

A preletting conference will be held at 11:00 a.m. on February 15, 2023 at the Wastewater Reclamation Facility, Administrative Building Conference Room, 3000 Vandalia Road, Des Moines, Iowa.



**DES MOINES METROPOLITAN
WASTEWATER RECLAMATION AUTHORITY**

OPERATING CONTRACTOR - CITY OF DES MOINES

WASTEWATER RECLAMATION FACILITY
3000 VANDALIA ROAD
DES MOINES, IOWA 50317-1346

**PUBLIC IMPROVEMENTS
CONTRACT DOCUMENTS**

WRF CLARIFIER IMPROVEMENTS PHASE 2

ACTIVITY ID

042022024

PLAN FILE NO.

643-182/205

WRA APPROVAL

APPROVAL DATE

March 21, 2023

WRA BOARD RESOLUTION NO.

CONTRACT NO.

CONTRACTOR

CONTRACT AMOUNT

§

ENGINEERING DEPARTMENT

Steven L. Naber, P.E.

Des Moines City Engineer

Funding Information

Object Code 543020

Organization No WR809855

Project No WR115

ENGINEERING DEPARTMENT
CITY OF DES MOINES, IOWA

WRF Clarifier Improvements Phase 2

Activity ID 042022024

The following documents are part of this contract:

Document

Instructions to Bidders

Official Publications

Proposal

Bid Bond

Contract

Performance, Payment and Maintenance Bond

Addenda:

Special Provisions:

Bidding Requirements

Contractual Requirements

SRF Required Front-End Specifications

Technical Specifications

Supplemental Specifications:

General Supplemental Specifications to SUDAS, 2022 Edition

March 21, 2022

WRA General Supplemental Specifications to SUDAS, 2022 Edition

April 19, 2022

PROJECT ENGINEER: Patrick A. Brown, P.E.

Phone Number: (515) 323-8027

INSTRUCTIONS TO BIDDERS

Activity ID 042022024
Project Name WRF Clarifier Improvements Phase 2
Fed/St. Project No.

The work comprising the above referenced project shall be constructed in accordance with the SUDAS Standard Specifications, 2022 Edition; and as further modified by the supplemental specifications and special provisions included in the contract documents. The Des Moines City Engineer is the Engineer. The terms used in the contract documents are defined in said SUDAS Standard Specifications. The Des Moines Metropolitan Wastewater Reclamation Authority is the Contracting Authority on this project and shall hereinafter be referred to as the "Jurisdiction". Before submitting your bid, please review the SUDAS Standard Specifications, in particular, Division 1 - General Provisions and Covenants, including the sections regarding proposal requirements, bonding, contract execution and insurance requirements. Please be certain that all documents have been properly completed and submit them to the City Clerk, 1st Floor, City Hall, 400 Robert D. Ray Drive, Des Moines, Iowa, 50309.

I. BID SECURITY

The bid security must be in the minimum amount of 10% of the total bid amount including all add alternates (do not deduct the amount of deduct-alternates). Bid security shall be as defined in Section 26.8 of the Iowa Code and 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 bid bond executed by a corporation authorized to contract as a surety in Iowa or satisfactory to the Jurisdiction. The bid bond must be submitted on the enclosed Bid Bond form (DSM Urban 04/20/98) as no other bid bond forms are acceptable. All signatures on the bid bond must be original signatures in ink; facsimile (fax) of any signature on the bid bond is not acceptable. Bid security other than said bid bond shall be made payable to the Des Moines Metropolitan Wastewater Reclamation Authority. "Miscellaneous Bank Checks", and personal checks, as well as "Money Orders" and "Traveler's Checks" issued by persons, firms or corporations licensed under Chapter 533B of the Iowa Code, are not acceptable bid security. **NOTE: If the Bidder submits Bid Security in the form of a Bid Bond, and the Bidder wishes to have their Bid Bond returned to them after an approved contract and bond has been executed or after there is a rejection of all bids (in accordance with Iowa Code 26.10), the Bidder shall include a self-addressed envelope with the Bid Bond.**

II. SUBMISSION OF THE PROPOSAL AND IDENTITY OF BIDDER

- A. 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, and deposited with the Jurisdiction at or before the time and at the place provided in the Notice to Bidders. It is the sole responsibility of the bidder to see that its proposal is delivered to the Jurisdiction prior to the time for opening bids, along with the appropriate bid security sealed in the separate envelope identified as Bid Security and attached to the outside of the bid proposal envelope. Any proposal received after the scheduled time for the receiving of proposals will be returned to the bidder unopened and will not be considered. Bidders must either utilize the two envelopes provided with the Bidding documents, or Bidders provide their own two envelopes, for their proposals and bid security for submission of their bids.

Sales Tax: The bidder should not include sales tax in the bid pursuant to Iowa Code. A sales tax exemption certificate will be available for all material purchased for incorporation in the project.

Accessibility for individuals with disabilities. The City of Des Moines is pleased to provide accommodations to individuals with disabilities or groups and encourages participation in City government. To better serve you, please notify us at least three business days in advance when possible at 515-283-4209, should special accommodations be required.

B. **All pages of the Proposal must be returned.** The following documents shall be completed, signed and returned in the Proposal envelope.

PROPOSAL - Complete each of the following parts:

- Part B - Acknowledgement of Addenda, if any have been issued;
- Part C - Bid Items, Quantities and Prices;
- Part F - Additional Requirements; The following proposal attachment documents must be completed and attached:

<u>ITEM NO.</u>	<u>DESCRIPTION OF ATTACHMENT</u>
1.	Reciprocal Resident Bidder and Labor Force
2.	General
3.	Certification of Nonsegregated Facilities
4.	Certification Regarding Debarment, Suspension, and other Responsibility Matters
5.	Disadvantaged Business Enterprise (DBE) Solicitation
6.	United States Environmental Protection Agency, Disadvantaged Business Enterprise Program, DBE Subcontractor Performance Form
7.	United States Environmental Protection Agency, Disadvantaged Business Enterprise Program, DBE Subcontractor Utilization Form
8.	United States Environmental Protection Agency, Prohibition on Certain Telecommunications and Video Surveillance or Equipment Form

- Part G - Identity of Bidder.

The Bidder shall sign the proposal. 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. The **Bidder Status Form** (PROPOSAL Part F Item 2B), is required by the Iowa Labor Commissioner, pursuant to Iowa Admin. Code rule 875-156.2(1). The Bidder must complete and submit the **Bidder Status Form**, signed by an authorized representative of the Bidder, with their bid proposal. Under Iowa Admin. Code rule 875-156.2(1), failure to provide the **Bidder Status Form** with the bid may result in the bid being deemed non-responsive and may result in the bid being rejected. The **Worksheet: Authorization to Transact Business** from the Labor Commissioner is included on page 3 of 3 of the Instructions to Bidders, to assist Bidders in completing the **Bidder Status Form**.

C. Out-of-State Contractors:

1. 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 Iowa Department of Workforce Development. The contractor should contact 515-242-5871 for further information. Prior to contract execution, the City 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.
2. Prior to entering into contract, the designated low bidder, if it be a corporation organized under the laws of a state other than Iowa, shall file with the 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, or as amended, governing foreign corporations. For further information contact the Iowa Secretary of State Office at 515-281-5204.

