in analyzing fault data.
 - d. The last 32 alarm codes shall be stored and time stamped for additional troubleshooting reference.
- 15. Overload Protection
 - a. The drive shall provide internal class 10 adjustable overload protection.
 - b. Overload protection shall be speed sensitive and adjustable.
 - c. A viewable parameter shall store the overload usage.
- 16. Auto Economizer
 - a. An auto economizer feature shall be available to automatically reduce the output voltage when the drive is operating in an idle mode (drive output current less than programmed motor FLA). The voltage shall be reduced to minimize flux current in a lightly loaded motor thus reducing kW usage.
 - b. When the load increases, the drive shall automatically return to normal operation.
- 17. Terminal Blocks
 - a. Separate terminal blocks shall be provided for control and power wiring.
 - b. I/O terminal blocks shall be removable with wiring in place.
- 18. Flying Start
 - a. The drive shall be capable of determining the speed and direction of a spinning motor and adjust its output to "pick-up" the motor at the rotating speed.
- 19. Inputs and Outputs
 - a. The Input / Output option modules shall consist of both analog and digital I/O.
 - b. No jumpers or switches shall be required to configure digital inputs and outputs.
 - c. All digital input and output functions shall be fully programmable.
 - d. The control terminal blocks shall be rated for 115V AC
 - e. Inputs shall be optically isolated from the drive control logic.
 - f. The control interface card shall provide input terminals for access to fixed drive functions that include start, stop, external fault, speed, and enable.
 - g. The VFD shall be capable of supporting up to 7 analog inputs, 7 analog outputs, 21 digital inputs, 7 relay outputs, 7 transistor outputs, and 3 positive temperature coefficient (PTC) inputs.
 - h. The Input / Output option modules shall have the following features:
 - 1) Analog Inputs:
 - (a) Quantity two (2) differentially isolated, $\pm 10V$ (bi-polar), 88k ohm input impedance, 11 bit plus sign.
 - (b) Analog inputs shall be user programmable for a variety of uses including frequency command and process loop input. Analog inputs shall be user

programmable for function scaling (including invert), offset, signal loss detect, and square root.

- 2) Analog Outputs:
 - (a) Quantity two (2) $\pm 10V$ (bi-polar) / 11 bit & sign, 2k ohm minimum load, 4-20 mA, 11 bit plus sign, 400 ohm maximum load.
 - (b) The analog output shall be user programmable to be proportional to one of fourteen process parameters including output frequency, output current, encoder feedback, and output power.
 - (c) Programming shall be available to select either absolute or signed values of these parameters.
- 3) Digital Inputs:
 - (a) Quantity of six (6) digital inputs rated 24V DC/155V AC.
 - (b) All inputs shall be individually programmable for multiple functions including; Start, Run, Stop, Auxiliary Fault, Speed Select, Jog and Process PI functions.
- 4) Digital Outputs:
 - (a) At least one (1) relay output (N.O or N.C.).
 - (b) For 240V AC or 24V DC, N.O. contact output ratings shall be 2 amp maximum, general purpose (inductive)/resistive N.C. contact output ratings shall be 2 amp maximum, resistive only.
 - (c) Relays shall be programmable to multiple conditions including: Fault, Alarm, At Speed , Drive Ready, and PI Excess Error.
 - (d) Timers shall be available for each output to control the amount of time, after the occurring event that the output relay actually changes state.
 - (e) At least one (1) transistor output.
 - (f) For 24V DC, transistor output rating shall be 1 amp max, Resistive.
20. Reference Signals
 - a. The drive shall be capable of using the following input reference signals:
 - 1) Analog Inputs.
 - 2) Preset speeds.
 - 3) Remote Potentiometer
 - 4) Digital MOP
 - 5) Human Interface Module.
 - 6) Communications Modules.
21. Loss of Reference
 - a. The drive shall be capable of sensing reference loss conditions.
 - b. In the event of loss of the reference signal, the drive shall be user programmable to the following:
 - 1) Fault the drive and coast to stop.
 - 2) Issue a minor fault.
 - 3) Alarm and maintain last reference.
 - c. When using a communications network to control the drive, the communications adapter shall have these configurable responses to network disruptions and controller idle (fault or program) conditions:
 - 1) Fault.
 - 2) Stop.
 - 3) Zero Data.
 - 4) Hold Last State.
 - 5) Send Fault Configuration.
22. Metering
 - a. At a minimum, the following parameters shall be accessible through the Human Interface Module, if installed:
 - 1) Output Current in Amps.
 - 2) Output Voltage in Volts.
 - 3) Output Power in kW.
 - 4) Elapsed MWh.
 - 5) DC Bus Voltage.
 - 6) Frequency.

- 7) Heatsink Temperature.
- 8) Last eight faults.
- 9) Elapsed Run Time.
- 10) IGBT Temperature.
- 23. Faults
 - a. At a minimum, the following faults shall be accessible through the Human Interface Module:
 - 1) Power Loss.
 - 2) Undervoltage.
 - 3) Overvoltage.
 - 4) Motor Overload.
 - 5) Heat Sink Over-temperature.
 - 6) Maximum Retries.
 - 7) Phase to Phase and Phase to Ground Faults.
- 24. Predictive Diagnostics.
 - a. At a minimum, the following predictive diagnostic features shall be provided:
 - 1) Relay Output Life Cycles based on load type and amps.
 - 2) Hours of Fan Life based on load and ambient temperature.
 - 3) Motor Bearing life based on expected hours of use.
 - 4) Motor Lubrication schedule based on hours of use.
 - 5) Machine Bearing life based on expected hours of use.
- 25. Real-Time Clock
 - a. Shall be capable of providing time stamped events.
 - b. Shall have the ability to be set locally or via a remote controller.
 - c. Shall provide the ability to be programmable for month, day, year and local time zones in HH:MM:SS.
- B. Harmonic Mitigation Techniques.
 - 1. Drive Input Line Reactor
 - a. Provide a drive input line reactor mounted within the drive system enclosure for drives that are less than 100 horsepower.
 - b. The line reactor shall meet the following specifications:
 - 1) The construction shall be iron core with an impedance of 3 percent.
 - 2) The winding shall be copper or aluminum wound.
 - 3) The insulation shall be Class H with a 115 °C rise over 50 °C ambient.
 - 4) The unit shall be rated for system voltage, ampacity, and frequency.
- C. Output Filtering
 - 1. 3% output line reactor.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surface is suitable for controller installation.
- B. Do not install controller until building environment can be maintained within the service conditions required by the manufacturer.
- C. Verify that field measurements are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install in accordance with NEMA ICS 7.1 and manufacturer's instructions.
- B. Provide required support and attachment in accordance with Section 26 0529.
- C. Tighten accessible connections and mechanical fasteners after placing controller.
- D. Identify variable frequency controllers in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

- A. Start-up Service
 - 1. At a minimum, the start-up shall include:
 - a. Perform pre-Power Check.
 - b. Megger Motor Resistances: Phase-to-Phase and Phase-to-Ground

- c. Verify system grounding per manufacturer's specifications.
 - d. Verify power and signal grounds.
 - e. Check connections.
 - f. Check environment.
- 2. Drive Power-up and Commissioning:
 - a. Measure Incoming Power Phase-to-Phase and Phase-to-Ground.
 - b. Measure DC Bus Voltage.
 - c. Measure AC Current Unloaded and Loaded.
 - d. Measure Output Voltage Phase-to-Phase and Phase-to-Ground.
 - e. Verify input reference signal.
- 3. All measurements shall be recorded.
- 4. Drive shall be tuned for system operation.
- 5. Drive parameter listing shall be provided.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.17. The insulation-resistance test on control wiring listed as optional is not required.

3.04 ADJUSTING

- A. Make final adjustments to installed controller to assure proper operation of load system. Obtain performance requirements from installer of driven loads.

3.05 CLOSEOUT ACTIVITIES

- A. Demonstrate operation of controllers in automatic and manual modes.
- B. Training
 - 1. Provide a quantity of one 2-hour session of on-site instruction.
 - 2. The basis of the training shall be the variable frequency drive, the engineered drawings, and the user manual. At a minimum the training shall:
 - a. Review the engineered drawings identifying the components shown on the drawings.
 - b. Review starting / stopping and speed control options for the controllers.
 - c. Review operation of the HIM for programming and monitoring of the VFD.
 - d. Review the maintenance requirements of the variable frequency drive.
 - e. Review safety concerns with operating the variable frequency drives.

END OF SECTION

SECTION 26 2924

SOLID-STATE REDUCED VOLTAGE CONTROLLER UNIT (SOFTSTART)

PART 1 GENERAL

1.01 SECTION INCLUDES

1.02 SOLID-STATE REDUCED-VOLTAGE CONTROLLER UNIT

1.03 ENCLOSED SOLID-STATE REDUCED-VOLTAGE CONTROLLER

A. RELATED REQUIREMENTS

1. Section 03 3000- <<134; or _____>>: Housekeeping pads.
2. Section 26 0548 – Vibration and Seismic Controls for Electrical Systems. Includes requirements for the seismic qualification of equipment specified in this section.
3. Section 26 0553 – Identification products and requirements.
4. Section 26 2813- Fuses

1.04 REFERENCE STANDARDS

- A. NEMA ICS 7 – Industrial Control and Systems: Adjustable-Speed Drives; 2006
- B. NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum); 2014
- C. NETA ATS – Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013
- D. NFPA 70 – National Electrical Code; Most Recent Edition Adopted by authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL508 – Underwriters Laboratory Inc.
- F. IEEE519 – Standard Practices and Requirements for Harmonic Control in Electrical Power Systems.

1.05 SUBMITTALS

- A. Refer to Section _01 3000 – Administrative Requirements, for submittal procedures.
- B. Manufacturer Drawings
 1. Elevation drawings showing dimensional information
 2. Structure descriptions showing
 - a. Enclosure ratings
 - b. Fault ratings
 - c. Other information as required for approval
 3. Conduit entrance locations
 4. Unit descriptions including amperage ratings, frame sizes, trip settings, pilot devices, etc.
 5. Nameplate Information
 6. Schematic wiring diagrams
- C. Product Data
 1. Publications on solid-state reduced-voltage controller.
 2. Data sheets and publications on all major components including but not limited to the following
 - a. Contactors
 - b. Circuit breakers and fuse information including time current characteristics
 - c. Control power transformers
 - d. Pilot devices
 - e. Relays
- D. Specification Response
 1. Detailed response to this specification showing where in the literature each requirement is satisfied.
 2. All clarifications and exceptions must be clearly identified.
- E. Installation Instructions
 1. Provide a copy of the manufacturer's installation instructions which includes the following:
 - a. Receiving, handling, and storage instructions
- F. FINAL SUBMITTALS

1. The contractor shall provide certification that the solid-state reduced-voltage controller has been installed in accordance with the manufacturer's instructions.
2. The contractor shall provide certification that the Contractor has properly adjusted any timing devices required in the starting circuitry.
3. Final Drawings
 - a. The manufacturer shall provide final drawings reflecting the "As-Shipped" state of the installed equipment.
 - b. Manufacturer drawings shall be provided in DWG format.
 - c. Manufacturer drawings do not need to be stamped is a drawing schedule is provided that lists the drawing numbers, revision levels, and status of drawings (Preliminary, Approval, Final, etc.)
 - d. The contractor shall be responsible for making changes to the "As-Shipped" drawings from the manufacturer to reflect any field modifications.
4. Maintenance Data
 - a. Solid Stat Reduced-Voltage controller installation instructions and User Manual.
 - b. Installation / Operation instructions for major components.
 - c. Parameter Data Listing
 - d. Solid State reduced-voltage controller spare parts listing and pricing.
 - e. Include name and phone number for local distributor for the spare parts.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: The manufacturer shall have a minimum of 25 years of experience in the manufacture of solid-state reduced-voltage controllers.
- B. Products: Listed, classified, and labeled as suitable for the application.
- C. The controller and all associated optional equipment shall be cULus Listed.
- D. The controller, with enclosure shall be factory pre-wired, assembled, and tested as a complete package.
- E. The manufacturer shall maintain factory trained and authorized service facilities within 100 miles of the project and shall have a demonstrated record of service for at least the previous ten years.
- F. Support personnel are to be direct employees of the manufacturer and be available 24 hours per day through a toll-free number.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. The contractor shall coordinate the shipping of equipment with the manufacturer.
- B. The contractor shall store the equipment in a clean and dry space.
- C. The contractor shall protect the units from dirt, water, construction debris and traffic.
- D. During storage the contractor shall connect internal space heaters (if specified) with temporary power.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Source limitations: Furnish reduced-voltage controllers and associated components produced by and obtain from a single supplier.

2.02 OPERATING REQUIREMENTS

- A. The solid-state reduced-voltage controller shall accept an input voltage: from 460 three-phase, 60 Hertz. The supply input voltage tolerance shall be plus 10 percent or minus 15 percent.
- B. The solid-state reduced-voltage controller shall have a minimum short circuit current rating of 65 kA when protected with a type CC/J/L fuses (up to 600V).
- C. Environmental Ratings
 1. Storage ambient temperature range: -25...+ 75°C.
 2. Operating ambient temperature range: 0... 40°C.
 3. The relative humidity range: 5% to 95% non-condensing.
 4. Operating elevation: up to 2000 meters.

2.03 SOLID-STATE REDUCED-VOLTAGE CONTROLLER UNIT DESIGN

- A. The open-type controller device shall consist of a power structure and a logic component.
- B. Power Structure
 - 1. The family of devices must be available from 1...480 A in a line connection
 - 2. The power structure shall include an electro-mechanical SCR bypass device.
 - 3. The power structure shall include built-in 3-phase current monitoring and overload protection.
 - 4. There shall be a current transformer on each phase of the device for current measurements.
 - 5. For ratings 1...480 A, SCRs shall have the following minimum repetitive peak inverse voltage ratings
 - a. 1400V for units rated 200...480V
 - b. 1600V for units rated 200...600V
- C. Logic Component
 - 1. The logic component shall be an integral part of the power structure so it cannot be removed and misplaced.
 - 2. The control module shall provide digital microprocessor control and supervision of all controller operation, including pulse firing of the SCRs.
 - 3. The control module shall consist of the following.
 - a. Self-tuning power supply accepting control power input from 100...240V AC or 24V AC/DC, 50/60 Hz.
 - b. Logic control circuitry incorporating a latch circuit for three-wire control.
 - c. Input / output circuitry
 - d. DIP switches are to be used for secure setting of the setup parameters
 - e. A POT setting is to be used for setting up the motor FLA
 - f. Integrated LED to indicate fault and running status
 - 4. The control terminals shall have the following characteristics
 - a. The control terminal wiring connector shall be easily accessible and located on the front top of the device.
 - b. The terminals shall be UL rated for 300 Volts, 10 Amps maximum.
 - c. The terminals are UL Recognized to accept a maximum of two (2) wires rated #24...#14 AWG.