III. GENERAL

- A. **All bid documents must be submitted as printed. No alterations, additions, or deletions are permitted.** If the Bidder notes a requirement in the contract documents that 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.

- B. Additional information regarding addenda, plan holders, bid tabulations, etc. can be found on the Engineering Department web site at <http://www.dmgov.org/Departments/Engineering/Pages/BidsContracts.aspx>.

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.

NOTICE TO BIDDERS

DES MOINES METROPOLITAN WASTEWATER RECLAMATION AUTHORITY PUBLIC IMPROVEMENT

Time and Place for Filing Sealed Proposals. Sealed bids for the work comprising each improvement as stated below must be filed at or before 11:00 a.m. on February 28, 2023, in the office of the City Clerk, 1st Floor, City Hall, 400 Robert D. Ray Drive, Des Moines, Iowa, 50309.

Accessibility for individuals with disabilities. The City of Des Moines is pleased to provide accommodations to individuals with disabilities or groups and encourages participation in City government. To better serve you, please notify us at least three business days in advance when possible at 515-283-4209, should special accommodations be required.

Time and Place Sealed Proposals Will be Opened and Considered. Sealed proposals will be opened and bids tabulated at 11:00 a.m., on February 28, 2023, in the City Council Chambers, 2nd Floor, City Hall, 400 Robert D. Ray Drive, Des Moines, Iowa, for consideration by the Des Moines Metropolitan Wastewater Reclamation Authority Board (WRA Board) at its meeting on March 21, 2023. The Des Moines Metropolitan Wastewater Reclamation Authority (Jurisdiction) reserves the right to reject any and all bids.

Time for Commencement and Completion of Work. Work on each improvement shall be commenced upon approval of the contract by the WRA Board, and completed as stated below.

Bid Security. Each bidder shall accompany its bid with bid security as defined in Section 26.8 of the Iowa Code and as specified by the Jurisdiction.

Contract Documents. Copies of the contract documents will be available after January 17, 2023, from the City Engineer's Office, 2nd Floor, City Hall, 400 Robert D. Ray Drive, Des Moines, Iowa 50309, at no cost, phone (515 -283-4573).

Preference for Iowa Products and Labor. 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.

Sales Tax. The bidder should not include sales tax in the bid. A sales tax exemption certificate will be available for all material purchased for incorporation in the project.

General Nature of Public Improvement.
WRF Clarifier Improvements Phase 2, 042022024

The improvement includes phased removal and replacement of twelve (12) secondary clarifier mechanisms, installation of clarifier launder and effluent channel covers and removal and replacement of flow control gates; including all necessary materials, equipment, labor, miscellaneous associated work, and cleanup; all in accordance with the contract documents, including Plan File No. 643-182/205, located at the Wastewater Reclamation Facility, 3000 Vandalia Road, Des Moines, Iowa.

This project shall be fully completed not later than October 2, 2026.

Engineer's Construction Estimate. \$36,375,000.00

Preletting Conference. A preletting conference will be held at 11:00 a.m. on February 15, 2023 at the Wastewater Reclamation Facility, Administrative Building Conference Room, 3000 Vandalia Road, Des Moines, Iowa.

NOTICE OF PUBLIC HEARING

DES MOINES METROPOLITAN WASTEWATER RECLAMATION AUTHORITY PUBLIC IMPROVEMENT

Public Hearing on Proposed Contract Documents and Estimated Costs for Improvement. A public hearing will be held by the Des Moines Metropolitan Wastewater Reclamation Authority Board on the proposed contract documents (plans, specifications and form of contract) on file in the City Engineer's Office, and estimated cost for each improvement at its meeting on March 21, 2023, at 1:30 p.m., in the Burnham Conference Room, Des Moines Metropolitan Planning Organization, 420 Watson Powell Jr. Way, Suite #200, Des Moines, Iowa. Please check the posted agenda in advance of the March 21, 2023 meeting for any update on the manner in which the public hearing will be conducted to comply with COVID-19 social distancing and safety guidelines. The Des Moines Metropolitan Wastewater Reclamation Authority Board Meetings are open to all individuals regardless of disability. To better serve you, please notify the Board Secretary at least three business days in advance, when possible, should special accommodations be required.

General Nature of Public Improvement

WRF Clarifier Improvements Phase 2, 042022024

The improvement includes phased removal and replacement of twelve (12) secondary clarifier mechanisms, installation of clarifier launder and effluent channel covers and removal and replacement of flow control gates; including all necessary materials, equipment, labor, miscellaneous associated work, and cleanup; all in accordance with the contract documents, including Plan File No. 643-182/205, located at the Wastewater Reclamation Facility, 3000 Vandalia Road, Des Moines, Iowa

Published in the Des Moines Register
March 1, 2023

****ALL SECTIONS OF THE PROPOSAL MUST BE COMPLETED WHERE APPLICABLE AND ALL PAGES RETURNED, OR THE BID WILL NOT BE ACCEPTED.****

ENGINEERING DEPARTMENT
CITY OF DES MOINES, IOWA



DES MOINES METROPOLITAN
WASTEWATER RECLAMATION AUTHORITY
OPERATING CONTRACTOR - CITY OF DES MOINES

PROPOSAL

To the Chairperson and Members of the Board of
the Des Moines Metropolitan Wastewater
Reclamation Authority

PROPOSAL: PART A - SCOPE

The Des Moines Metropolitan Wastewater Reclamation Authority, hereinafter called the "Jurisdiction", has need of a qualified contractor to complete the work comprising the below referenced improvement. The undersigned Bidder hereby proposes to complete the work comprising the below referenced improvements or project as specified in the contract documents, which are officially on file with the Jurisdiction, in the Des Moines City Engineer's Office, at the prices hereinafter provided in Part C of this Proposal, for the following described improvements:

WRF Clarifier Improvements Phase 2, 042022024

The improvement includes phased removal and replacement of twelve (12) secondary clarifier mechanisms, installation of clarifier launder and effluent channel covers and removal and replacement of flow control gates; including all necessary materials, equipment, labor, miscellaneous associated work, and cleanup; all in accordance with the contract documents, including Plan File No. 643-182/205, located at the Wastewater Reclamation Facility, 3000 Vandalia Road, Des Moines, Iowa

PROPOSAL: PART B - ACKNOWLEDGEMENT 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, QUANTITIES AND PRICES

UNIT BID PRICE CONTRACTS: The bidder must provide all unit prices, the amount, the total construction cost, any alternate price(s), and the total construction cost plus any add-alternates if there are alternates on the proposal on Proposal Attachment: Part C - Bid Items, Quantities, and Prices. The total construction cost plus any alternates selected by the Jurisdiction shall be used for comparison of bids. The total construction cost plus any add-alternates shall be used for determining the sufficiency of the bid security.

BASE BID CONTRACTS: The bidder must provide any bid price(s), the total base bid price, any alternate price (s), and the total base bid plus any add-alternates if there are alternates on the proposal on Proposal Attachment: Part C - Bid Items, Quantities, and Prices. The total base bid plus any alternates selected by the Jurisdiction shall be used for comparison of bids. The total base bid plus any add-alternates shall be used 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 plus any selected 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 and provide the following documents:
 - Proof of registration with the Iowa Division of Labor in accordance with Chapter 91C of the Iowa Code by providing a valid Registration Number,
 - Proof of insurance by a Certificate(s) of Insurance,
 - 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 documents and information as requested in Item 1 above acceptable to the Des Moines City Engineer; and
3. Commence the work on this project on or after the date a written Notice to Proceed is issued by the Jurisdiction, and to fully complete the project not later than October 2, 2026; and to pay liquidated damages for noncompliance with said completion provisions at the rate of One Thousand Two Hundred and 00/100 (\$1,200.00) for each calendar day thereafter that the work remains incomplete.

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 paid 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 put in a sham bid or to refrain from bidding, and 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 that all statements in this proposal are true; and
5. 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.	<u>DESCRIPTION OF ATTACHMENT</u>
1.	Reciprocal Resident Bidder and Labor Force
2.	General
3.	Certification of Nonsegregated Facilities
4.	Certification Regarding Debarment, Suspension, and other Responsibility Matters
5.	Disadvantaged Business Enterprise (DBE) Solicitation
6.	United States Environmental Protection Agency, Disadvantaged Business Enterprise Program, DBE Subcontractor Performance Form
7.	United States Environmental Protection Agency, Disadvantaged Business Enterprise Program, DBE Subcontractor Utilization Form
8.	United States Environmental Protection Agency, Prohibition on Certain Telecommunications and Video Surveillance or Equipment Form

PROPOSAL: PART G - IDENTITY OF BIDDER

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

- Individual, Sole Proprietorship
- Partnership
- Corporation
- Limited Liability Company
- Joint-venture: all parties must join-in and execute all documents
- Other _____

Bidder

By _____
Signature

Name (Print/Type)

Title

Street Address

City, State, Zip Code

Telephone Number / Email Address

A contract will not be executed until the apparent low Bidder is registered with the Iowa Commissioner of Labor pursuant to Section 91C.5 of the Iowa Code. The Bidder should contact 515-242-5871 for registration information.

Engineering Department Staff will contact the apparent low Bidder and obtain the name and title of the company's owner, president, CEO, etc. if a different person than entered above.

NOTE: The signature on this proposal must be an original signature in ink; copies or facsimile of any signature will not be accepted.

PROPOSAL ATTACHMENT: PART C - BID ITEMS, QUANTITIES AND PRICES: 1 of 1

This is a unit bid price contract. The bidder must provide all unit prices, the amount, the total construction cost, any alternate price(s), and the total construction cost plus any add-alternates if there are alternates on the proposal. The total construction cost plus any alternates selected by the Jurisdiction shall be used for comparison of bids. The total construction cost plus any add-alternates shall be used for determining the sufficiency of the bid security.

Activity ID: 04-2022-024

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNITS</u>	<u>ESTIMATED QUANTITY</u>	<u>UNIT PRICE</u>	<u>AMOUNT</u>
1	WRF Clarifier Improvements Phase 2, Complete as Specified and Described in Contract Documents	LS	1	\$ _____	\$ _____
2	Concrete Surface Repair, Complete as Specified and Described in Contract Documents	SF	100	\$ _____	\$ _____
3	Concrete Crack Repair, Complete as Specified and Described in Contract Documents	LF	200	\$ _____	\$ _____
TOTAL BASE BID				\$ _____	\$ _____
Deduct Alternate No.1	Deductive Alternative Cost for twelve (12) FRP clarifier launder covers in Lieu of aluminum launder covers Included as Part of Bid Item No. 1 Base Bid, Complete as Specified and Described in Contract Documents	LS	1	\$ _____	\$ _____

TOTAL CONSTRUCTION COST (BASE BID PLUS DEDUCT ALTERNATE NO.1) \$ _____

**DO NOT REDUCE BASE BID BY THE AMOUNT OF DEDUCT-ALTERNATE.
TOTAL TO BE USED ONLY TO DETERMINE SUFFICIENCY OF BID SECURITY.**

BIDDER MUST SUBMIT BID ON DEDUCT ALTERNATE ITEM.

NOTE: It is understood that the above quantities are estimated for the purpose of this bid. All quantities are subject to revision by the WRA. Quantity changes which amount to twenty (20) percent or less of the total bid shall not affect the unit bid price of that item.

PROPOSAL ATTACHMENT: PART F - ADDITIONAL REQUIREMENTS
ITEM 1 - RECIPROCAL RESIDENT BIDDER AND LABOR FORCE

Iowa Code section 73A.21 provides for a Reciprocal Resident Bidder and Labor Force preference.

Because of the nature of this project (i.e. Federal-aid participation), the Reciprocal Resident Bidder and Labor Force preference,

shall not apply to this project, and the bidder need not complete the Resident Bidder Information below.

shall apply to this project, and the bidder shall complete the Resident Bidder Information below.

To implement section 73A.21, the Iowa Labor Commissioner adopted chapter 156 of the Iowa Administrative Code, "Bidder Preferences in Government Contracting". Iowa Admin. Code rule 875-156.2(1) requires each bidder to complete the attached Bidder Status Form. The Bidder must complete and submit the Bidder Status Form, signed by an authorized representative of the bidder, with their bid Proposal. Under Iowa Admin. Code rule 875-156.2(1), failure to provide the statement with the bid may result in the bid being deemed nonresponsive and may result in the bid being rejected.

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: Authorization to Transact Business", on page 3 of the "Instructions to Bidders".)

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: _____

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

This form has been approved by the Iowa Labor Commissioner.

309-6001 02-14

**PROPOSAL ATTACHMENT: PART F - ADDITIONAL REQUIREMENTS
ITEM 2 - GENERAL**

1. The work under this proposal shall be constructed in accordance with the SUDAS Standard Specifications, 2022 Edition, and as further modified by the supplemental specifications and special provisions included in the contract documents.
Alternate Sales Tax:
Section 1020, 1.08, B, of the Supplemental Specifications shall apply. The bidder should not include sales tax in the bid. A sales tax exemption certificate will be available for all material purchased for incorporation in the project.
2. The Bidder hereby acknowledges that the Des Moines Metropolitan Wastewater Reclamation Authority in advertising for public bids for this work reserves the right to give a limited notice to proceed of a duration not longer than three months. This limited notice to proceed shall be given where all necessary right-of-way has not yet been acquired. The limited notice to proceed will allow construction to proceed as far as possible and practical on the right-of-way, which has been acquired.
3. The Bidder hereby acknowledged and agrees:
 - To comply with the Equal Employment Opportunity Program included in the City of Des Moines Contract Compliance Program, which is available at the following website [http://www.dmgov.org/Departments/Engineering/PDF/Contract%20Compliance%20Program%20\(June%202017\).pdf](http://www.dmgov.org/Departments/Engineering/PDF/Contract%20Compliance%20Program%20(June%202017).pdf) or from the City Engineer's Office.
 - To comply with any and all applicable provisions of the Des Moines Human Rights Ordinance, Chapter 62, of the Des Moines Municipal Code.
 - Not to discriminate against any employees, or applicants for employment, on the basis of age, race, religion, creed, color, sex, sexual orientation, national origin, ancestry, disability, familial status or gender identity.
 - To include this provision in all subcontracts for this project.
4. The City's Overall Annual DBE/TSB Goal for this project is 6.03%, which represents a target that the City would like to achieve in including DBE/TSB participation on City contracts; and is not a mandatory goal for this project. The Certified Directory of DBEs is available at the following website <https://secure.iowadot.gov/DBE/Directory/Index/>. The Certified Directory of TSBs is available at the following website <https://iowaeda.dynamics365portals.us/tsb-search/>