2.04 SOLID-STATE REDUCED-VOLTAGE CONTROLLER UNIT MODES

- A. Starting Modes
 - 1. Soft start with Selectable Kickstart
 - a. Programmable initial torque value of 15...65% of locked rotor torque.
 - b. Programmable acceleration ramp time from 0...30 seconds.
 - c. A selectable kickstart, or boost, shall be provided at the beginning of the voltage ramp. The kickstart shall provide a current pulse of 550% of the full load current. The kickstart time shall be adjustable from 0...2 seconds.
 - 2. Current limit start
 - a. Provides means of limiting the maximum starting current
 - b. Adjustable from 150...450% of motor full load current.
- B. Stopping Modes
 - 1. Soft stop
 - a. The soft stop option shall provide a voltage ramp-down for an extended motor stopping time.
 - b. Soft stop shall be initiated by a dedicated Soft Stop input. A coast-to-rest stop shall still be possible with a separate stop input.
 - c. Programmable voltage ramp down time from 100...300% of the start time selected.
 - d. The load shall stop when the motor voltage drops to a point where the load torque is greater than the motor torque

2.05 SOLID-STATE REDUCED-VOLTAGE CONTROLLER UNIT FEATURES

- A. Overload Protection
 - 1. Shall meet applicable standards as a motor thermal protective device.

2. Shall utilize three-phase current sensing. The use of two current transformers shall be unacceptable.
 3. Selectable trip classes of 10, 15, and 20 shall be provided as standard.
 4. Electronic thermal memory shall provide enhanced motor protection.
- B. Digital I/O
1. A minimum of two (2) auxiliary contacts shall be provided for customer use
 2. The contacts shall be rated for 240V AC maximum.
 3. Contact configurations shall be programmable and contain the following configurations:
 - a. Aux1 (N.O.) Normal/Up-to-Speed
 - b. Aux 2 (N.O./N.C.) Normal/Up-to-Speed
 - c. Fault Aux (N.O.) Fault
- C. Input Control Signal: Communication; EtherNet/IP as primary control means.
1. Shall utilize hardwired Input Control Signals for Hand operation.
 2. Shall utilize hardwired Input Control Signals when operating in backup mode.
- D. Protection and Diagnostics
1. Pre-start line fault advising of shorted SCR or missing load connection with phase indication.
 2. Phase imbalance protection
 3. Running line fault advising power loss, shorted SCR, or missing load connection.
 4. SCR Over temperature
 5. The overload is the only defeatable protection provided as standard with the controller.
 6. When fault conditions are detected, the controller shall inhibit starting or shutting down SCR pulse firing.
 7. An auxiliary contact that is user programmable for fault indication shall be provided for customer use.

PART 3 EXECUTION

3.01 FIELD INSTALLATION AND TESTING

- A. Install in accordance with NEMA ICS 7.1 and manufacturer's instructions.
- B. Provide required support and attachment in accordance with Section 26 0529
- C. Provide fuses in fusible switches and control circuit per design documents.
- D. Identify motor controllers <<in accordance with Section 26 0859; in accordance with Section ____; ____; or None – N/A>>.

3.02 FIELD QUALITY CONTROL

- A. Start-up personnel shall be direct employees of the manufacturer and shall be degreed engineers.
- B. The contractor shall verify all field measurements prior to the fabrication of the solid-state reduced-voltage controller.
- C. At a minimum, the start-up service shall include:
 1. Pre-power check
 - a. Megger motor resistance: phase-to-phase and phase-to-ground
 - b. Verify system grounding per manufacturer's specifications
 - c. Verify power and signal grounds
 - d. Check connections
 - e. Check environment
 2. Power-up and commissioning
 - a. Measure incoming power phase-to-phase and phase-to-ground
 - b. Measure DC bus voltage
 - c. Measure AC current unloaded and loaded
 - d. Measure output voltage phase-to-phase and phase-to-ground
 3. Recording of all measurements
 4. Tuning for system operation
 5. Providing a parameter list

3.03 CLOSEOUT ACTIVITIES

A. TRAINING

1. Manufacturer to provide a quantity of one (1) session of on-site instruction.
2. The service engineer shall perform training.
3. The instruction shall include the operational and maintenance requirements of the controller
4. The basis of the training shall be the installed controller, the engineered drawings and the user manual. At a minimum, the training shall do the following:
 - a. Review of the engineered drawings identifying the components shown on the drawings.
 - b. Review starting / stopping options for the controller.
 - c. Review operation of the Human Interface for programming and monitoring of the controller.
 - d. Review the maintenance requirements of the controller.
 - e. Review safety concerns with operating the controller.

B. SPARE MATERIALS

1. Provide one (1) set of three (3) of each size power fuse utilized.
2. Provide spares equal to 10 percent of the installed quantity for primary and secondary control power fuses.
3. Provide one (1) spare control relay for each unique relay utilized on the project.

C. WARRANTY

1. The manufacturer shall provide their standard parts warranty for eighteen (18) months from the date of shipment or twelve (12) months from the date of being energized, whichever occurs first.
2. The manufacturer shall confirm this warranty as part of the submittal.
3. This warranty applies only to stand alone solid-state reduced-voltage controllers.

END OF SECTION.

SECTION 26 3600
TRANSFER SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Transfer switches for low-voltage (600 V and less) applications and associated accessories:
 - 1. Automatic transfer switches.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- C. NEMA ICS 10 Part 1 - Industrial Control and Systems Part 1: Electromechanical AC Transfer Switch Equipment; 2005.
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2013.
- E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 1008 - Transfer Switch Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate compatibility of transfer switches to be installed with work provided under other sections or by others.
 - 2. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
 - 3. Coordinate arrangement of equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Coordinate the work with placement of supports, anchors, etc. required for mounting.
 - 5. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features.
- C. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing all factory and field connections.

1.06 QUALITY ASSURANCE

- A. Comply with the following:
 - 1. NFPA 70 (National Electrical Code).
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store transfer switches in accordance with manufacturer's instructions.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's instructions to avoid damage to transfer switch components, enclosure, and finish.

1.08 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Transfer Switches - Other Acceptable Manufacturers:
 - 1. ABB/GE: www.geindustrial.com/#sle.
 - 2. ASCO Power Technologies: www.ascopower.com.
 - 3. Eaton Corporation: www.eaton.com/#sle.
 - 4. Thomson Power Systems: www.thomsonps.com/#sle.
 - 5. Same as manufacturer of engine generator(s) used for this project.
 - a. Cummins.
- B. Products other than basis of design are subject to compliance with specified requirements and prior approval of Engineer. By using products other than basis of design, Contractor accepts responsibility for costs associated with any necessary modifications to related work, including any design fees.
- C. Source Limitations: Furnish transfer switches and accessories produced by a single manufacturer and obtained from a single supplier.

2.02 TRANSFER SWITCHES

- A. Provide complete power transfer system consisting of all required equipment, conduit, boxes, wiring, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Applications:
 - 1. Utilize open transition transfer unless otherwise indicated or required.
- D. Construction Type: Only "contactor type" (open contact) transfer switches are acceptable. Do not use "breaker type" (enclosed contact) transfer switches.
- E. Automatic Transfer Switch:
 - 1. Transfer Switch Type: Automatic transfer switch.
 - 2. Transition Configuration: Open-transition (no neutral position).
 - 3. Voltage: 480/277.
 - 4. Ampere Rating: 1200.
 - 5. Neutral Configuration: Solid neutral (unswitched), except as indicated.
- F. Comply with NEMA ICS 10 Part 1, and list and label as complying with UL 1008 for the classification of the intended application (e.g. emergency, optional standby).
- G. Do not use double throw safety switches or other equipment not specifically designed for power transfer applications and listed as transfer switch equipment.
- H. Load Classification: Classified for total system load (any combination of motor, electric discharge lamp, resistive, and tungsten lamp loads with tungsten lamp loads not exceeding 30 percent of the continuous current rating) unless otherwise indicated or required.
- I. Switching Methods:
 - 1. Open Transition:
 - a. Provide break-before-make transfer without a neutral position that is not connected to either source, and with interlocks to prevent simultaneous connection of the load to both sources.
 - 2. Obtain control power for transfer operation from line side of source to which the load is to be transferred.
- J. Service Conditions: Provide transfer switches suitable for continuous operation at indicated ratings under the service conditions at the installed location.
- K. Enclosures:
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:

- a. Indoor Clean, Dry Locations: Type 12.
- 2. Finish: Manufacturer's standard unless otherwise indicated.
- L. Short Circuit Current Rating:
 - 1. Withstand and Closing Rating: Provide transfer switches, when protected by the supply side overcurrent protective devices to be installed, with listed withstand and closing rating not less than 65,000 rms symmetrical amperes.
- M. Automatic Transfer Switches:
 - 1. Description: Transfer switches with automatically initiated transfer between sources; electrically operated and mechanically held.
 - 2. Control Functions:
 - a. Automatic mode.
 - b. Test Mode: Simulates failure of primary/normal source.
 - c. Voltage and Frequency Sensing:
 - 1) Undervoltage sensing for each phase of primary/normal source; adjustable dropout/pickup settings.
 - 2) Undervoltage sensing for alternate/emergency source; adjustable dropout/pickup settings.
 - 3) Underfrequency sensing for alternate/emergency source; adjustable dropout/pickup settings.
 - d. Outputs:
 - 1) Contacts for engine start/shutdown (except where direct generator communication interface is provided).
 - 2) Auxiliary contacts; one set(s) for each switch position.
 - e. Adjustable Time Delays:
 - 1) Engine generator start time delay; delays engine start signal to override momentary primary/normal source failures.
 - 2) Transfer to alternate/emergency source time delay.
 - 3) Retransfer to primary/normal source time delay.
 - 4) Engine generator cooldown time delay; delays engine shutdown following retransfer to primary/normal source to permit generator to run unloaded for cooldown period.
 - f. In-Phase Monitor (Open Transition Transfer Switches): Monitors phase angle difference between sources for initiating in-phase transfer.
 - 1) Shall have ability to automatically override in-phase monitor and initiate transfer if not in-phase within 120 seconds.
 - g. Engine Exerciser: Provides programmable scheduled exercising of engine generator selectable with or without transfer to load; provides memory retention during power outage.
 - 3. Status Indications:
 - a. Connected to alternate/emergency source.
 - b. Connected to primary/normal source.
 - c. Alternate/emergency source available.
 - 4. Automatic Sequence of Operations:
 - a. Upon failure of primary/normal source for a programmable time period (engine generator start time delay), initiate starting of engine generator where applicable.
 - b. When alternate/emergency source is available, transfer load to alternate/emergency source after programmable time delay.
 - c. When primary/normal source has been restored, retransfer to primary/normal source after a programmable time delay. Bypass time delay if alternate/emergency source fails and primary/normal source is available.
 - d. Where applicable, initiate shutdown of engine generator after programmable engine cooldown time delay.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that the ratings and configurations of transfer switches are consistent with the indicated requirements.

- B. Verify that rough-ins for field connections are in the proper locations.
- C. Verify that mounting surfaces are ready to receive transfer switches.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Arrange equipment to provide minimum clearances and required maintenance access.
- D. Install transfer switches plumb and level.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Prepare and start system in accordance with manufacturer's instructions.
- C. Automatic Transfer Switches:
 - 1. Inspect and test in accordance with NETA ATS, except Section 4.
 - 2. Perform inspections and tests listed in NETA ATS, Section 7.22.3. The insulation-resistance tests listed as optional are not required.
- D. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

3.04 CLOSEOUT ACTIVITIES

- A. Demonstration: Demonstrate proper operation of transfer switches to Owner, and correct deficiencies or make adjustments as directed.

END OF SECTION

SECTION 26 4300
SURGE PROTECTIVE DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surge protective devices for service entrance locations.
- B. Surge protective devices for distribution locations.
- C. Surge protective devices for branch panelboard locations.

1.02 RELATED REQUIREMENTS

- A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

1.03 ABBREVIATIONS AND ACRONYMS

- A. SPD: Surge Protective Device.

1.04 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.
- C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate size and location of overcurrent device compatible with the actual surge protective device and location to be installed. Notify Engineer/Architect of any conflicts or deviations from Contract Documents to obtain direction prior to ordering equipment.

1.06 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include detailed component information, voltage, surge current ratings, repetitive surge current capacity, voltage protection rating (VPR) for all protection modes, maximum continuous operating voltage (MCOV), nominal discharge current (I-n), short circuit current rating (SCCR), connection means including any required external overcurrent protection, enclosure ratings, outline and support point dimensions, weight, service condition requirements, and installed features.
- C. Shop Drawings: Include wiring diagrams showing all factory and field connections with wire and circuit breaker/fuse sizes.

1.07 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.08 DELIVERY, STORAGE, AND PROTECTION

- A. Store in a clean, dry space in accordance with manufacturer's written instructions.

1.09 FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.10 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Manufacturer's Warranty: Provide minimum five year warranty covering repair or replacement of surge protective devices showing evidence of failure due to defective materials or workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Field-installed, Externally Mounted - Current Technology; a company of ABB; Model #SL3-125-480-3Y-MDB-M4E-F; www.tnbpowersolutions.com.
- B. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SURGE PROTECTIVE DEVICES - GENERAL REQUIREMENTS

- A. Description: Factory-assembled surge protective devices (SPDs) for 60 Hz service; listed, classified, and labeled as suitable for the purpose intended; system voltage as indicated on the drawings.
- B. Unless otherwise indicated, provide field-installed, externally-mounted SPDs.
- C. List and label as complying with UL 1449, Type 1 when connected on line side of service disconnect overcurrent device and Type 1 or 2 when connected on load side of service disconnect overcurrent device.
- D. Protected Modes:
 - 1. Wye Systems: L-N, L-G, N-G, L-L.
- E. UL 1449 Voltage Protection Ratings (VPRs):
 - 1. 480Y/277V System Voltage: Not more than 1,500 V for L-N, L-G, and N-G modes and 2,000 V for L-L mode.
- F. UL 1449 Maximum Continuous Operating Voltage (MCOV): Not less than 115% of nominal system voltage.
- G. Enclosure Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - 1. Indoor clean, dry locations: Type 12.