PROPOSAL ATTACHMENT: PART F - ADDITIONAL REQUIREMENTS
ITEM 3 - CERTIFICATION OF NONSEGREGATED FACILITIES

The Bidder must complete Proposal Attachment: Part F-Additional Requirements, Item 3, Certification of Nonsegregated Facilities which is the Iowa Department of Natural Resources, State Revolving Fund Program, U.S. Environmental Protection Agency, Attachment 1, Certification of Nonsegregated Facilities, EPA-7 5720-4.2 dated January 2021. This form must be submitted with the proposal.

PROPOSAL ATTACHMENT: PART F - ADDITIONAL REQUIREMENTS
ITEM 4 - CERTIFICATION REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS

The Bidder must complete Proposal Attachment: Part F-Additional Requirements, Item 4, Debarment and Suspensions, Certification Regarding Debarment, Suspension, and Other Responsibility Matters which is the Iowa Department of Natural Resources, State Revolving Fund Program, U.S. Environmental Protection Agency, Attachment 2, Debarment and Suspensions, Certification Regarding Debarment, Suspension, and Other Responsibility Matters, Form EPA Form 5700-49 (11-88) dated January 2021. This form must be submitted with the Proposal.

PROPOSAL ATTACHMENT: PART F - ADDITIONAL REQUIREMENTS
ITEM 5 - DISADVANTAGED BUSINESS ENTERPRISE (DBE) SOLICITATION

The Bidder must complete Proposal Attachment: Part F-Additional Requirements, Item 5, Disadvantaged Business Enterprise (DBE) Solicitation, which is the Iowa Department of Natural Resources, State Revolving Fund Program, Attachment 3, Disadvantaged Business Enterprise (DBE) Solicitation form dated January 2021. This form must be submitted with the Proposal.

PROPOSAL ATTACHMENT: PART F - ADDITIONAL REQUIREMENTS
ITEM 6 - UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, DISADVANTAGED BUSINESS ENTERPRISE PROGRAM, DBE SUBCONTRACTOR PERFORMANCE FORM

The Bidder must complete Proposal Attachment: Part F - Additional Requirements, Item 6, United States Environmental Protection Agency, Disadvantaged Business Enterprise Program, DBE Subcontractor Performance Form, Attachment 4, EPA Form 6100-3 (DBE Subcontractor Performance Form) dated January 2021. This form must be submitted with the Proposal.

PROPOSAL ATTACHMENT: PART F - ADDITIONAL REQUIREMENTS
ITEM 7 - UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, DISADVANTAGED BUSINESS ENTERPRISE PROGRAM, DBE SUBCONTRACTOR UTILIZATION FORM

The Bidder must complete Proposal Attachment: Part F - Additional Requirements, Item 7, United States Environmental Protection Agency, Disadvantaged Business Enterprise Program, DBE Subcontractor Utilization Form, Attachment 5, EPA Form 6100-4 (DBE Subcontractor Utilization Form) dated January 2021. This form must be submitted with the Proposal.

PROPOSAL ATTACHMENT: PART F - ADDITIONAL REQUIREMENTS
ITEM 8 - UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE OR EQUIPMENT FORM

The Bidder must complete Proposal Attachment: Part F - Additional Requirements, Item 8, United States Environmental Protection Agency, Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment Form, Attachment 10, dated January 2021. This form must be submitted with the Proposal.

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 original, 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

January 2021

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 will be prohibited from the bidding process. The excluded parties records search engine is located at the System for Award Management (SAM) website: <https://www.sam.gov/SAM/>. Pursuant to 2 CFR Part 180, as supplemented by 2 CFR 1532, any entity submitting a bid while the SAM website lists that entity as having an active exclusion will be determined by the DNR to be a non-responsive bidder and will not be able to receive SRF funding.

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 or 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 for cause or default.

I understand that a false statement on this certification may be grounds 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.

January 2021

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 know 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 <https://secure.iowadot.gov/DBE/Home/Index/>.

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:	<input type="checkbox"/> Minority-Owned <input type="checkbox"/> Women-Owned

January 2021

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/offerors 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.

January 2021

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.

January 2021

**PROPOSAL ATTACHMENT: PART F – ADDITIONAL REQUIREMENTS
 ITEM 6 – UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, DISADVANTAGED
 BUSINESS ENTERPRISE PROGRAM, DBE SUBCONTRACTOR PERFORMANCE FORM**

**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)

**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 <input type="checkbox"/> DOT <input type="checkbox"/> SBA <input type="checkbox"/> Other: _____		Meets/exceeds EPA certification standards? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> 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.

**PROPOSAL ATTACHMENT: PART F – ADDITIONAL REQUIREMENTS
 ITEM 6 – UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, DISADVANTAGED
 BUSINESS ENTERPRISE PROGRAM, DBE SUBCONTRACTOR PERFORMANCE FORM (CONTINUED)**

**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

**PROPOSAL ATTACHMENT: PART F – ADDITIONAL REQUIREMENTS
 ITEM 7– UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, DISADVANTAGED
 BUSINESS ENTERPRISE PROGRAM, DBE SUBCONTRACTOR UTILIZATION FORM**

**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)

**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.

**PROPOSAL ATTACHMENT: PART F – ADDITIONAL REQUIREMENTS
 ITEM 7 – UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, DISADVANTAGED
 BUSINESS ENTERPRISE PROGRAM, DBE SUBCONTRACTOR UTILIZATION FORM (CONTINUED)**

**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

IASRF6100-4 DBE Subcontractor Utilization Form – Page 2

January 2021

Attachment 10

SRF Required Front-End Specifications

(This form must be completed and signed by Prime Contractor and submitted with the bid)

PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT

This term and condition implements 2 CFR 200.216 and is effective for obligations and expenditures of EPA financial assistance funding on or after 8/13/2020. EPA recipients and subrecipients, including borrowers under EPA funded revolving loan fund programs, are prohibited from obligating or expending loan or grant funds to:

- (a) Procure or obtain, extend or renew a contract to procure or obtain;
- (b) Enter into a contract (or extend or renew a contract) to procure; or
- (c) Obtain the equipment, services, or systems that use "covered telecommunications equipment or services" identified in the regulation as a substantial or essential component of any system, or as critical technology as part of any system.

Certain equipment, systems, or services, including equipment, systems, or services produced or provided by entities subject to the prohibition are recorded in the System for Award Management exclusion list, website: <https://www.sam.gov/SAM/>.

- (1) As described in Public Law 115-232, section 889, covered telecommunications equipment or services includes:
 - (i) Telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).
 - (ii) For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).
 - (iii) Telecommunications or video surveillance services provided by such entities or using such equipment.
 - (iv) Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

(2) Consistent with 2 CFR 200.471, costs incurred for telecommunications and video surveillance services or equipment such as phones, internet, video surveillance, and cloud servers are allowable except for the following circumstances:

- (i) Obligating or expending EPA funds for covered telecommunications and video surveillance services or equipment or services to procure (enter into, renew or extend contracts) or obtain the equipment, services, or systems as described in 2 CFR 200.216.

I understand the above prohibitions and certify that the project will be in compliance with all the requirements.

Typed Name & Title of Authorized Representative

Signature of Authorized Representative

Date

January 2021



BID BOND

KNOW ALL BY THESE PRESENTS:

That we, _____, as Principal, and _____, as Surety, are held and firmly

bound unto the Des Moines Metropolitan Wastewater Reclamation Authority, as Obligee (hereinafter the "Jurisdiction"), in the penal sum of

_____ dollars

(\$ _____) lawful money of the United States, for which payment the Principal and Surety bind themselves, their heirs, executors, administrators, successors, and assigns jointly and severally, firmly by these presents.

The Principal has submitted to the Jurisdiction a proposal to enter into a contract in writing, for the following described improvements:

WRF Clarifier Improvements Phase 2, 042022024

The improvement includes phased removal and replacement of twelve (12) secondary clarifier mechanisms, installation of clarifier launder and effluent channel covers and removal and replacement of flow control gates; including all necessary materials, equipment, labor, miscellaneous associated work, and cleanup; all in accordance with the contract documents, including Plan File No. 643-182/205, located at the Wastewater Reclamation Facility, 3000 Vandalia Road, Des Moines, Iowa

The Surety hereby stipulates and agrees that the obligations of the Surety and its Bond will be in no way impaired or affected by any extension of the time within which the Jurisdiction may accept the Bid or execute a Contract; and the 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 will be Polk County, State of Iowa. If legal action is required by the Jurisdiction against the Surety or Principal to enforce the provisions of this bond or to collect the monetary obligation accruing to the benefit of the Jurisdiction, the Surety or Principal agrees to pay the Jurisdiction all outlay and expense incurred by the Jurisdiction in enforcing any of the provisions of this Bond. All rights, powers, and remedies of the Jurisdiction are cumulative and not alternative and are in addition to all rights, powers and remedies given to the Jurisdiction by law. The Jurisdiction may proceed against the Surety for any amount guaranteed hereunder whether action is brought against Principal or whether or not the Principal is joined in the action. As used herein, the phrase "all outlay and expense" is not to be limited in any way, but includes 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, outside experts, attorneys fees (including overhead expenses of the Jurisdiction's staff attorneys), and all costs and expenses of litigation as they are incurred by the Jurisdiction.

If the proposal by the Principal is accepted and the Principal enters into a contract with the Jurisdiction in accordance with the terms of the proposal, including the provision of insurance and bond as specified in the contract documents with good and sufficient surety for the faithful performance of the contract, for the prompt payment of labor and material furnished in the prosecution of the work, and for the maintenance of the improvements as may be required in the contract documents or, in the event the Principal does not enter into a contract and provide the required insurance and bonds, the Principal pays the penal sum to the Jurisdiction, then this obligation will become null and void; otherwise, the Surety 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 _____

<p>SURETY:</p> <p>_____</p> <p>Surety Company</p> <p>By _____</p> <p>Signature Attorney-in-Fact/Officer</p> <p>_____</p> <p>Name of Attorney-in-Fact/Officer</p> <p>_____</p> <p>Company Name</p> <p>_____</p> <p>Company Address</p> <p>_____</p> <p>City, State Zip Code</p> <p>_____</p> <p>Company Telephone Number</p>	<p>PRINCIPAL:</p> <p>_____</p> <p>Bidder</p> <p>By _____</p> <p>Signature</p> <p>_____</p> <p>Name</p> <p>_____</p> <p>Title</p> <p>_____</p> <p>Address</p> <p>_____</p> <p>City, State Zip Code</p> <p>_____</p> <p>Telephone Number</p>
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NOTE:

1. **All signatures on this bid bond must be original signatures in ink; copies or facsimile of any signature will not be accepted.**
2. **This bond must be sealed with the Surety's raised, embossed seal.**
3. **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 security watermark.**
4. **The name and signature of the Surety's Attorney-in-Fact/Officer entered on this bond must be exactly as listed on the Certificate or Power of Attorney accompanying this bond.**

ENGINEERING DEPARTMENT
CITY OF DES MOINES, IOWA

CONTRACT NO. _____
DATE 3/21/2023
WRA BOARD RESOLUTION NO. _____

CONTRACT

THIS CONTRACT, made and entered into at Des Moines, Iowa, on _____, by and between the Des Moines Metropolitan Wastewater Reclamation Authority, by its WRA Board Chair, upon order of its Des Moines Metropolitan Wastewater Reclamation Authority Board, hereinafter the "Jurisdiction", and _____, hereinafter the "Contractor".

WITNESSETH:

The Contractor hereby agrees to complete the work comprising the below referenced improvement as specified in the contract documents, which are officially on file with the Jurisdiction, in the Des Moines City Engineer's Office. This contract includes all contract documents. The work under this contract shall be constructed in accordance with the SUDAS Standard Specifications, 2022 Edition; and as further modified by the supplemental specifications and special provisions included in said contract documents, and the Contract Attachments attached hereto. The Des Moines City Engineer is the Engineer. 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: Item 2: Bid Items, Quantities and Prices which were proposed by the Contractor in its proposal submitted in accordance with the Notice to Bidders for the following described improvements:

WRF Clarifier Improvements Phase 2, 042022024

The improvement includes phased removal and replacement of twelve (12) secondary clarifier mechanisms, installation of clarifier launder and effluent channel covers and removal and replacement of flow control gates; including all necessary materials, equipment, labor, miscellaneous associated work, and cleanup; all in accordance with the contract documents, including Plan File No. 643-182/205, located at the Wastewater Reclamation Facility, 3000 Vandalia Road, Des Moines, Iowa

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, payment, and maintenance bond. The Contractor hereby agrees to commence work under this contract on or after the date a written Notice to Proceed is issued by the Jurisdiction and to fully complete the project not later than October 2, 2026; and to pay liquidated damages for noncompliance with completion provisions in the amount of One Thousand Two Hundred and 00/100 dollars(\$1,200.00), for each calendar day thereafter that the work remains incomplete.