2.03 SURGE PROTECTIVE DEVICES FOR DISTRIBUTION LOCATIONS

- A. Distribution locations include SPDs connected to distribution panelboards, motor control centers, and busway.
- B. Surge Protective Device:
 - 1. Protection Circuits: Field-replaceable modular.
 - 2. Surge Current Rating: Not less than 120 kA per mode/240 kA per phase.
 - 3. UL 1449 Nominal Discharge Current (I-n): 20 kA.
 - 4. UL 1449 Short Circuit Current Rating (SCCR): Not less than the available fault current at the installed location as indicated on the drawings.
 - 5. Diagnostics:
 - a. Protection Status Monitoring: Provide indicator lights to report the protection status for each phase.
 - b. Alarm Notification: Provide indicator light and audible alarm to report alarm condition. Provide button to manually silence audible alarm.
 - c. Remote Status Monitoring: Provide Ethernet/IP communication for remote annunciation of status.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that the service voltage and configuration marked on the SPD are consistent with the service voltage and configuration at the location to be installed.
- C. Verify system grounding and bonding is in accordance with Section 26 0526, including bonding of neutral and ground for service entrance and separately derived systems where applicable. Do not energize SPD until deficiencies have been corrected.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).

- B. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- C. Install conductors between SPD and equipment terminations as short and straight as possible, not exceeding manufacturer's recommended maximum conductor length. Breaker locations may be reasonably rearranged in order to provide leads as short and straight as possible. Twist conductors together to reduce inductance.
- D. Do not energize SPD until bonding of neutral and ground for service entrance and separately derived systems is complete in accordance with Section 26 0526 where applicable. Replace SPDs damaged by improper or missing neutral-ground bond.

3.03 CLEANING

- A. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 5100
INTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior luminaires.
- B. Emergency lighting units.
- C. Exit signs.
- D. Ballasts and drivers.
- E. Lamps.

1.02 RELATED REQUIREMENTS

- A. Section 26 0529 - Hangers and Supports for Electrical Systems.
- B. Section 26 0533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts - Supplements; 2011.
- B. IES LM-63 - IESNA Standard File Format for Electronic Transfer of Photometric Data and Related Information; 2002 (Reaffirmed 2008).
- C. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; 2008.
- D. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; 2015, with Errata (2017).
- E. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; 2006.
- F. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.
- G. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2016.
- H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 844 - Luminaires for Use in Hazardous (Classified) Locations; Current Edition, Including All Revisions.
- K. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- L. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- M. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
 - 2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
 - 3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
 - 4. Notify Engineer/Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate dimensions and components for each fixture that is not a standard product of the manufacturer.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
 - 1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.
 - 2. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency in IES LM-63 standard format upon request.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings. Alternate light fixture data sheet shall be submitted to the Engineer for approval prior to bid. No exceptions.

2.02 LUMINAIRES

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Hazardous (Classified) Location Luminaires: Listed and labeled as complying with UL 844 for the classification of the installed location.
- H. LED Luminaires:
 - 1. Components: UL 8750 recognized or listed as applicable.
 - 2. Tested in accordance with IES LM-79 and IES LM-80.
 - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

2.03 EMERGENCY LIGHTING UNITS

- A. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
- B. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

- C. Battery:
 - 1. Size battery to supply all connected lamps, including emergency remote heads where indicated.
- D. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
- E. Provide low-voltage disconnect to prevent battery damage from deep discharge.

2.04 EXIT SIGNS

- A. Description: Internally illuminated exit signs with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
 - 1. Number of Faces: Single or double as indicated or as required for the installed location.
 - 2. Directional Arrows: As indicated or as required for the installed location.
- B. Self-Powered Exit Signs:
 - 1. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
 - 2. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
 - 3. Provide low-voltage disconnect to prevent battery damage from deep discharge.

2.05 BALLASTS AND DRIVERS

- A. Ballasts/Drivers - General Requirements:
 - 1. Electronic Ballasts/Drivers: Inrush currents not exceeding peak currents specified in NEMA 410.
- B. Dimmable LED Drivers:
 - 1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
 - 2. Control Compatibility: Fully compatible with the dimming controls to be installed.

2.06 LAMPS

- A. Manufacturers:
 - 1. GE Lighting: www.gelighting.com.
 - 2. Philips Lighting Co of NA: www.lighting.philips.com.
 - 3. Sylvania: www.sylvania.com
 - 4. Manufacturer Limitations: Where possible, provide lamps produced by a single manufacturer.
- B. Lamps - General Requirements:
 - 1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
 - 2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.
 - 3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
 - 4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the Engineer/Architect to be inconsistent in perceived color temperature.
- C. Lamp Types: As specified for each fixture.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.

- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- D. Provide required support and attachment in accordance with Section 26 0529.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Suspended Luminaires:
 - 1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
 - 2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
- G. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- H. Install accessories furnished with each luminaire.
- I. Bond products and metal accessories to branch circuit equipment grounding conductor.
- J. Emergency Lighting Units:
 - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
- K. Exit Signs:
 - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
- L. Install lamps in each luminaire.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Operate each luminaire after installation and connection to verify proper operation.
- D. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.
- E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Engineer/Architect.

3.04 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Engineer/Architect. Secure locking fittings in place.
- B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Engineer/Architect or authority having jurisdiction.
- C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Engineer/Architect or authority having jurisdiction.

3.05 CLEANING

- A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.06 CLOSEOUT ACTIVITIES

- A. Just prior to Substantial Completion, replace all lamps that have failed.

3.07 SCHEDULE - SEE DRAWINGS

END OF SECTION

SECTION 26 5600
EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Exterior luminaires.
- B. Ballasts.

1.02 RELATED REQUIREMENTS

- A. Section 26 0529 - Hangers and Supports for Electrical Systems.
- B. Section 26 0533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

- A. AASHTO LTS - Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals; American Association of State Highway and Transportation Officials; 6th Edition, with 2015 Interim Revisions.
- B. ANSI C78.379 - American National Standard for Electric Lamps -- Reflector Lamps -- Classification of Beam Patterns; 2006.
- C. ANSI C82.1 - American National Standard for Lamp Ballast - Line Frequency Fluorescent Lamp Ballast; 2004.
- D. ANSI C82.4 - American National Standard for Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type); 2002.
- E. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts - Supplements; 2011.
- F. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; 2008.
- G. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; 2015, with Errata (2017).
- H. IES RP-8 - Roadway Lighting; 2014.
- I. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- J. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems; 2006.
- K. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- L. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- M. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Notify Engineer/Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
- B. Coordination: Furnish bolt templates and pole mounting accessories to installer of pole foundations.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
 - 1. LED Luminaires:

- a. Include estimated useful life, calculated based on IES LM-80 test data.
- D. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.
- B. Any deviation from what is called out in the Light Fixture Schedule requires prior approval from the Engineer.
 - 1. Provide Cut Sheets and Photometrics.
- C. Substitutions: See Section 01 6000 - Product Requirements.

2.02 LUMINAIRES

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. LED Luminaires:
 - 1. Components: UL 8750 recognized or listed as applicable.
 - 2. Tested in accordance with IES LM-79 and IES LM-80.
 - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

2.03 BALLASTS AND DRIVERS

- A. Dimmable LED Drivers:
 - 1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
 - 2. Control Compatibility: Fully compatible with the dimming controls to be installed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.

- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires in accordance with NECA/IESNA 501.
- D. Provide required support and attachment in accordance with Section 26 0529.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- G. Install accessories furnished with each luminaire.
- H. Bond products and metal accessories to branch circuit equipment grounding conductor.
- I. Provide concrete bases for lighting poles at locations indicated, in accordance with Section 03 3000.
- J. Install lamps in each luminaire.
- K. Bond luminaires, metal accessories, and metal poles to branch circuit equipment grounding conductor.

3.03 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Perform field inspection, testing, and adjusting in accordance with Section 01 4000.
- D. Operate each luminaire after installation and connection to verify proper operation.
- E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Engineer/Architect.
- F. Measure illumination levels to verify conformance with performance requirements. Take measurements during night sky, without moon or with heavy overcast clouds effectively obscuring moon.

3.04 ADJUSTING

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Engineer/Architect. Secure locking fittings in place.
- B. Aim and adjust luminaires to provide illumination levels and distribution indicated on Drawings.

3.05 CLEANING

- A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.
- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosure.
- D. Clean photometric control surfaces as recommended by manufacturer.
- E. Clean finishes and touch up damage.

3.06 CLOSEOUT ACTIVITIES

3.07 PROTECTION

- A. Protect installed luminaires from subsequent construction operations.

3.08 SCHEDULE - SEE DRAWINGS

END OF SECTION

DIVISION 46: Water and Wastewater Equipment

SECTION 46 0103
STARTUP AND COMMISSIONING PROCEDURES

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 46 0106 - Operation and Maintenance Manual.

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures; except:
 - 1. Make submittals on time schedule specified by Owner's representative.
 - 2. Submit draft submittals intended for the use of the Owner's representative, in preparing final documents, in editable electronic format, Microsoft Word 2010, or later edition, preferred.
 - 3. Allow for time required for review and approval.
- B. Summary Startup and Commissioning Schedule: Within 60 days after award of Contract, submit anticipated dates for construction, with start and duration of major testing activities; indicate activities on the critical path.
- C. Startup Plan and Forms.
- D. Pre-Functional Checklists.
- E. Functional Test Procedures and Forms.
- F. Completed Pre-Functional Checklists.
- G. Completed Startup Reports.
- H. Completed Functional Test Reports.

PART 2 PRODUCTS

2.01 DOCUMENTATION IDENTIFICATION SYSTEM

- A. Give each submitted form or report a unique identification; use the following scheme.
- B. Type of Document: Use the following prefixes:
 - 1. Pre-Functional Checklist: PFC-.
 - 2. Startup Plan: SP-.
 - 3. Startup Report: SR-.
 - 4. Functional Test Procedure: FTP-.
 - 5. Functional Test Report: FTR-.
- C. For Unit Processes: Use the Unit Process specification section number (series 4600xx) and assign letters sequentially (A, B, C, etc) to indicate the commissioning activities relevant to the process as a whole.
- D. For Individual Components: Use the unique Plant ID number; see Section 46 0500.
- E. Test, Revision, or Submittal Number: Number each successive iteration sequentially, starting with 1.
- F. Example: FTP-460023-A.2 would be the Functional Test Procedure for the whole Memorial Pump Station, revision 2.
- G. Example: FTP-460023-001.1 would be the Functional Test Procedure for equipment item 1 in the Memorial Pump Station, probably a pump, first submittal.
- H. Example: PC-460023-001.2 would be the Pre-Functional Checklist for equipment item 1 in the Memorial Pump Station, probably a pump, revision 2.

PART 3 EXECUTION

3.01 STARTUP PLAN AND STARTUP

- A. Startup Plan: Prepare an overall startup plan covering all operating equipment and devices with forms for startup reports.
 - 1. List all equipment by Plant ID and description.
 - 2. Include anticipated date and duration of startup and functional testing for each item.
 - 3. Cross-reference individual equipment Startup Plans, Startup Report forms, Pre-Functional Checklists, and Functional Test Procedures by identifying number.

4. If special equipment, personnel, or other conditions are necessary for startup or testing, describe them.
 5. Submit for approval and revise as directed.
- B. Updating Plan: Keep plan up to date as startup and testing progress.
- C. Equipment Startup Plans: Prepare a Startup Plan for each item of operating equipment and device.
1. Incorporate manufacturer's recommended startup procedures, checklists, etc.
 2. Reference Pre-Functional Checklist by identifying number.
 3. If Pre-Functional Checklist covers all startup activities, no separate equipment startup plan is necessary; cross-reference the Pre-Functional Checklist on overall Startup Plan with notation that no separate equipment startup plan is required.
- D. Operating Personnel Orientations: Prior to startup of any Unit Process, or modified portion of existing Unit Process, conduct an operating personnel orientation.
1. Timing: Not more than 2 weeks and not less than 1 week prior to startup so that personnel can review O&M Manual.
 2. Owner will designate personnel to attend; also require attendance by installers' and manufacturers' representatives.
 3. Handouts: Make minimum of 10 printed copies of relevant layouts and diagrams from O&M Manual.
 4. Review the sequence of startup activities, the Pre-Functional Checklists and startup forms, and explain the expected results.
 5. Review and discuss problems that might occur during startup, especially any not discussed in the O&M Manual because they would not be encountered in normal operation, and preparations made to correct them.
 6. Spend at least 1 hour in visual orientation on-site, pointing out all components of the process and answering questions.
- E. Execution: Execute startup of each item of operating equipment, device, and unit process; fill out relevant Startup Report form
1. Verify that startup procedures are correctly described in O&M Manual.
 2. Submit Pre-Functional Checklists and equipment startup reports together with overall Unit Process Startup Report.
 3. Submit completed Unit Process Startup Reports within two days of completion.
- F. Deficiencies: Correct deficiencies and restart, at no extra cost to Owner; if difficulty in correction would delay progress, report deficiency immediately.

3.02 PREFUNCTIONAL CHECKLISTS

- A. Draft Checklists: Prepare a Pre-Functional Checklist for each item of operating equipment, device, and unit process.
1. Submit for approval and revise as directed.
 2. No sampling of identical or near-identical items is allowed.
 3. These checklists do not replace manufacturers' recommended startup checklists, regardless of apparent redundancy.
- B. Forms: Include the following types of information:
1. Plant ID number.
 2. Manufacturer, model number, and relevant capacity information.
 3. Serial number of installed unit.
 4. List of inspections to be conducted to document proper installation; these will be primarily static inspections and procedures; for equipment and systems may include normal manufacturer's start-up checklist items and minor testing.
 5. Include field quality control inspections and tests specified in individual specification sections.
 6. Sensor and actuator calibration information.
 7. Status of O&M data submissions.
 8. Status of Startup Plan submissions.
 9. Status of Training Plan submissions.
 10. Certification by installing contractor that the unit is properly installed and ready for Startup

11. Spaces for witnessing, dates, and conditions.
- C. Execution: Fill out and submit Pre-Functional Checklists after completion of installation of each item of equipment.
 1. Each line item without deficiency is to be witnessed, initialed, and dated by the actual witness; checklists are not complete until all line items are initialed and dated complete without deficiencies.
 2. Checklists with incomplete items may be submitted for approval provided the Contractor attests that incomplete items do not preclude the performance of safe and reliable Functional Testing; re-submission of the Checklist is required upon completion of remaining items.
 3. Individual Checklists may contain line items that are the responsibility of more than one installer; assign responsibility to appropriate installers or subcontractors, with identification recorded on the form.
 4. If any Checklist line item is not relevant, record reasons on the form.
 5. Regardless of these reporting requirements, Contractor is responsible for correct startup and operation.
 6. Submit completed Checklists within two days of completion.
- D. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to Owner; if difficulty in correction would delay progress, report deficiency immediately.