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

<p>JURISDICTION:</p> <p>By _____ Sara Kurovski, WRA Board Chair</p> <p>(Seal) ATTEST:</p> <p>_____</p> <p>Chelsea Huisman, Board Secretary</p> <p>FORM APPROVED BY:</p> <p>_____</p> <p>Kathleen Vanderpool, Deputy City Attorney</p>	<p>CONTRACTOR:</p> <p>_____</p> <p style="text-align: center;">Contractor</p> <p>By _____</p> <p>Signature</p> <p>_____</p> <p style="text-align: center;">Title</p> <p>_____</p> <p style="text-align: center;">Street Address</p> <p>_____</p> <p style="text-align: center;">City, State - Zip Code</p> <p>_____ / _____</p> <p style="text-align: center;">Telephone Number / Email Address</p>
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CONTRACTOR PUBLIC REGISTRATION INFORMATION To Be Provided By:

1. All Contractors: The Contractor's Public Registration Number, issued by the Iowa Commissioner of Labor pursuant to Section 91C.5 of the Iowa Code, is as follows:
Number

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 City 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 be a corporation organized under the laws of a state other than Iowa, shall file with the 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, or as amended, governing foreign corporations. For further information contact the Iowa Secretary of State Office at 515-281-5204.

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

CORPORATE ACKNOWLEDGEMENT

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; _____ 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 _____
My commission
expires _____

CONTRACT ATTACHMENT: ITEM 1: GENERAL

1. The Contractor acknowledges and agrees:
 - To comply with the Equal Employment Opportunity Program included in the City of Des Moines Contract Compliance Program, which is available at the following website [http://www.dmgov.org/Departments/Engineering/PDF/Contract%20Compliance%20Program%20\(June%202017\).pdf](http://www.dmgov.org/Departments/Engineering/PDF/Contract%20Compliance%20Program%20(June%202017).pdf) > or from the City Engineer's Office.
 - To comply with any and all applicable provisions of the Des Moines Human Rights Ordinance, Chapter 62, of the Des Moines Municipal Code.
 - Not to discriminate against any employees, or applicants for employment, on the basis of age, race, religion, creed, color, sex, sexual orientation, national origin, ancestry, disability, familial status or gender identity.
 - To include this provision in all subcontracts for this project.
2. The Contractor agrees to comply with the requirements of the Des Moines Metropolitan Wastewater Reclamation Authority Contract Compliance Program as referenced in the proposal. Final acceptance of the project will not be made until the Contractor has submitted to the City Engineer a notarized summary of payments to and scope of work by all DBE/TSB subcontractors.
3. The City of Des Moines Master Construction Safety Packet (Safety Plan) is available at <http://www.dmgov.org/Departments/Engineering/PDF/MasterConstructionSafetyPacket.pdf> and is also available upon request from the Engineering Department. The Engineering Department will make available a copy of the City of Des Moines Safety Plan to the Contractor when the contract is awarded. The Contractor understands and agrees that said Safety Plan is for the Contractor's information only and that it is the Contractor's sole responsibility to provide, or make available, this safety information to all its Subcontractors.
4. The Contractor understands and agrees that the construction of the work included in this contract is by its nature dangerous work. The Contractor agrees:
 - That the Contractor should have a safety program; however, the Contractor need not submit a safety program to the Des Moines Metropolitan Wastewater Reclamation Authority, and Des Moines Metropolitan Wastewater Reclamation Authority staff will not review or approve the Contractor's safety program. The Des Moines Metropolitan Wastewater Reclamation Authority assumes that the Contractor will maintain a safe worksite; however, Des Moines Metropolitan Wastewater Reclamation Authority staff will not intrude in the Contractor's responsibility for safety issues.
 - That until the work is accepted by the Jurisdiction; the work shall be in the custody of and under the charge, care, and control of the Contractor.
 - That the Contractor is responsible for the project area or work site.
 - That the Contractor is solely responsible for the safety of everyone on its work site.
 - That it is the Contractor's sole responsibility to provide as safe a working site as possible given the nature of the work.
 - That it is the Contractor's responsibility to notify and advise its employees, subcontractors, suppliers, and everyone on the worksite of the dangers associated with the work, and provide them with appropriate safety information to protect them from those dangers.
5. The Contractor acknowledges and agrees that no contract shall be binding upon the Des Moines Metropolitan Wastewater Reclamation Authority until said contract has been executed by the Bidder, and shall have been approved by the Des Moines Metropolitan Wastewater Reclamation Authority Board and executed by the WRA Board Chair and attested to by the Board Secretary.

6. The Contractor agrees that sixty (60) days shall constitute a reasonable time within which it shall be required to make progress payments or final payment to subcontractors after each subcontractor's satisfactory performance of its work, all as required by Section 573.12 2.b.(2) of the Code of Iowa.

CONTRACT ATTACHMENT: ITEM 2 - BID ITEMS, QUANTITIES AND PRICES: 1 of 1

This contract is awarded and executed for completion of the work specified in the contract documents for the bid price 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. Quantity changes which amount to twenty (20) percent or less of the amount bid shall not affect the unit bid price of that item.

Activity ID: 04-2022-024

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>UNITS</u>	<u>ESTIMATED QUANTITY</u>	<u>UNIT PRICE</u>	<u>AMOUNT</u>
1	WRF Clarifier Improvements Phase 2, Complete as Specified and Described in Contract Documents	LS	1	\$ _____	\$ _____
2	Concrete Surface Repair, Complete as Specified and Described in Contract Documents	SF	100	\$ _____	\$ _____
3	Concrete Crack Repair, Complete as Specified and Described in Contract Documents	LF	200	\$ _____	\$ _____
TOTAL BASE BID				\$ _____	\$ _____
Deduct Alternate No. 1	Deductive Alternative Cost for twelve (12) FRP clarifier launder covers in Lieu of aluminum launder covers Included as Part of Bid Item No. 1 Base Bid, Complete as Specified and Described in Contract Documents	LS	1	\$ _____	\$ _____
TOTAL CONSTRUCTION COST (BASE BID PLUS DEDUCT ALTERNATE NO.1)				\$ _____	\$ _____

FOR INFORMATION ONLY

PERFORMANCE, PAYMENT & MAINTENANCE BOND

KNOW ALL BY THESE PRESENTS:

That we, _____, as Principal (the "Contractor" or "Principal"), and _____, as Surety, are held and firmly bound unto the Des Moines Metropolitan Wastewater Reclamation Authority, as Obligee (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 and severally, firmly by these presents.

The conditions of the above obligations are such that whereas the Contractor entered into a contract with the Jurisdiction, bearing the date of _____, (the "Contract") wherein the Contractor undertakes and agrees to construct the following described improvements:

WRF Clarifier Improvements Phase 2, 042022024

The improvement includes phased removal and replacement of twelve (12) secondary clarifier mechanisms, installation of clarifier launder and effluent channel covers and removal and replacement of flow control gates; including all necessary materials, equipment, labor, miscellaneous associated work, and cleanup; all in accordance with the contract documents, including Plan File No. 643-182/205, located at the Wastewater Reclamation Facility, 3000 Vandalia Road, Des Moines, Iowa

and to faithfully perform all the terms and requirements of the Contract within the time specified, in a good and workmanlike manner, and in accordance with the Contract Documents. Provided however, that one year after the date of acceptance by the Jurisdiction as complete, of the work under the above referenced Contract, the maintenance portion of this Bond shall continue in force but the penal sum for maintenance shall be reduced to _____dollars (\$ _____), which is the cost associated with those items shown on the Proposal and in the Contract which require a maintenance bond period in excess of one year.

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

1. **PERFORMANCE:** The Contractor shall well and faithfully observe, perform, fulfill and abide by each and every covenant, condition and part of the Contract and Contract Documents, by reference made a part hereof, and shall indemnify and save harmless the Jurisdiction from all outlay and expense incurred by the Jurisdiction by reason of the Contractor's default or 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.

2. **PAYMENT:** The Contractor and Surety on this bond hereby agree to pay all just claims submitted by persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the performance of the Contract, 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 unless the claims have been established as provided by law. The Contractor and Surety hereby bind themselves to the obligations and conditions set forth in Iowa Code Chapter 573.

3. **MAINTENANCE:** The Contractor and the Surety shall, at their own expense:
 - A. Remedy any and all defects that may develop in or result from work to be performed under the Contract within the period of one (1) year(s) from the date of acceptance of the work under the Contract, by reason of defects in workmanship or materials used in construction of the work;
 - B. Keep all work in continuous good repair; and
 - C. Pay the Jurisdiction's reasonable costs of monitoring and inspecting to assure that any defects are remedied, and to repay the Jurisdiction all outlay and expense incurred as a result of Contractor's and Surety's failure to remedy any defect as required by this section.

Contractor's and Surety's obligation extends to defects in workmanship or materials not discovered or known to the Jurisdiction at the time the work was accepted.

4. **GENERAL:** Every Surety on this Bond shall be deemed and held bound, any contract to the contrary notwithstanding, to the following provisions:
 - A. To consent without notice to any extension of time to the Contractor in which to perform the Contract;
 - B. To consent without notice to any change in the Contract or Contract Documents, that 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
 - C. 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 liquidated damages are being charged against the Contractor.

5. The Contractor and every Surety on this Bond shall be deemed and held bound, any contract to the contrary notwithstanding, to the following provisions:
 - A. 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.

- B. 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 as 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, attorneys 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.
- C. 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 Polk 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 accruing to the benefit of the Jurisdiction, the Contractor and Surety agree, jointly and severally, to pay the Jurisdiction all outlay and expense incurred 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 the Surety for any amount guaranteed hereunder whether action is brought against the Contractor or whether or not the Contractor is joined in the action.

NOW THEREFORE, the condition of this obligation is such that if the Principal shall faithfully perform all of 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 word, 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.

Witness our hands, in triplicate, this _____ day of _____, 20_____

<p>PRINCIPAL:</p> <p>_____</p> <p style="text-align: center;">Contractor</p> <p>By _____</p> <p>Signature</p> <p>_____</p> <p style="text-align: center;">Title</p> <p>FORM APPROVED BY:</p> <p>_____</p> <p>Kathleen Vanderpool Deputy City Attorney</p>	<p>SURETY:</p> <p>_____</p> <p>Surety Company</p> <p>By _____</p> <p>Signature Attorney-in-Fact/Officer</p> <p>_____</p> <p>Name of Attorney-in-Fact/Officer</p> <p>_____</p> <p>Company Name</p> <p>_____</p> <p>Company Address</p> <p>_____</p> <p>City, State Zip Code</p> <p>_____</p> <p>Company Telephone Number</p>
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NOTE:

1. **All signatures on this performance, payment & maintenance bond must be original signatures in ink; copies or facsimile of any signature will not be accepted.**
2. **This bond must be sealed with the Surety’s raised, embossed seal.**
3. **The Certificate or Power of Attorney accompanying this bond must be valid on its face and sealed with the Surety’s raised, embossing seal.**
4. **The name and signature of the Surety's Attorney-in-Fact/Officer entered on this bond must be exactly as listed on the Certificate or Power of Attorney accompanying this bond.**
5. **This bond form must be utilized as printed; no additions/deletions/alterations are permitted, other than providing the required information.**

**ENGINEERING DEPARTMENT
CITY OF DES MOINES, IOWA**

**SPECIAL PROVISION
BIDDING REQUIREMENTS
ON
WRF CLARIFIER IMPROVEMENTS PHASE 2
ACTIVITY ID 04-2022-024**

1) AWARD OF CONTRACT

The apparent low Bidder on this project will be required to furnish executed contract; Performance, Payment, and Maintenance Bond; and Certificate of Insurance; and NPDES Certification Statements, if required, in substantial compliance with the contract documents to the City of Des Moines Engineering Department before 12:00 noon on Friday, March 17, 2023. Completed documents in accordance with the contract documents and acceptable to the City of Des Moines Engineering and Legal Departments will be presented to the Des Moines Metropolitan Wastewater Reclamation Authority Board for award of this contract on Tuesday, March 21, 2023. This would allow construction to begin upon issuance of the Notice to Proceed in accordance with the Special Provisions.

By submission of a bid, the Bidder agrees that if the Bidder fails to furnish said executed contract; Performance, Payment, and Maintenance Bond; and Certificate of Insurance; and NPDES Certification Statements, if required, in substantial compliance with the contract documents to the Des Moines Engineering Department before 12:00 noon on Friday, March 17, 2023; the amount of the Bidder's bid security may become the property of the Des Moines Metropolitan Wastewater Reclamation Authority and may be retained--not as a penalty but as liquidated damages. The award of the contract may then, at the discretion of the Des Moines Metropolitan Wastewater Reclamation Authority Board, be made to the next-lowest responsible Bidder, or the work may be readvertised or may be constructed by the Des Moines Metropolitan Wastewater Reclamation Authority Board in any legal manner. Notice to Proceed will not be issued until the Contractor's insurance is in compliance with the specifications.

The Bidder is reminded that all subcontractors must be approved by the Des Moines Metropolitan Wastewater Reclamation Authority Board at the time the contract is awarded, if possible. The Bidder should submit a letter requesting approval of any subcontractors along with the subcontractor's NPDES Certification Statement, if required, at the time its executed contracts are submitted for approval.

2) BIDDING AND CONTRACT PROCESS INCLUDING CONTRACT COMPLIANCE PROGRAM

On February 12, 2007, under Roll Call Number 07-291, the Des Moines City Council approved bidding and contracting process changes for construction of public improvements. In accordance with the Initial Operating Contract with the City of Des Moines approved by the WRA Board under WRA Board Resolution Number 04-017, the City of Des Moines Engineering Department shall utilize its standard Bidding/Contracting Process for construction of WRA Improvements. The standard Bidding/Contracting Process included with said Roll Call 07-291 shall apply on this WRA project except of the following:

- The Change Order Process revisions shall not apply as the WRA Board has previously approved its own change order policy.
- The Equal Employment Opportunity (EEO) Program included in the Des Moines Contract Compliance Program shall apply to all WRA projects as state and federal law mandate these requirements; however, the Disadvantaged Business Enterprise/Targeted Small Business (DBE/TSB) Program shall not apply to projects funded solely with WRA funds. If federal or state funds include DBE or TSB requirements, these requirements will be included in those projects by special provision.

Said Roll Call 07-291 is available on the Engineering Department website at http://www.dmgov.org/departments/ENG/Bid_Information/index.htm and includes an updated, revised Contract Compliance Program for the City of Des Moines, which is available at the same website.