3.03 FUNCTIONAL TESTS

- A. At least one Functional Test is required for each item of operating equipment, device, and unit process, unless sampling of multiple identical or near-identical units is allowed by the final test procedures.
 1. Some test procedures are included in the Contract Documents; where Functional Test procedures are not included in Contract Documents, propose test procedures appropriate to the equipment or process being tested.
- B. Functional Test Procedures: Prepare descriptions of functional tests, with forms for recording test conditions and results.
 1. Submit for approval and revise as directed.
 2. List steps to be taken to demonstrate performance, in order of occurrence.
 3. List test apparatus, if any.
 4. List performance criteria which if achieved demonstrate satisfactory performance.
- C. Functional Test Report Forms: Include the following types of information:
 1. Plant ID number, for equipment, or Unit Process identification.
 2. Manufacturer, model number, and relevant capacity information.
 3. Serial number of installed unit.
 4. Test apparatus calibration information.
 5. List of test steps, with spaces for results, witnessing, and dates.
 6. Final results.
- D. Execution: Perform Functional Tests and fill out and submit test report form after completion of test.
 1. Verify that operating functions and procedures are correctly and completely described in O&M Manual.
 2. Use the approved test report form.
 3. Submit completed test report form within two days of completion.
 4. If a deficiency is not corrected and re-tested immediately, document the deficiency and intentions regarding correction.
- E. Deficiencies: Correct deficiencies and re-test at no extra cost to Owner, including cost of Owner representative witnessing; if difficulty in correction of deficiency would delay progress, report deficiency immediately.
 1. Deficiencies are any condition in the installation or function of a component, piece of equipment or system that is not in compliance with Contract Documents or does not perform properly.
 2. Coordinate scheduling of re-tests with Owner's representative.
 3. Identical or Near-Identical Items: If 10 percent, or three, whichever is greater, of identical or near-identical items fail to perform due to material or manufacturing defect, all items will

be considered defective; provide a proposal for correction within 2 weeks after notification of defect, including provision for testing sample installations prior to replacement of all items.

- F. Deferred Functional Tests: Some tests may need to be performed later, after substantial completion, due to seasonal requirements or other conditions; performance of these tests remains the Contractor's responsibility regardless of timing.

3.04 TEST PROCEDURES - GENERAL

- A. Provide skilled technicians to execute starting of equipment and to execute the Functional Tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.
- B. Provide all necessary materials and system modifications required to produce the flows, pressures, temperatures, and conditions necessary to execute the test according to the specified conditions. At completion of the test, return all affected equipment and systems to their pre-test condition.
- C. Manual Testing: Use hand-held instruments, immediate control system readouts, or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation").
- D. Simulating Conditions: If necessary, artificially create the necessary condition for the purpose of testing the response of a sensor or process.
- E. Simulating Signals: Disconnect the sensor and use a signal generator to send an appropriate signal to amperage, resistance or pressure to the transducer and control system to simulate the sensor value.
- F. Indirect Indicators: Remote indicators of a response or condition, such as a reading from a control system screen reporting a valve to be 100 percent closed, are considered indirect indicators.

3.05 COMMISSIONING PLAN AND COMMISSIONING

- A. Commissioning Plan: Prepare an overall commissioning plan with forms for reports.
- B. Execution: Execute each commissioning activity; fill out relevant report form.
 - 1. Submit completed Reports within two days of completion.
- C. Deficiencies: Correct deficiencies found at no extra cost to Owner.

END OF SECTION

SECTION 46 0106
OPERATION AND MAINTENANCE MANUAL

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Section 46 0500 - Common Work Results For Water and Wastewater Equipment.
- C. Individual Product Sections: Additional requirements for operation and maintenance data.

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, and Section 46 0500 for submittal procedures.

PART 2 OPERATION AND MAINTENANCE MANUAL

2.01 DOCUMENT FORMATS

- A. Editable Document Format: Microsoft Word 2010 or later, Open Document Format (ODF), or Rich Text Format (RTF) ____.
- B. PDF Format: Adobe Reader version 7 or later; use for:
 - 1. Approved submittals, such as product data, shop drawings, O&M data; furnish PDF of approved copy, not original
 - 2. O&M documents prepared by manufacturers.
 - 3. Project record documents, as described in Section 01 7800 - Closeout Submittals and in individual Sections.
 - 4. Startup checklists and functional test reports.
 - 5. Other documents that will not need to be modified in the future.
- C. Drawings: Convert to PDF format, maintaining original document page size (i.e. do not reduce a large size drawing to 8-1/2 by 11, or any different size).

2.02 ORGANIZATION OF MANUAL

- A. The function of this manual is to make needed information quickly and easily found and understood. To increase effectiveness the following general principles should be observed:
 - 1. Generally, use less narrative and more diagrams, charts, and checklists.
 - 2. An operator looking for a specific piece of information should not have to read an essay to find it.
 - 3. Do not include information that is not specific to this plant.
 - 4. If both graphic and text are needed for the same subject, place the graphic above the text.
 - 5. If footnotes or legends are used, make them large enough to read easily and place above or to the left of the chart or table they refer to, so they are not overlooked.
 - 6. If a graphic will fit in a page of a normal browser window, insert it as a picture in the page; if very large, link to it as an external PDF file.
 - 7. Very large drawings and diagrams should not be used as a primary information source; if they are the only source of a particular item of information, consider snipping relevant portions to insert as pictures.
 - 8. Content management system software uses HTML editors in which tables are often difficult to format; charts and tables may be made as pictures if the original editable document is also furnished and linked to.

2.03 EQUIPMENT INFORMATION

- A. For each individual item of equipment, provide the following information; use a consistent format for all equipment, including order of presentation of information and starting each item on a new page.
- B. See individual product specification sections for additional requirements.
- C. Design Data: List design capacity and other operating parameters.
 - 1. Pumps: Include pump curve for the specific pump installed, shutoff head, discharge head, and suction head; identify impeller trim and motor horsepower.
 - 2. Startup Form: Recorded actual values of design parameters at startup.

3. Manufacturer's design data sheets may be linked to or referenced.
- D. Product Data: Project record copy of approved submittals.
 1. If no approved product data submittal exists, provide manufacturer's current data sheet marked to clearly identify specific products and components that were installed; delete or cross out inapplicable information.
- E. Shop Drawings: Project record copy of approved shop drawings.
- F. Wiring Diagrams: As installed.
- G. Operating Procedures:
 1. Describe start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
 2. Manufacturer's printed procedures may be used, provided they are in electronic form.
 3. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific equipment.
- H. Maintenance Requirements:
 1. Provide summary of necessary maintenance activities for this equipment in this particular plant, prepared from manufacturer data, with necessary frequency.
 2. Describe routine procedures for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
 3. Manufacturer's servicing and lubrication schedule, and list of lubricants required.
 4. Manufacturer's illustrations, assembly drawings, and diagrams required for maintenance.
 5. Manufacturer's printed procedures may be used, provided they are in electronic form.
 6. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific equipment.
- I. Tools: List of tools necessary for adjustment, operation, maintenance and disassembly; identify by manufacturer and model number any special tools that are specific to the equipment, not commonly encountered in repair shops, or only available from limited sources.
- J. Replaceable Parts and Consumable Supplies:
 1. Manufacturer's parts list with model numbers, prices, and edition date.
 2. List of parts that manufacturer recommends having on hand, with quantities.
 3. List of parts that require long lead time, with time estimates.
 4. Nearby Sources: Name, address, phone number.
- K. Equipment Startup Reports:
 1. Completed Pre-Functional Checklist.
 2. Completed Functional Test report.
- L. Additional Requirements: As specified in individual product specification sections.

2.04 PROTECTIVE FINISHES INFORMATION

- A. For each protective finish, provide the following information:
 1. Product data, with catalog number, size, composition, and color and texture designations.
 2. Information for ordering additional material.
 3. Manufacturer's recommended inspection schedule.
 4. Instructions for repair of damaged and deteriorated coatings, including surface preparation.
 5. Additional information as specified in individual product specification sections.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the maintenance of the specific products.

END OF SECTION

SECTION 46 0500

COMMON WORK RESULTS FOR WATER AND WASTEWATER EQUIPMENT

PART 1 GENERAL

1.01 APPLICABILITY

- A. Requirements of this section apply to other sections of Division 46.
- B. Some requirements of this section are specified only in this section; these apply to other sections of Division 46 whether specifically cross-referenced or not.
- C. Some requirements of this section amplify requirements of other sections of Division 46; these also apply to those sections unless a requirement of this section and another section cannot both be met; in that case, comply with the requirement of the other section.

1.02 RELATED REQUIREMENTS

- A. Section 05 1200 - Structural Steel Framing.

1.03 DEFINITIONS

- A. Buried: Equipment, piping, and structures are in contact with earth or which would be in contact with earth without the protection specified.
- B. Corrosive Atmosphere Zone: Where raw sewage runs in open channels; surfaces subject to corrosive atmosphere include floors, walls, ceilings, structural members, and inside and outside of equipment housings.
- C. Hazardous Atmosphere Zone: Chlorine gas storage and handling and spaces where explosion hazard exists.
- D. Indoor Dry Zone: Enclosed spaces not connecting to open liquid surfaces, not subject to water vapor emissions, and not anticipating more than occasional, accidental water-based liquid contact; the following are considered "Indoor, Dry":
 - 1. Administration areas, offices, laboratories.
 - 2. Mechanical rooms and utility tunnels meeting this definition.
 - 3. Electrical rooms.
- E. Outdoors: Exposed to the outdoor ambient environment, whether under cover or not.
- F. Splash Zone: Surfaces less than 12 inches above normal liquid level in process tanks and channels.
- G. Submerged Zone: Below the surface of the liquid or solids process stream.

1.04 REFERENCE STANDARDS

- A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings; 2015.
- B. ABMA STD 11 - Load Ratings and Fatigue Life for Roller Bearings; 2014.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- D. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2018).
- E. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2003 (Reapproved 2016).
- F. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- G. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- H. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2009 (Reapproved 2015).
- I. IEEE/ASTM SI 10 - American National Standard for Metric Practice; 2016, with Errata (2017).
- J. NACE No. 2 - Joint Surface Preparation Standard Near-White Metal Blast Cleaning; 1994 (Reaffirmed 2006).
- K. SSPC-SP 10 - Near-White Blast Cleaning; 2007.

PART 2 PRODUCTS

2.01 GENERAL EQUIPMENT REQUIREMENTS

- A. Unless otherwise indicated, provide products that are new and unused.
- B. Where components serve the same function and are the same size, provide identical units from same manufacturer.
- C. Provide components of a specific type by the same manufacturer.
- D. Operating Equipment: For equipment that is electrically, hydraulically, or pneumatically operated, or has moving parts or electronic components, provide products that:
 - 1. Are standard products of a manufacturer regularly engaged in manufacture of such products.
 - 2. Essentially duplicate items that have been in satisfactory use for at least 2 years.
 - 3. Is capable of operating in outdoor ambient temperature range anticipated at project site, unless located in a climate-controlled space or enclosure.
- E. Provide necessary accessories, fittings, interconnections, services, and adjustments required for complete and operable system.

2.02 EQUIPMENT WITH MOVING PARTS

- A. Protection from Moving Parts: Locate and guard belts, chains, pulleys, gears, projecting setscrews, keys, couplings, and other rotating and moving parts in accordance with OSHA requirements.
 - 1. Make guards removable or so arranged as to allow access for maintenance.
 - 2. A lockable housing without openings is considered a sufficient guard.
- B. Lubrication: Provide adequate means of lubrication for moving parts subject to wear.
 - 1. Unless otherwise indicated, provide lubrication by either grease or oil.
 - 2. Grease Lubrication: Provide grease fittings; if grease fitting is not easily accessible, provide grease tubing to a convenient location.
 - 3. Oil Lubrication: Provide oil reservoirs of liberal size with opening for filling, overflow opening at proper location to prevent overfilling, and drain opening at the lowest point; vent reservoirs to prevent pressure build-up.
 - 4. Provide equipment that is fully lubricated at Startup.
- C. Bearings: Provide bearings complying with ABMA STD 9 or ABMA STD 11 as applicable to type of bearing.
 - 1. Life Expectancy: Theoretical L-10 life expectancy.
 - 2. Relief Ports: Provide to prevent build-up of pressure that might damage bearings or seals.
- D. Locate drives, lubrication, and bearings that are accessible from walkways at or above ground level.

2.03 LANGUAGE AND UNITS OF MEASURE

- A. Language: Use English language for forms of identification and human-machine interfaces (HMIs).
- B. Units of Measure:
 - 1. Use the same units of measure in each device measuring or displaying the same characteristic.
 - 2. Metric Units of Measure: As defined in IEEE/ASTM SI 10, American National Standard for Metric Practice.

2.04 IDENTIFICATION OF EQUIPMENT, PIPING, AND ENCLOSURES

- A. Plant Item Identification Scheme (Plant ID): Identify each item of equipment, device, and enclosure using a unique alphanumeric identifier and use the same identifier in each submittal and other documentation.
- B. Plant Item Nameplates: For each item of equipment, device, and enclosure, provide a nameplate permanently secured in a prominent, easily readable location.
 - 1. Include Plant ID number and the generic name of the item.

- a. Enclosures: Include both enclosure ID and internal device ID; where a single enclosure contains more than one device, show both enclosure ID and device IDs on outside nameplate with separate nameplates inside identifying each device.
 - b. Motor Starters: Include both starter ID and name and ID of device controlled by starter.
- 2. Lettering: At least one inch high letters in color contrasting with background.
- 3. Nameplate Material: Engraved multicolor laminated plastic.
- 4. Attachment: Where exposed to weather or humid environment, use epoxy adhesive, other permanent adhesive, or screw attachment; other locations, permanent self-adhesive.
- C. Manufacturer Nameplates: For each valve, item of equipment, and device, provide a nameplate permanently secured in a conspicuous location.
 - 1. Nameplate Information: Manufacturer's name and address, type or style, model or serial number, and catalog number.
 - 2. Nameplate Material: Same as Plant Item nameplates, or stainless steel or other corrosion-resistant material; information cast integrally need not be repeated on nameplate; manufacturer's original nameplates may be used provided they are in an easily readable location.
- D. Piping Identification: Identify piping by its contents and flow direction every 20 feet of straight run.
 - 1. Provide additional identification at branch connections, inlets and outlets of equipment, upstream of valves, and within 3 feet of entrance to or exit from basins, foundation walls, and similar barriers.
 - 2. Identify contents by color coding and lettering in contrasting color.
 - 3. Lettering: At least 1 inch high; on horizontal piping, orient lettering horizontally; on vertical piping, orient lettering so it is readable when you tilt your head to the left.
 - 4. Identify flow by large arrows.
 - 5. For contents identification, use either painted stenciled lettering or self-adhesive plastic tape pre-printed with supplemental attachment by plastic tape banding around pipe; for small diameter piping use any method that will provide durable, easily readable identification.

2.05 PROTECTIVE FINISHES

- A. Surfaces related to unit processes are required to have a protective finish as specified, except that the following are not required to be separately finished unless otherwise specified:
 - 1. Stainless steel.
 - 2. Hot-dipped galvanized steel.
 - 3. Fiberglass.
 - 4. Aluminum, if not located in submerged, splash, or corrosive atmosphere zones.
 - 5. Ductile iron.
 - 6. PVC and CPVC.
 - 7. Concrete, unless submerged or in splash zone.
- B. Architectural and Structural Components: Finish exposed surfaces of the following using the specified finish, unless the material is not required to have a protective finish:
 - 1. Walls, ceilings, and exposed overhead structure in corrosive atmosphere zone, hazardous atmosphere zone, and ____.
 - 2. Walls in the splash zone.
 - 3. Inside of concrete basins and channels.
- C. Shop and Factory Finishes: Where finishing prior to delivery to project site is feasible, shop or factory-applied finishes are required, whether or not manufacturer's or fabricator's standard procedure; this requirement is non-negotiable, to achieve required corrosion resistance.
- D. Field Finishes: Field finishing is permitted for the following:
 - 1. Architectural and structural components.
 - 2. Inside of concrete basins and channels.
 - 3. Metallic piping, before installation of insulation.
 - 4. Piping identification.
 - 5. Finish painting of designated equipment in addition to specified factory/shop painting.

- E. Finishes:
 - 1. Apply coatings in accordance with coating manufacturer's recommendations and as specified.
 - 2. Measure thickness of coatings using a commercial film thickness gage.
 - 3. Test coatings with electric detector equipped with audible signal that operates when a flaw defect is detected, such as a 90-volt wet sponge type pinhole detector.
 - 4. Coating Repair: If welding is required after finishing or finish is otherwise damaged, prepare, re-coat, and test in the same manner as specified for original coating.
- F. Finish Applications:
 - 1. Buried: Coal tar coating; field or shop applied unless otherwise indicated.
 - 2. Corrosive Atmosphere Zone: Coal tar epoxy polyamide or epoxy polyamide coating.
 - 3. Hazardous Atmosphere Zone: Coal tar epoxy polyamide or epoxy polyamide coating.
 - 4. Splash and Submerged Zones - Concrete Surfaces: Chlorinated rubber coating.
 - 5. Splash and Submerged Zones - Not Concrete: Coal tar epoxy polyamide coating.
 - 6. Other Areas: Manufacturer's standard finish.
- G. Coal Tar Coating: Black, hot applied coal tar coating system.
 - 1. Preparation: Blasting in accordance with SSPC-SP 10/NACE No. 2, near white blast cleaning.
 - 2. Total Dry Film Thickness: ____ mils, minimum.
- H. Coal Tar Epoxy Polyamide Coating: High-build, black or dark red, VOC-compliant; shop or factory applied after fabrication.
 - 1. Preparation: Blasting in accordance with SSPC-SP 10/NACE No. 2, near white blast cleaning.
 - 2. Top Coats: Two coats.
 - 3. Total Dry Film Thickness: 16 mils, minimum.
 - 4. Maximum Time Between Coats: 72 hours.
- I. Epoxy Polyamide Coating: VOC-compliant; shop or factory applied after fabrication.
 - 1. Color: To be selected by Engineer/Architect from manufacturer's full color range.
 - 2. Preparation: Blasting in accordance with SSPC-SP 10/NACE No. 2, near white blast cleaning.
 - 3. Maximum Time Between Coats: 72 hours.
- J. Chlorinated Rubber Coating: Glossy.
 - 1. Color: To be selected by Engineer/Architect from manufacturer's full color range.
 - 2. Preparation: Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
 - 3. Top Coats: Two coats.
 - 4. Total Dry Film Thickness: ____ mils, minimum.
- K. Galvanizing: Hot-dipped zinc-alloy coating complying with ASTM A123/A123M or ASTM A153/A153M as applicable to item galvanized; electro-galvanized coating not acceptable; inspect for defects in factory; where repair is permitted by standard, use one of the methods specified in ASTM A780/A780M.
 - 1. Stainless steel may be substituted where galvanizing is specified.
- L. Galvanizing Repair Paint: ASTM A780/A780M.

2.06 METALS AND CONSTRUCTION MATERIALS USED IN EQUIPMENT

- A. Stainless Steel: Type 304, Type 304L, Type 316, or Type 316L, unless otherwise indicated.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M and as specified in Section 05 1200.
- C. Galvanized Steel Assemblies: Design to be field assembled using bolts without any welding.
- D. Malleable Iron: ASTM A47/A47M, grade No. 32510, minimum.
- E. Cast Iron: ASTM A48/A48M Class 30, minimum.

END OF SECTION

SECTION 46 0505
PIPING, VALVES, AND APPURTENANCES

PART 1 GENERAL

1.01 QUALITY ASSURANCE

- A. Install piping to meet requirements of local building code.
- B. Provide manufacturer's certificate that materials meet or exceed minimum requirements as specified.

1.02 RELATED REQUIREMENTS

- A. Division 00 - Procurement and Contracting Requirement.
- B. Division 01 - General Requirements
- C. SUDAS Section 4010.
- D. SUDAS Section 5020.
- E. SUDAS Section 6010.
- F. TenStates Color Schedule.
- G. Section 03 3000 - Cast-in-Place Concrete
- H. Section 46 0106 - Operation and Maintenance Manual: Operating and Maintenance Data.
- I. Section 46 0500 - Common Work Results for Water and Wastewater Equipment

1.03 SUBMITTALS

- A. Certificates: Submit manufacturer's certificates of conformance.
 - 1. Includes American Iron and Steel (AIS) certificates where applicable. See Division 00.
- B. Test Reports: Submit certified pressure test reports.
- C. Working drawing.
- D. Manufacturer's instructions.
- E. Itemized list of quantities.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. During loading, transporting, and unloading, exercise care to prevent damage to materials.
- B. Do not drop pipe or fittings.
- C. Store materials on site in enclosures or under protective coverings.
- D. Assure that materials are kept clean and dry.
- E. Do not store materials directly on ground.

PART 2 PRODUCTS

2.01 GENERAL

- A. All process piping shall be as indicated on plan sheets.

2.02 DUCTILE IRON PIPE

- A. Underground joints shall be mechanical per AWWA C111, Class 50.
- B. Exposed joints shall be flanged per AWWA C115 Class 250.
- C. Underground piping shall be coated on the outside with cement mortar per item G below.
- D. Underground fittings shall be mechanical joint AWWA C110 Class 250 with lugs where tie rods are used. Provide restrained joints (tie rods or MJ retaining glands) on all underground piping within 10 feet of structure foundations and 90 degree bends.
- E. Provide either AWWA C115 flanged joints with red rubber full face gasket or cast iron grooved end fittings for all exposed piping. Joints shall conform to the requirements of AWWA C111. Gaskets shall be lubricated as recommended by the manufacturer.
- F. Interior of all ductile iron pipe and fittings shall be lined with cement mortar in accordance with AWWA C104 with thickness:
 - 1. 3"-12": 1/16 inch

2. 14"-24": 3/32 inch
 3. 30"-54": 1/8 inch
- G. All exposed ductile iron not otherwise noted for painting shall be furnished with an outside bituminous coating at least 1 mil in thickness and shall receive one (1) coat (1/32" thick) of Cold-Applied Coal Tar Paint.

2.03 VALVES

- A. Check Valves:
1. Design: AWWA C508.
 2. Manufacturers:
 - a. Dezurik
 - b. Clow Valve Company
 - c. Or Engineer Approved Equal.
 3. Check valves shall close and prevent reverse flow while minimizing the effect of surge and water hammer.
 4. Valves shall open when inlet pressure exceeds downstream pressure by ¼ to ½ psi. Valve shall maintain positive drop tight shutoff until inlet pressure exceeds downstream pressure.
 5. Swing check valves shall be ValMatic Swing Flex or approved equal. Valves shall include steel and nylon reinforced Buna-N disc with integral "O" ring type seal, epoxy interior coating and 100% flow area.
 6. Valves shall be constructed with cast iron or ductile iron body.
- B. Plug Valves:
1. Design: AWWA C517.
 2. Manufacturers:
 - a. Dezurik
 - b. Clow Valve Company
 - c. Or Engineer Approved Equal.
 3. Type: Eccentric.
 4. Material: Cast Iron.
 5. Rating: 175 PSIG at 140 degrees F.
 6. ASME Class: 150 in accordance with ASME B16.34.
 7. Body: Non-lubricated type; cast iron; drip-tight shutoff with pressure from either direction.
 8. Plugs: Cast iron, with rectangular ports
 9. Ports: Full bore.
 10. Lining: Coated with butadiene acrylonitrile.
 11. Seats: Nickel.
 12. Stem Bearings: Self-lubricating stainless steel.
 13. Stem Seals: Multiple V-rings.
 14. End Connections:
 - a. Flanged as per ASME B16.1.
 15. Manual Operator for Valves 8-inches and larger: totally enclosed, geared; with hand wheel, 2-inch nut, or chain wheel.
- C. Combination Air Valve : Combined air and vacuum valve and air release valve.
1. Function: Automatically exhaust air during filling of a piping system and allow air to re-enter during draining or when vacuum occurs; automatically exhaust entrained air that accumulates in piping system.
 2. Rating: 150 psig working pressure.
 3. Body: Cast iron standard elongated body and cover.
 4. End Connections:
 - a. Sizes 1/2 through 3 inches: Threaded inlet and outlet, ASME B1.20.1 (ASME B1.20.2M) threading.
 - b. Sizes 4 inches and Larger: Flanged, ASME B16.5 Class 150.
 5. Provide blow off valve, quick disconnect couplings, and minimum 6 feet of hose to permit back flushing after installation without dismantling valve.

2.04 MODULAR WALL SEAL AND WALL SLEEVES

- A. Provide in locations as shown in plans.

- B. Pipe to floor/wall penetration closures shall be "Link-Seal" Modular Seal by Pipeline Seal and Insulator, Inc. or approved equal.
- C. Seals shall be modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall sleeve or core bit drilled concrete.
- D. Seal shall provide an absolutely water-tight seal between the pipe and wall sleeve or core bit drilled concrete with a minimum pressure rating of 15 psi.
- E. Wall sleeves shall be Link-Seal or equal manufactured from heavy wall welded or seamless steel pipe. A full circle continuously welded water stop plate shall provide positive water sealing on the sleeve OD and shall anchor the sleeve to prevent thrust movement.
- F. Contractor shall utilize the manufacturer's recommendations to determine the required sleeve dimensions and size and number of modular seals required at each location.
- G. Coordinate wall and floor sleeves with materials called out on plan sheets.

2.05 SUPPORTS AND HANGERS

- A. Horizontal Piping Hangers and Supports:
 - 1. Except as otherwise indicated, provide factory fabricated horizontal piping hangers and supports complying with MSS SP-58 of one of the following MSS types listed, selected by Installer to suit horizontal piping systems in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for copper piping systems.
 - 2. Adjustable Steel Clevis Hangers: MSS Type 1.
 - 3. Steel Pipe Clamps: MSS Type 4.

PART 3 EXECUTION

3.01 PIPE INSTALLATION

- A. Underground pipe shall be installed as specified in the current edition of the Urban Standard Specifications for Public Improvements (SUDAS).
- B. Examine pipe and fittings before installation and assure no defective materials are incorporated.
- C. Cut pipe in neat and workmanlike manner without damage to pipe.
- D. All field welding shall be performed by certified welding operators in accordance with the procedures recommended in the latest revision of the Code for Pressure Piping, ANSI B31.1.
- E. Solvent welded joints (on pipe 6" in diameter or smaller) shall be constructed in a method recommended by the pipe manufacturer and approved by the Engineer. No pipe or fittings shall be joined when the temperature is below 40° or above 90° F unless the method is specifically approved by the pipe manufacturer.
- F. All pipes shall be round and straight and of required size. Sizes shown on drawings are nominal pipe sizes and not outside diameters.
- G. Cutting and reaming shall be performed as per manufacturer's recommendations.
- H. Run pipes substantially as indicated on the Drawings.
 - 1. Carefully layout and schedule pipe runs to avoid unnecessary interferences with other work.
 - 2. Coordinate layout with other trades so condensation from piping and appurtenances will not fall on equipment which could be water damaged.
 - 3. Contractor shall make minor changes in pipe locations where space conflicts occur at no additional cost to the owner.
- I. Run pipes with proper grade to provide for easy draining.
 - 1. Install pipes in group runs where applicable.
 - 2. Install in a neat and orderly manner to the satisfaction of the Engineer.
- J. Lines required to be enclosed in ceiling, chaseways or similar spaces shall be installed to permit such enclosure as intended.
- K. Properly support, guide, anchor, sway brace, and connect all piping.

- L. Provide protection and insulation where required.
- M. Install piping with ample provisions for expansion and contraction to prevent damage to same and to the structure.
 - 1. Use piping offsets, changes in direction, expansion loops, and/or suitable expansion joints.
 - 2. Use suitable anchors and guides for deflection, expansion and contraction of such offsets, loops and expansion joints.
- N. Mitered fittings will not be permitted in welded lines.
 - 1. Connections shall be made with welding tees.
 - 2. The use of weldolets will be permitted in lieu of welding tees in welded lines provided they are installed in prefabricated assemblies and the pipe interior is cleaned of slag.
 - 3. Field installation of weldolets will be permitted where the branch piping is one-half the size of the main piping or less.
- O. Pipe caps in welded lines may be fabricated from flat steel plate, cut round and inserted into the pipe a sufficient depth to permit a fillet weld equal to the plate thickness (the plate thickness shall be twice the pipe wall thickness for pipe sizes 12 inches or less).
- P. The pipe ends in all tees, laterals and reducers shall be carefully prepared to provide for proper weld penetrations in accordance with ASA Standards.
- Q. Long radius, reducing type, butt welding elbows, in size 2-1/2 inch and larger, shall be used at pump and equipment connections wherever a change in pipe size and a 90° change in direction are involved.
- R. Butt welding tees, forged steel socket welding tees or forged steel welding outlet fittings shall be used for making branch connections in welding pipe systems.
- S. Pipe ends and other pipe joints which are to be welded shall be carefully prepared to provide for proper weld penetration and all welding shall be performed by certified welding operators and in accordance with procedures recommended in the latest revision of the Code for Pressure Piping ASA B31.1.

3.02 PIPE CONNECTIONS

- A. Furnish and install unions or mating flanges at all connections to each piece of equipment, conveniently located to facilitate quick and easy disconnecting of equipment for replacement, cleaning or general maintenance.
 - 1. Flanged or union connections shall be used on both sides of control valves, pressure reducing valves, meters, tanks, pumps, etc.
 - 2. Unions or flanges shall be of the same material or finish as the piping systems in which they are installed.
- B. Dielectric unions or flanges shall be installed in water lines where copper or brass piping is connected to ferrous material such as cast iron or steel pipe, steel tanks, steel water heater, etc.
 - 1. Dielectric unions 2 inch size and smaller shall be steel body and nut with insulating gasket and copper connector, 250 psi rating at 190° F.
 - 2. For 2-1/2 inch size and larger, the union shall be flanges, cast iron with insulated gasket and copper connector, 175 psi rating at 190° F.

3.03 VALVE INSTALLATION

- A. Provide chainwheel operator on valves located more than seven (7) feet above floor level.
- B. Install according to manufacturer's recommendations.
- C. Check valves for proper operation and smooth action. Adjust controls of automatic valves as required.

3.04 PIPE HANGERS, SUPPORTS, AND ANCHORS

- A. Provide supports as shown and detailed on the drawings and specified herein and/or as required to adequately support the piping system.
 - 1. All support components shall conform to manufacturer's Standardization Society Specification SP-58.
 - 2. Supports shall be located near or at changes in piping direction and at concentrated loads.

3. Supports shall provide vertical adjustment to maintain pitch required for proper drainage and shall allow for expansion and contraction of the piping.
 4. Supports shall bear directly on piping.
 5. Supports shall be stainless steel.
- B. Where groups of three or more pipes occur, they may be supported with trapezed hangers using two (2) hangers as specified with a capped pipe cross member.
- C. Horizontal steel and ductile iron piping shall be supported as follows:

Pipe Size	Rod Diameter	Maximum Spacing
Up to 1-1/4 inch	3/8 inch	8 feet
1-1/2 to 2 inch	1/2 inch	8 feet
2-1/2 to 3-1/2 inch	1/2 inch	10 feet
4 to 5 inch	5/8 inch	15 feet
6 inch	3/4 inch	17 feet
8 inch to 12 inch	7/8 inch	22 feet
12 inch to 18 inch	1-1/4 inch	24 feet
20 inch to 24 inch	1-1/2 inch	27 feet

- D. Pipe hangers for cold water piping shall be large enough to encompass the insulation, where insulation is required, using a metal shield so the vapor barrier jacket will not be broken.

3.05 PAINTING

- A. See Section 09 9600 Coating Systems for Wastewater Treatment Facilities and TenStates Color Schedule.

Sanitary Sewer	Dark Gray	Sanitary
Raw Water	Olive Green	Raw Water
Finished Water	Dark Blue	Finished Water

3.06 TESTING AND DISINFECTION

- A. Pipe interior, fittings, valves, and equipment shall be protected against contamination during delivery, storage and installation.
- B. New lines and equipment shall be flushed thoroughly prior to disinfection until all traces of construction materials and soil or foreign matter have been removed.
- C. All pressure pipelines shall be tested with water and proven watertight under a hydrostatic pressure of 150 psi for two (2) hours.
- D. All gravity lines shall be tested with water and proven watertight under a hydrostatic pressure of 50 psi for two (2) hours.
- E. No loss of pressure during the test period, after isolation of the test section, will be allowed.
- F. Any pipe section not meeting these test requirements shall be repaired and retested until the test requirements are met.
- G. Isolate control panel and other equipment which may be damaged by test pressure prior to the test.
- H. Install test caps, plugs, or other fittings as appropriate on open-ended lines as required to pressure test each line.
- I. Flush thoroughly after pressure testing and, if applicable, backfilling.
- J. Disinfect by injecting a solution of sodium hypochlorite or calcium hypochlorite and water at a slow rate.
 1. Conform to AWWA C651.
 2. Retain solution in lines for 24 hours.
 3. Minimum residual after 24 hours shall be 20 parts per million.
- K. Thoroughly flush all lines until residual chlorine at any point is not over one (1) part per million.
- L. After final flushing, and before the piping system is placed in service, two (2) consecutive samples collected twenty four (24) hours apart, shall be collected from the end of the line and tested for bacteriologic quality and shall show the absence of coli form organisms.

- M. If the initial disinfection fails to produce satisfactory samples, disinfection shall be repeated until satisfactory samples have been obtained.

END OF SECTION

SECTION 46 0526
WASTEWATER TREATMENT PUMPS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pump application schedule.
- B. Pumps for the following lift station components:
 - 1. Average Flow Wet Well.

1.02 RELATED REQUIREMENTS

- A. Division 00 - Procurement and Contracting Requirements
- B. Division 01 - General Requirements
- C. Section 03 3000 - Cast-in-Place Concrete: Concrete for bases.
- D. Section 46 0103 - Startup and Commissioning Procedures.
- E. Section 46 0106 - Operation and Maintenance Manual: Operating and Maintenance Data.
- F. Section 46 0505 - Piping, Valves, and Appurtenances.

1.03 REFERENCE STANDARDS

- A. American Iron & Steel Institute (AISI)
- B. American Society for Testing and Materials (ASTM)
- C. Factory Mutual (FM)
- D. Hydraulic Institute Standards for Centrifugal, Rotary, and Recip Pumps (HI).
- E. National Fire Protection Agency (NFPA).
- F. International Standards Organization (ISO) - ISO-9001.
- G. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings; 2015.
- H. ABMA STD 11 - Load Ratings and Fatigue Life for Roller Bearings; 2014.
- I. NEMA MG 1 - Motors and Generators; 2016.
- J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Division 00 for submittal procedure.
- B. Product Data: Manufacturer's descriptive and technical data on each item of equipment, including performance charts and curves, catalog cuts, and installation instructions.
 - 1. Submit pump characteristic curves showing:
 - a. Capacity in gallons per minute.
 - b. Net positive suction head (NPSH).
 - c. Head.
 - d. Efficiency.
 - e. Pumping horsepower from zero to 110 percent of design capacity.
- C. Shop Drawings: Show layout and anchorage of equipment and appurtenances.
 - 1. Show relationship to other parts of work including clearances for maintenance and operation.
 - 2. Include complete wiring and schematic diagrams.
 - 3. Include any other details necessary to demonstrate that system has been coordinated and will properly function as a unit.
- D. Field Quality Control Reports.
- E. Operating and Maintenance Data: Provide six (6) copies of manufacturer's maintenance and operation instructions.
- F. Maintenance Materials:
 - 1. Spare Parts: Furnish the following spare parts for each pump and any additional parts recommended by manufacturer to keep on hand.

- a. 2 sets - all gaskets
 - b. 2 sets - all bearings
 - c. 1 set - mechanical seals
 - d. 2 sets - discharge connection sealing devices
- 2. One set of special tools, calibration devices, and instruments required for operation, calibration, and maintenance.
- 3. Spare parts shall be stored in accordance with these provisions:
 - a. Spare parts shall be tagged by project equipment number and identified by part number, equipment manufacturer, and subassembly component (if appropriate).
 - b. Spare parts subject to deterioration, such as ferrous metal items and electrical components, shall be properly protected by lubricants or desiccants and encapsulated in hermetically sealed plastic wrapping.
 - c. Spare parts with individual weights less than 50 pounds and dimensions less than 2 feet wide, or 18 inches high, or 3 feet in length shall be stored in a wooden box with a hinged wooden cover and locking hasp. Hinges shall be strap type. The box shall be painted and identified with stenciled lettering stating the name of the equipment, equipment numbers, and the words "spare parts." A neatly typed inventory of spare parts shall be taped to the underside of the cover.
- G. Manufacturer/Vendor warranty.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. During loading, transporting, and unloading, exercise care to prevent damage to materials.
- B. Store materials on site in enclosures or under protective coverings.
- C. Assure that materials are kept clean and dry.
- D. Do not store materials directly on ground.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacture, assembly, and field performance of pumps, with minimum three years of documented experience.

1.07 WARRANTY

- A. See Division 00 - Procurement and Contracting Requirements for additional warranty requirements.
- B. The pump manufacturer shall warrant the units (pumps, motors, panels, and guide system) against defects in materials and workmanship for a period of five (5) years, under normal use, operation, and service in accordance with a published pump warranty, from the date of initial startup. This warranty shall be delivered, in writing, to the Owner and shall include, as a minimum, 100 percent full payment coverage by Manufacturer/Vendor for all parts and all labor during the warranty period.
- C. Pump manufacturer warranties shall be in published form, and shall apply to all similar units. A copy of each warranty shall be provided to the Owner at startup.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Centrifugal Pumps, Non-Submersible (Non-Self-Priming):
 - 1. Basis of Design Product
 - a. Flygt
 - 1) Model: NT3202.095-615LT
 - 2. Or Engineer Pre-Approved equal required during bidding process.

2.02 PUMP APPLICATIONS

- A. **Average Flow Wet Well - Pump No. 1 & 2: Centrifugal type (non-submersible, non-self-priming):**
 - 1. Pump Location: Memorial Lift Station.
 - 2. Pump Installation: Vertical - dry
 - 3. Pump Service: Raw sewage.
 - 4. Design Operating Point: 3,760 gallons per minute flow, 42.2 feet head

5. The design point must be within the Preferred Operating Range (POR) as defined by the Hydraulic Institute to be acceptable.
6. Maximum Break Horsepower (MBH) anywhere along the curve cannot exceed 50 HP, which includes the runout condition.
7. Maximum Operating Speed: 1170 rpm.
8. Pump Discharge Size: 10" minimum
9. Motor Type: Explosion Proof, Totally non-overloading.
10. Electrical Characteristics: 460 volts ac, 3 phase, 60 Hz.
11. Size: Within rated load driving pump at specified rpm.

2.03 MATERIALS

- A. Pump Case: Cast Iron, ASTM A48, Class 35B.
- B. Motor Housing: Cast Iron, ASTM A48, Class 35B.
- C. Impeller: Cast Iron, ASTM A48, Class 35B.
- D. Intermediate Housing (Backplate): Cast Iron, ASTM A48, Class 35B.
- E. 90 Degree Suction Bend: Cast Iron, ASTM A48, Class 35B with service Hatch
- F. Pump/Motor Shaft: Chrome Steel, ASTM A276 with replaceable ASTM A276 Type 420T shaft protection sleeve.
- G. Shaft Sleeve: Stainless Steel, ASTM A276 Type 420T.
- H. Wear Ring, Case: Cast Iron, ASTM A48, minimum 200 Brinell.
- I. Wear Ring, Impeller (enclosed impellers only): Stainless Steel, AISI329, 350 Brinell.
- J. O-Rings: Nitrile Rubber (NBR).
- K. Fasteners (including impeller fastener): Stainless Steel, ASTM A276 Type 316Ti.
- L. Lower Seal Faces: Silicon Carbide/Silicon Carbide.
- M. Upper Seal Faces: Silicon Carbide stationary/Carbon rotating.
- N. Oil-all uses (seal lubrication, etc): Ecologically safe, paraffin or mineral base.
- O. Base/Mounting Plate: Stainless Steel, ASTM A276, Type 316 with drilled flange/ring custom drilled (see drawings).
- P. Power/Control Cable Jacket: Chloroprene with non-wicking fillers.
- Q. Pump Stand: Precast concrete capable of withstanding weight and torque of pump. Consult pump manufacturer for specifications.

2.04 PUMPS - GENERAL REQUIREMENTS

- A. Pumps: Complete pumping systems, including motor and drive, manual operator, automatic actuators where indicated, piping, valves, conduit and wiring, supporting structures, electrical and process controls, overload protection, and alarms; capable of continuous operation without overheating and without excessive vibration, noise, or power consumption.
 1. Cast Iron Pump Casings: Constructed of uniform quality and free from blow holes, porosity, hard spots, shrinkage defects, cracks, and other injurious defects.
 2. Impellers (Except for Rotors): Cast iron.
 3. Finishes: Factory finish pumps and motors with manufacturer's standard primer and two coats of paint.
 4. Exterior Surfaces of Casings in Contact with Sewage: Field applied sewage resistant coal tar epoxy coating.
 5. Major Components: Furnish major components (pump case, impeller, intermediate housing, motor housing) of cast material as specified with smooth surfaces devoid of blow holes and other irregularities. Pump case design shall incorporate a centerline discharge for stability when mounted on the base elbow.
 6. Provide pumps capable of handling raw unscreened wastewater. Final connection shall insure zero leakage between pump and discharge connection flange. All exposed cast iron and ferrous surfaces shall be cleaned of dirt and grease, sandblasted to near white finish, and coated with an anti-corrosion reaction primer. The pump shall then be coated with two-component thick coat paint, with an epoxy resin base, having a minimum 83% solids

by volume. This coating shall be non-toxic and approved for both wastewater and water applications.

- B. Identification: Show the manufacturer's name, address, catalogue or model number, pump capacity, pump head, speed of rotation, and direction of rotation, cast into the body of the pump.
- C. Pressure Gauges:
 - 1. Provide standard pressure gauges on discharge side of pumps.

2.05 CENTRIFUGAL PUMPS

- A. Centrifugal Pumps:
 - 1. Solids Handling Pumps: Where indicated to pump sewage, provide non-clogging centrifugal type designed to pump solids up to 3 inches in diameter, with no internal interstices that can catch solids and stringy materials.
- B. Pump Casing: Cast iron, with smooth volute passages, and tapped and plugged holes for venting and draining pump.
 - 1. Cast Iron, ASTM A48, Class 35B.
 - 2. Volute shall have a centerline discharge
 - 3. The single piece pump casing shall be made of suitable thickness to allow for long pump life and to safely withstand the pressure of shut off head.
 - 4. The discharge nozzle shall be provided with integrally cast flange.
 - 5. Critical mating surfaces where water tight sealing is required shall be machined and fitted with O-rings. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact for four sides without the requirement of a specific torque limit. Rectangular cross-sectioned gaskets requiring specific torque limits to achieve compression shall not be considered as adequate or equal. No secondary sealing compounds, elliptical O-rings, grease, or other devices shall be used.
 - 6. Capable of withstanding pressures 50 percent greater than maximum operating pressure.
- C. Impeller: Cast iron, with smooth passages to prevent clogging and pass stringy or fibrous materials.
 - 1. Cast Iron, ASTM A48, Class 35B.
 - 2. Provide non-clog type impeller, capable of passing at minimum a 3" spherical solid per Ten States Standards.
 - 3. Single Vane Type.
 - 4. Statically, dynamically, and hydraulically balanced within operating range and to first critical speed at 150 percent of maximum operating speed.
 - 5. Securely keyed to shaft with locking arrangement whereby impeller cannot be loosened by torque from either forward or reverse direction.
- D. Wearing Rings: Steel or cast iron, renewable, on both impeller and casing, with wearing surfaces normal to axis of rotation.
 - 1. Wear Ring, Case: Cast Iron, ASTM A48, minimum 200 Brinell
 - 2. Wear Ring, Impeller: Hard Metal
 - 3. Designed for ease of maintenance.
 - 4. Secured to prevent rotation.
- E. Pump Shaft: Stainless or high grade alloy steel; adequate size and strength to transmit full driver horsepower with liberal safety factor.
 - 1. Pump/Motor Shaft: Carbon Steel, ASTM A276 with replaceable ASTM A276 Type 420 shaft protection sleeve. If a sleeve is not used, machine the entire pump/motor shaft of ASTM A276 Type 420 Stainless Steel.
 - 2. Provide common pump/motor shaft of sufficient size to transmit full driver output with a maximum deflection of 0.002 inches measured at the lower mechanical seal.
 - 3. Machine the shaft of carbon steel (for maximum strength and motor efficiency) and isolate the shaft from the pumped media with a replaceable Type 420 stainless steel sleeve under the lower mechanical seal. Do not use carbon steel as shaft material without a stainless steel sleeve.
 - 4. Joint between shaft and sleeve sealed to prevent leakage.

- F. Mechanical Shaft Seals: Single, with each seal interface held in contact by its own spring system, supplemented by external liquid pressure; constructed to be readily removable from shaft.
1. Primary Seal Faces: Silicon Carbide/Silicon Carbide
 2. Secondary Seal Faces: Silicon Carbide stationary/Carbon rotating
 3. Provide two totally independent mechanical shaft seals, installed in tandem, each with its own independent single spring system acting in a common direction.
 4. The sealing shall not depend on the direction of rotation. The primary, impeller-side seal shall operate in a large flooded chamber formed by the cast recesses in the impeller and backplate. The impeller-side seal shall be of bellows type mechanical seal. The primary and secondary seal faces shall operate in a generously proportioned lubricant chamber that hydrodynamically lubricates the seal faces to allow for extended periods of dry-running operation without the need for external seal lubrication or cooling systems. The lubrication chamber liquid shall be an environmentally friendly and nontoxic.
 5. The seal face material of the primary seal shall be Silicon Carbide versus Silicon Carbide (SiC/SiC) for excellent hardness and chemical resistance across the entire "pH" Range. The secondary seal shall be of Carbon versus Silicon Carbide (Carbon/SiC) for best Emergency Running properties. The seal faces must be of a solid material capable of being re-lapped. The seals shall require neither routine maintenance nor adjustment, but capable of being easily inspected and replaced. Mechanical seal metal parts shall be of CrNiMo-stainless steel.
 6. Seals shall be non-proprietary in design, and shall be available from another vendor in addition to the pump manufacturer.
 7. Do not provide seals with the following characteristics: conventional double mechanical seals with single or multiple springs acting in opposed direction; cartridge-type mechanical seals; seals incorporating coolant circulating impellers, seals with face materials other than those specified.
- G. Bearings: Ball or roller type designed to handle all thrust loads in either direction.
1. Life Expectancy: B10 life of 100,000 hours minimum.
 - a. Furnish upper and lower bearings, single row (preferred) or double rows as needed to provide desired life expectancy.
 2. Provide sealed/shielded (permanently lubricated) bearings. If open-type (non-shielded) bearings are used, provide re-lubrication ports with positive anti-leak plugs for periodic addition of lubrication from external to the pump.
- H. Supports and Bases:
1. Concrete base to be precast and provided by contractor. Contractor to coordinate with pump manufacturer for dimensions.
- I. Motor:
1. Motor Housing: Cast Iron, ASTM A48, Class 35B
 2. Intermediate Housing (Backplate): Cast Iron, ASTM A48, Class 35B
 3. Provide a motor which is squirrel cage, induction in design, housed in a completely watertight and air filled chamber, with a min 1.15 service factor. The motor housing shall be both air filled and watertight. Motor protection shall be at minimum IP 68. The motor shall be adequately sized and rated for continuous operation at a maximum fluid temperature of 104° F (40° C).
 4. The motor stator shall be wound using Class H monomer-free polyester resin insulation resulting in an overall motor rating of 311 Degrees F (155 degrees C), Class F insulation. The stator windings shall be trickle impregnated resulting in a winding fill factor of at least 95%. The use of a multiple step "dip and bake" type stator insulation method shall not be acceptable. The rotor bars and short circuit rings shall be made of aluminum.
 5. The motor and pump set complete shall be designed and manufactured by the same company.
 6. Provide motors which are explosion proof to CSA, NEC FM Class I Division 1 Groups C&D hazardous locations as defined by the National Electric Code.
- J. Accessories:
1. Temperature Protection

- a. Furnish temperature monitoring devices in motor windings for use in conjunction with and supplemental to external motor overload protection. Arrange controls to shut down pump should any of the monitors detect high temperature and automatically reset once motor temperature returns to normal. Set temperature monitors at levels recommended by pump manufacturer.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install as indicated and in accordance with manufacturer's instructions.
- B. Prior to applying electrical power to any motor driven equipment, rotate drive train by hand to demonstrate free operation of all mechanical parts.
- C. Provide factory-trained personnel to check installation and initial operation.

3.02 MANUFACTURER/VENDOR SERVICES

- A. After the installation and prior to startup, the Manufacturer, through its authorized and qualified representative, shall inspect the equipment to make sure that it is installed per Manufacturer's recommendations and ready to be placed into operation. Upon correction of any condition found to be unsatisfactory, the Manufacturer's representative shall certify the proper installation of the equipment. See Section 3.01 of this specification.
- B. Manufacturer's authorized and qualified representative, upon certifying satisfactory installation, shall witness the equipment being placed into operation and take such observations and measurements deemed necessary to ensure the equipment supplied is functioning as designed.
- C. Manufacturer's authorized and qualified representative shall provide a minimum of one visit of two hours, excluding travel time, for on-site instruction to the Owner's personnel in operation and maintenance of the pump. This training shall occur after the acceptance by the Owner's project representative of the Operations and Maintenance Manuals.
- D. The activities required in this section shall be performed by factory-trained service technician of the manufacturer. Services by sales representatives are not acceptable.

3.03 FIELD QUALITY CONTROL - PRIOR TO STARTUP

- A. Demonstrate proper operation of each pump, motor driver, actuator (if any), and controls; that each is mechanically, electrically, and structurally sound; meets specified operating characteristics; and has no leaks in seals or piping.
- B. Correct deficiencies and re-test.

3.04 TEST AND ADJUST

- A. Furnish services of a competent manufacturer's representative to check equipment, place it into operation, and instruct Owner in operation and maintenance.
- B. Tests shall be performed in accordance with the Test Code for Centrifugal Pumps per the Standards of the Hydraulic Institute, Grade 1B. Tests shall be performed on the actual assembled pumps to be supplied. Tests shall cover a range from shut-off to at minimum 20% beyond specified design capacity. Conduct test per above specification on all supplied pumps, generating a curve showing actual flow, head, BHP and hydraulic efficiency.
- C. Follow 46 0103 Startup and Commissioning Procedure.

3.05 CLEANING

- A. Clean oil and dirt from unit and touch up any scratches to paint finish.
- B. Remove debris and waste materials resulting from installation.

3.06 FIELD QUALITY CONTROL - AFTER STARTUP

- A. Demonstrate proper operation in conjunction with process control system demonstration.
- B. Equipment manufacturer shall cooperate with Engineer and System Integrator in terms of scheduling and execution of start-up activities.

3.07 OPERATION AND MAINTENANCE MANUALS

- A. Manufacturer shall provide Owner's Operation and Maintenance (O&M) manuals containing the approved bill of materials with components literature, materials of construction, routine maintenance activities, lubrication requirements, and troubleshooting guidelines. Manual shall be provided in three hard copies and three copies of a CD version in electronic format (PDF). Hard copies shall be in 3-ring binders with table of contents and section tabs.

3.08 CLOSEOUT ACTIVITIES

- A. See Division 00 - Procurement and Contracting Requirements for closeout requirements.
- B. Training: Train Owner's personnel on operation, adjustment, and maintenance of system.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of two (2) hours of training.
 - 3. Instructor: Manufacturer's authorized representative.
 - 4. Location: At project site.

END OF SECTION

DETAILS

Project Construction Sign

White Background

Project Title

Sponsor/Developer

Official(s) or Sponsor Address

Architect or Engineer

(second line)

Contractor

(second line)

Project Financed by:

Community Development Block Grant
Iowa Economic Development Authority

Kim Reynolds, Governor

Sign Dimensions: 1200mm x 2400mm (approx. 4'x8'x3/4")
Plywood Panel (APA Rated A-B Grade-Exterior)

Black
Lettering



Black



Pantone 7540
(CMYK: 0/0/0/72)

Pantone 390
(CMYK: 22/0/100/8)

Pantone 7540
(CMYK: 0/0/0/72)

Black
Lettering

ATTACHMENTS

EXPERTISE

Architecture

Engineering

Environmental

Planning

WORK

Agriculture

Commercial

Education

Energy

Food + Industrial

Government + Cultural

Healthcare

Housing

Mining

Public Works

Sports + Recreation

Transportation



Mankato, MN
Minneapolis/St. Paul, MN
Des Moines, IA
Storm Lake, IA
Waterloo, IA
Green Bay, WI
La Crosse, WI
Sioux Falls, SD

ISGInc.com

On January 12, 2017, ISG formally announced its transition of firm ownership to a 100% employee stock ownership plan (ESOP). As a multi-disciplinary firm that started 45+ years ago, ISG has since grown to be a Top 500 Design Firm as recognized by Engineering News-Record (ENR), a Zweig Group Hot Firm, and PSMJ Circle of Excellence recipient, illustrating the progressive increase in talent, expertise, and market share.

PROPOSED PROJECT SCHEDULE

Memorial Lift Station Improvements
Storm Lake, Iowa
22797



September 24, 2020	City Approves CDBG Agreement
October 5, 2020	Set Date for Public Hearing to Approve Plans, Specifications, Form of Contract, and Engineer's Estimate of Cost (Regular Council Meeting)
October 7, 2020	Publish Notice of Public Hearing (City: Publish Hearing Notice once, not less than 4 and not more than 20 days prior to the hearing)
October 19, 2020	Public Hearing and Resolution to Approve Plans, Specifications, Form of Contract, and Engineer's Estimate of Cost (Effectively Sets Bid Date as November 19, 2020) (Regular Council Meeting)
October 20, 2020	1) Send Notice to Prospective Bidders (ISG) 2) Post Notice of Bid Letting (ISG: Post Bid Letting Notice once, no less than 13 and not more than 45 days prior to the Bid Letting) (ISG: Post Notice of Bid Letting to: QuestCDN, Iowa League of Cities, a Plan Room)
November 10, 2020	Pre-Bid Meeting with Interested Contractors @ 10:00 AM, Memorial Lift Station
November 19, 2020	Public Bid Letting @ 10:00 AM City Hall
December 7, 2020	Resolution Accepting Bids, Awarding Bid, and Approving Contract (Regular Council Meeting)
December 21, 2020	Approve Contracts and Bonds
December 22, 2020	Notice to Proceed (Tentative)
November 26, 2021	Substantial Completion - Base Bid (339 Calendar Days)
December 31, 2022	Final Completion

Notes:

- Regular Council Meetings are held on the 1st and 3rd Monday of each month at 5:00 PM.

Staff Summary

10/19/2020

Agenda Item # 10.



City of Storm Lake
PO Box 1086
Storm Lake, IA 50588
p (712) 732-8000
f (712) 732-4114

REPORT TO: Honorable Mayor and City Council

FROM: Keri Navratil, City Manager

SUBJECT: **Resolution No. 21-R-2020-2021 approving the proposed plans and specifications, form of contract and estimate of cost for the construction of Memorial Lift Station Improvements Project**

BACKGROUND: Notice was given that the City Council of Storm Lake, Iowa, would meet at City Hall, 620 Erie Street, Storm Lake, Iowa on the 19th day of October, 2020, at 5:00 p.m., at which time and place a hearing will be held on the proposed plans and specifications, form of contract and estimate of cost for Memorial Lift Station Improvements, Storm Lake, Iowa in and for said City. Any interested person may appear at said hearing and file objections to the proposed plans, specifications, form of contract and estimated costs for said improvements.

The general description of types of construction and their limits for which bids will be received shall be as follows:

Memorial Lift Station Improvements

Lift station improvements which generally include replacement of the existing 60HP dry pit centrifugal pumps, valves, and related piping; replacement of the electrical MCC, variable frequency drives, controls, lighting and related work; replacement and relocation of HVAC ventilation and heating system; structural rehabilitation, roof replacement, and access modifications.

The general project location is as follows: 299 Memorial Road, Storm Lake, IA 50588

FISCAL IMPACT: N/A

RECOMMENDATION: Approve Resolution No. 21-R-2020-2021 approving the proposed plans and specifications, form of contract and estimate of cost for the construction of Memorial Lift Station Improvements Project

ATTACHMENTS:

Description	Type
 Resolution No. 21-R-2020-2021	Resolution

RESOLUTION NO. 21-R-2020-2021

**RESOLUTION ADOPTING PLANS, SPECIFICATIONS, FORM OF CONTRACT,
ESTIMATE OF COST MEMORIAL LIFT STATION IMPROVEMENTS PROJECT**

WHEREAS, the plans, specifications, form of contract, estimate of cost were filed with the CITY for the construction of certain public improvements described in general as the Memorial Lift Station Improvements Project; and

WHEREAS, notice of hearing on plans, specifications, form of contract and estimate of cost for said public improvements was published as required by law:

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF STORM LAKE, IOWA;

Section 1. That the said plans, specifications, form of contract and estimate of cost, are hereby approved, as described in the preamble of this Resolution.

PASSED AND APPROVED this 19th day of October 2020.

Michael Porsch, Mayor

ATTEST:

Mayra A. Martinez, City Clerk

Staff Summary

10/19/2020

Agenda Item # 11.



City of Storm Lake
PO Box 1086
Storm Lake, IA 50588
p (712) 732-8000
f (712) 732-4114

REPORT TO: Honorable Mayor and City Council

FROM: Keri Navratil, City Manager

SUBJECT: **Resolution No. 22-R-2020-2021 Approving Change Order No. 3 for Condominium Entrance Road Project**

BACKGROUND: The City has a developer's agreement with FB Storm Lake II, LLC to construct driveways to the entrance of the housing development. The City will be responsible for the \$100,000 of construction costs and the developer will be responsible for the balance of construction costs.

Change order #1 increased the cost of the project by \$5,415.13 due to PCC Pavement & gutter work that was required and extended the date of substantial completion to September 30, 2019 and the date of final payment to December 31, 2019.

Change order # 2 extended the date of concrete work to start after March 1, 2020 and extends the date of substantial completion to May 31, 2020 with the date of final payment to June 30, 2020.

This change order #3 is a housekeeping item to adjust the quantities to match the work preformed. This change order is a reduction of \$3,559.75. The final amount of the project is \$256,987.68.

FISCAL IMPACT: The City is responsible of \$100,000 of construction which will be funded by Tax Increment Financing funds and FB Storm Lake II, LLC will be responsible for the balance of construction costs which will include the reduction of Change Order No. 3 in the amount of \$3,559.75. The total cost of the contract including Change Order No. 3 is \$256,987.68.

RECOMMENDATION: **Approve Resolution No. 22-R-2020-2021**

ATTACHMENTS:

Description

Type

- ▣ Resolution No. 22-R-2020-2021
- ▣ Change Order No. 3

Resolution
Change Order

RESOLUTION NO. 22-R-2020-2021

RESOLUTION APPROVING CHANGE ORDER NO. THREE TO THE CONDOMINIUM ENTRANCE PROJECT

WHEREAS, the plans, specifications, form of contract, estimate of cost, and award bid were filed with the CITY for the construction of certain public improvements described in general as the Condominium Entrance Project; and

WHEREAS, notice of hearing on plans, specifications, form of contract and estimate of cost for said public improvements was published as required by law; and

WHEREAS, a contract in the amount of \$255,132.30 was awarded to Healy Excavating for the project; and

WHEREAS, Change Order No. 1 increased the project cost in the amount of \$5,415.13. FB Storm Lake II, LLC responsible for the balance of construction costs which will include Change Order No. 1 in the amount of \$5,415.13. No change to the City's responsible portion of \$100,000.00 of the total construction cost. For a total contract amount of \$260,547.43.

WHEREAS, Change Order No. 2 extends the date of concrete work to start after March 1, 2020. Extends the date of substantial completion to May 31, 2020 and the date of final payment to June 30, 2020.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF STORM LAKE, IOWA:

Section 1. To approve Change Order No. 3 to the contract with Healy, of Lake View, Iowa for the Condominium Entrance Project. Change order No. 3 decreases the cost by \$3,559.75 finalizes quantities to final out the project and to change the date of final payment from June 30, 2020 to October 19th, 2020.

FB Storm Lake II, LLC responsible for the balance of construction costs which will include Change Order No. 3 in the amount of \$3,559.75. No change to the City's responsible portion of \$100,000.00 of the total construction cost.

The total cost of the contract including Change Order No. 3 is \$256,987.68.

Section 2. That the Mayor and Clerk are hereby directed to execute this Change Order No. 3.

PASSED AND APPROVED this 19th day of October, 2020.

Michael Porsch, Mayor

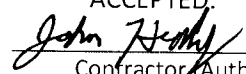
ATTEST:

Mayra A. Martinez, City Clerk

Date of Issuance: 10/14/2020 Effective Date: 10/14/2020
Owner: City of Storm Lake Owner's Contract No.: N/A
Contractor: HEALY EXCAVATING Contractor's Project No.: N/A
Engineer: Emmons & Oliver Resources, Inc Engineer's Project No.: 01112-0018
Project: King's Pointe Condominium Entrance Road Contract Name: N/A
Project

The Contract is modified as follows upon execution of this Change Order: DELETION OF WORK ITEMS THAT
Description: WERE NOT NEEDED TO BALANCE CONTRACT VALUE TO ZERO: (\$3,559.75)
Attachments: [List documents supporting change] (SEE ATTACHMENT A)

CHANGE IN CONTRACT PRICE	CHANGE IN CONTRACT TIMES [note changes in Milestones if applicable]
Original Contract Price: \$ <u>255,132.30</u>	Original Contract Times: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] from previously approved Change Orders No. ____ to No. <u>1</u> : \$ <u>5,415.13</u>	[Increase] [Decrease] from previously approved Change Orders No. ____ to No. ____: Substantial Completion: _____ Ready for Final Payment: _____ days
Contract Price prior to this Change Order: \$ <u>260,547.43</u>	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
[Increase] [Decrease] of this Change Order: \$ <u>3,559.75</u>	[Increase] [Decrease] of this Change Order: Substantial Completion: _____ Ready for Final Payment: _____ days or dates
Contract Price incorporating this Change Order: \$ <u>256,987.68</u>	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for Final Payment: _____ days or dates

RECOMMENDED:	ACCEPTED:	ACCEPTED:
By: <u></u>	By: _____	By: <u></u>
Title: <u>PROJECT ENGINEER</u>	Owner (Authorized Signature)	Contractor (Authorized Signature)
Date: <u>OCTOBER 14, 2020</u>	Title _____	Title <u>Owner</u>
	Date _____	Date <u>10-15-20</u>

Approved by Funding Agency (if applicable)

By: _____ Date: _____
Title: _____

****END OF SECTION****

EJCDC® C-941, Change Order.

Prepared and published 2013 by the Engineers Joint Contract Documents Committee.

Staff Summary

10/19/2020

Agenda Item # 12.



City of Storm Lake
PO Box 1086
Storm Lake, IA 50588
p (712) 732-8000
f (712) 732-4114

REPORT TO: Honorable Mayor and City Council

FROM: David Derragon, Assistant City Manager

SUBJECT: **Third and Final Reading of Ordinance No. 01-O-2020-2021 amending Chapter 3-1 of Title III of the city code of the City of Storm Lake, Iowa, titled "Garbage Storage and Collection," to revise requirements relating to the collection of garbage and its storage out of doors**

BACKGROUND: Following are items that have been clarified by the proposed amendments to the ordinance amending Chapter 3-1 Garbage Storage and Collection:

- If commercial containers such as dumpsters are used by commercial customers for the storage of garbage and recyclable materials, such containers shall be suitable in capacity for the storage of garbage and recyclable materials accumulating in a normal collection period of seven days.
- If a commercial customer's commercial containers do not have the capacity to store garbage and recyclable materials accumulating in a normal collection period of seven days, the commercial customer shall arrange with a collector for a shorter collection period so that the storage capacity of the commercial customer's commercial containers is adequate to contain the garbage and recyclable materials.
- Commercial customers shall employ commercial or industrial balers for the compression of recyclable materials if needed to prevent the blowing and scattering of cardboard and other recyclables and to allow for the storage of such materials as required by this Chapter.
- Commercial containers used by commercial customers shall (1) be equipped with closeable lids and kept covered; (2) be properly maintained and kept in good repair to ensure fitness for

use and prevent garbage or recyclable materials from falling or blowing out, (3) prominently display the name of the owner of the commercial container, and 4) be marked or labeled in such a way as to inform the collector whether the contents of the container are garbage or recyclable materials.

· Equipment used in such transport operations shall clearly and prominently display the collector's name and telephone number.

This is the third and final reading of the Ordinance amending Chapter 3-1 with an effective date of January 1, 2021. Staff will send letters to all commercial garbage accounts advising them of the clarity added to the ordinance. Press releases will also be issued with information being placed on the City's social media platforms regarding the ordinance update.

FISCAL IMPACT:

N/A

RECOMMENDATION:

Move to adopt on third and final reading Ordinance No. 01-O-2020-2021 amending Chapter 3-1 of Title III of the city code of the City of Storm Lake, Iowa, titled "Garbage Storage and Collection," to revise requirements relating to the collection of garbage and its storage out of doors

~~First Reading: September 21, 2020~~

~~Second Reading: October 5, 2020~~

Third Reading: October 19, 2020

ATTACHMENTS:

Description		Type
	Ordinance	Ordinance

ORDINANCE NO. 01-O-2020-2021

ORDINANCE AMENDING CHAPTER 3-1 OF TITLE III OF THE CITY CODE OF THE CITY OF STORM LAKE, IOWA, TITLED "GARBAGE STORAGE AND COLLECTION," TO REVISE REQUIREMENTS RELATING TO THE COLLECTION OF GARBAGE AND ITS STORAGE OUT OF DOORS

WHEREAS, the City Council of the City of Storm Lake, Iowa, has determined that Chapter 3-1 of Title III of the City Code of the City of Storm Lake, Iowa should be amended to revise some requirements relating to the collection of garbage and its storage out of doors;

NOW, THEREFORE, BE IT ORDAINED by the City Council of the City of Storm Lake, Iowa, as follows:

Section 1. Chapter 3-1 of Title III of the City Code of the City of Storm Lake, Iowa, is hereby amended as follows:

a. Section 3-1-2, captioned, "Definitions," is deleted and, in lieu thereof, the following new Section 3-1-2, captioned, "Definitions," is inserted:

Section 3-1-2 Definitions

For use within this Chapter the following terms are hereby defined:

(A) "CAN": A container for the storage of garbage or recyclable materials which is provided with a handle and tight-fitting cover; is watertight; is substantially made of galvanized iron, plastic or rubber or other non-rusting material, when feasible; and of a size that may be conveniently handled by the collector.

(B) "COLLECTOR": Any person, specifically including the City of Storm Lake, that picks up and removes garbage, recyclable materials, or yard waste for a fee.

(C) "COMMERCIAL CUSTOMER": Any person owning, controlling, or occupying commercial property

(D) "COMMERCIAL PROPERTY": Property (1) on which garbage is stored or from which garbage is collected by a collector and (2) on which commercial, business, charitable, institutional, industrial, or other non-residential activities are conducted or on which four or more residential units are situated.

(E) "GARBAGE": All animal, fruit, vegetable and other waste material resulting from the preparation of food and drink together with other discarded items that do not fall into the category of recyclable material or yard waste.

(F) "PERSON": Any individual, firm, company, corporation, business entity, private contractor, trust, or other organized group, or any governmental unit.

(G) "RECYCLABLE MATERIAL": Materials which may be designated as recyclable by the Sanitary Disposal Project for Buena Vista County such as cardboard, clean newspapers, magazines, number one and two plastic, tin cans, clear and amber glass; subject to such additional items or deletions of items that the Sanitary Disposal Project for Buena Vista County may make from time to time.

(H) "RESIDENTIAL CUSTOMER": Any person owning, controlling, or occupying residential property.

(I) "RESIDENTIAL PROPERTY": Property on which garbage is stored or from which garbage is collected by a collector and on which three or fewer residential units are situated.

(J) "SHREDDED PAPER": Paper that has been shredded or cross-shredded by a machine designed for such purposes.

(K) "YARD WASTE": Yard waste shall have such definition as is given to it by the Iowa Department of Natural Resources, but, in any case, shall include grass clippings, leaves, garden waste and branches from trees and shrubs.

b. Section 3-1-3, captioned, "Duty to Provide Cans," is deleted and, in lieu thereof, the following new Section 3-1-3, captioned "Duty to Provide Cans or Commercial Containers," is inserted:

Section 3-1-3 Duty To Provide Cans or Commercial Containers

Except as otherwise provided in this Section 3-1-3, each residential customer and commercial customer who shall store garbage or recyclable materials out of doors on residential property or commercial property or who places garbage out of doors in a place readily accessible to the collector for collection shall provide and use cans suitable in capacity for the storage of garbage and recyclable materials accumulating in a normal collection period of seven days. The foregoing shall not be construed as requiring a can of sufficient capacity for the occasional discarded item which is too large for a can if discards of this type are not regularly recurring. All garbage or recyclable materials stored out of doors or placed out of doors for collection, except for the occasional discarded item too large for a can, shall be stored or placed in cans that have a capacity of at least thirty-two (32) gallons. The collector may limit the maximum size of the can provided the limit is not less than thirty-two (32) gallons.

All cans provided shall be kept covered and reasonably clean at all times. They shall be placed in a position readily accessible to the collector outside of buildings but not in alleys or streets; provided, however, that a commercial customer may store garbage and recyclable materials discretely on such commercial property or in an adjoining alley in cans or commercial containers such as dumpsters if such cans or containers are stored immediately adjacent to the adjoining building or, if no building on the commercial property adjoins the alley, stored as close as practical to the lot line of the commercial property adjoining the alley.

If commercial containers such as dumpsters are used by commercial customers for the storage of garbage and recyclable materials, such containers shall be suitable in capacity for the storage of garbage and recyclable materials accumulating in a normal collection period of seven days. If a commercial customer's commercial containers do not have the capacity to store garbage and recyclable materials accumulating in a normal collection period of seven days, the commercial customer shall arrange with a collector for a shorter collection period so that the storage capacity of the commercial customer's commercial containers is adequate to contain the garbage and recyclable materials. Commercial customers shall employ commercial or industrial balers for the compression of recyclable materials if needed to prevent the blowing and scattering of cardboard and other recyclables and to allow for the storage of such materials as required by this Chapter. Commercial containers used by commercial customers shall (1) be equipped with closeable lids and kept covered; (2) be properly maintained and kept in good repair to ensure fitness for use and prevent garbage or recyclable materials from falling or blowing out, (3) prominently display the name of the owner of the commercial container, and (4) be marked or labeled in such a way as to inform the collector whether the contents of the container are garbage or recyclable materials.

A person who places a can in any city-owned street right-of-way adjacent to a public street, for the purpose of garbage collection, shall not do so earlier than 7:00 a.m. on the day preceding the day scheduled for garbage collection for such person's residence and shall cause the can to be removed from such location by 7:00 a.m. on the day following the day scheduled for garbage collection for such person's residence.

c. Section 3-1-11, captioned, "Collection Equipment," is deleted and, in lieu thereof, the following new Section 3-1-11, captioned "Collection Equipment," is inserted:

Section 3-1-11 Collection Equipment

When transported by collectors, all garbage and recyclable materials as well as yard waste shall be transported in factory-made compaction equipment as

recognized by the waste industry. Equipment used in such transport operations shall clearly and prominently display the collector's name and telephone number.

Section 2. All ordinances or parts of ordinances in conflict with the provisions of this ordinance are hereby repealed.

Section 3. This ordinance shall be in effect January 1, 2021, following its passage, approval, and publication as provided by law.

PASSED AND APPROVED this _____ day of _____, 2020.

Michael Porsch, Mayor

ATTEST:

Mayra A. Martinez, City Clerk

First Reading: September 21, 2020

Second Reading: October 5, 2020

Third Reading: October 19, 2020

Staff Summary

10/19/2020

Agenda Item # 13.



City of Storm Lake
PO Box 1086
Storm Lake, IA 50588
p (712) 732-8000
f (712) 732-4114

REPORT TO: Honorable Mayor and City Council

FROM: Keri Navratil, City Manager

SUBJECT: **Work Session Amending City Code Chapter 5-10 Property Maintenance**

BACKGROUND: Work Session to discuss amending City Code Chapter 5-10 Property Maintenance to allow for alternate paving materials to be used to construct a parking lot for a non-conforming building that is not required to provide off- street parking.

FISCAL IMPACT: N/A

RECOMMENDATION: N/A

Staff Summary

10/19/2020

Agenda Item # 14.



City of Storm Lake
PO Box 1086
Storm Lake, IA 50588
p (712) 732-8000
f (712) 732-4114

REPORT TO: Honorable Mayor and City Council

FROM:

SUBJECT: **City Council Requested Items**

BACKGROUND: Future City Council Work Sessions:
1. None at this time

FISCAL IMPACT: No Fiscal Impact at this time.

RECOMMENDATION: Concurrence for each item to be considered for a specified City Council Meeting work session or deny work session consideration for the following items:
1. None at this time