3) ALTERNATE SALES AND USE TAX

Section 1020, 1.08, B, of the General Supplemental Specifications shall apply to this contract. The bidder should not include sales tax in the bid pursuant to Iowa Code. A sales tax exemption certificate will be available for all material purchased for incorporation in the project. Complete information on qualifying materials and supplies can be found at www.state.ia.us/tax, the Iowa Department of Revenue and Finance (IDRF) Web site. Links are found in the Business Taxes and Local Government categories. Contact the IDRF at idrf@idrf.state.ia.us if you have questions on this requirement.

ENGINEERING DEPARTMENT
CITY OF DES MOINES, IOWA

**SPECIAL PROVISION
CONTRACTUAL REQUIREMENTS
ON**

**WRF CLARIFIER IMPROVEMENTS PHASE 2
ACTIVITY ID 04-2022-024**

PROPERTY INSURANCE – INSTALLATION FLOATER

The Jurisdiction will not purchase and maintain Builder's Risk Insurance on this project as referenced in the General Supplemental Specifications in Section 1070, 3.05A.2 (Builder's Risk Insurance by the Jurisdiction). The Contractor shall purchase and maintain an Installation Floater as referenced in the General Supplemental Specifications in Section 1070, 3.05A.3 (Installation Floater).

SPECIAL PROVISION
SRF REQUIRED FRONT-END SPECIFICATIONS
ON
WRF CLARIFIER IMPROVEMENTS PHASE 2
ACTIVITY ID 04-2022-024

- 1) **Exhibit 12A - SRF Required Front-End Specifications – January 2021.** The enclosed Exhibit 12A - SRF Required Front-End Specifications – January 2021, shall apply to this project. Several of these forms are required to be submitted by the bidder in its proposal and those forms have been reproduced and included in the proposal document. Several of these forms are self-explanatory; however, the following clarifications will be utilized on this project.
- a. **Attachment 1, Certification of Non-Segregated Facilities.** This attachment is self-explanatory.
 - b. **Attachment 2, Debarments and Suspensions and Certification Regarding Debarment, Suspension, and Other Responsibility Matters.** This attachment is self-explanatory.
 - c. **Attachment 3, Disadvantaged Business Enterprise (DBE) Solicitation – Additional Information and Clarification.**
 - i. The first table on Page 1 of this IDNR/EPA form lists MBE and WBE Goals for various elements and an average. The first paragraph under this table states that only DBE's certified by the Iowa Department of Transportation (IDOT) can be counted toward the goal. Engineering Department Staff contacted Chester Stovall, US EPA, 913-551-7549, for clarifications regarding the EPA DBE requirements and received the following information and form clarifications.
 - ii. Since this is a construction project, the 1.7% MBE and the 2.2% WBE goals apply to this project. The form also states that only DBE's certified by the IDOT may be counted toward this goal. The IDOT certifies DBEs not MBEs and WBEs. However, Engineering Department Staff have contacted Mr. Len A. Hill, IDOT Office of Contracts, 515-239-1833, who has stated that the IDOT has included on the DBE certification/renewal letter that the DBE is certified as a W-DBE (Women Disadvantaged Business Enterprise, which is referred to in the Attachments as a Women-Owned Business Enterprise (WBE)) or an M-DBE (Minority Disadvantaged Business Enterprise, which is referred to in the Attachments as a Minority-Owned Business Enterprise (MBE)). Therefore, the bidder should be able to obtain the minority (MBE) or women (WBE) certification information from the DBE to properly complete Attachments 3, 4, and 5.
 - iii. Chester Stovall stated that the EPA DBE program is a good faith effort program, and the bidder must make efforts to contact and utilize DBEs in its bid. The Good Faith Efforts Checklist is to be used to measure the bidder's efforts and compliance with the program.
 - iv. Page 2, Good Faith Efforts Checklist, Item 2, references 30-day notice to DBE's. The project has a two week bid period, so the WRA expects the bidders to contact DBE as soon as possible of their interest in bidding this project, and would expect a reasonable notice if the bidder checks the "YES" box. This project has been on the City's design and contract schedule for some time, and the City will send notices to DBE's as part of its Good Faith Efforts to solicit DBEs.

- v. Page 2, Good Faith Efforts Checklist, Item 4, references encouraging contracting with a consortium of DBEs when the contract is too large for a DBE to handle individually. The bidder may also check this box YES if it would consider utilizing a small DBE for a small portion of the work; for example a DBE trucker with one truck to do a portion of the trucking.
- vi. Page 2, Good Faith Efforts Checklist, Item 5, references using the services of the Small Business Administration and Minority Business Development Agency to identify potential subcontractors. Since only DBEs certified by the IDOT can be counted toward the goal, the bidder should document by checking the “YES” box if it has utilized the IDOT’s 2015 Iowa Directory of Certified Disadvantaged Business Enterprises to identify potential DBE subcontractors.
- vii. DBEs shall be certified by the IDOT; however, the Good Faith Efforts measurements of the IDOT do NOT apply to this project. The bidder is required to make Good Faith Efforts to contact and solicit DBE participation as stated in Items 1–5 on Page 2, AND is required to list the potential DBE subcontractors that were contacted on the table under Item 6. Note that the form specifically states “potential subcontractors that were contacted”, so simply identifying one DBE subcontractor, and using that DBE subcontractor, will probably NOT be considered a Good Faith Effort.
- viii. This attachment must be submitted with the proposal.

d. **Attachment 4, DBE Subcontractor Performance Form - Additional information and Clarification.**

- i. This IDNR/EPA form is for identification of DBE quotations received. Only IDOT certified DBEs shall be identified and submitted on these forms. The bidder must submit Attachment 4 for each DBE it lists on Attachment 5; the bidder need not submit these forms for any DBE that the bidder does not intend to use on this project. The bidder need not identify non-DBE subcontractors on this form.
- ii. Attachment 4 has a signature space for both the prime contractor and the DBE subcontractor. The WRA recognizes that this will require extra time to prepare the bid. Therefore, the WRA will accept a copy of the signature by the DBE subcontractor. The DBE subcontractor should prepare/complete the form, sign it, and may fax or e-mail it to the prime bidder. The prime bidder should sign the form for DBEs it intends to use on this project and submit its original signature document with its proposal. The WRA reserves the right to verify signatures with the DBE.
- iii. If the bidder does not intend to use any DBEs on the project and has not listed any DBEs on Attachment 5, the bidder should complete the space provided to identify the project and the Prime Contractor Name, insert NONE in the space provided for the Name of Subcontractor and/or Item of Work or Description of Services Bid to Prime, and sign in the space provided for Signature of Prime Contractor.
- iv. This attachment must be submitted with the proposal.

e. **Attachment 5, DBE Subcontractor Utilization Form - Additional information and Clarification.**

- i. This IDNR/EPA form is for identification of DBE quotations used by the bidder in its bid, and to identify DBE subcontractors that will be used in the contract work. Only IDOT certified DBEs shall be identified and submitted on this form. The bidder need not identify non-DBE subcontractors on this form.
- ii. The bidder is still required to complete the Proposal Attachment, Part F, Item 1, Identity of Subcontractors, which requires the bidder to identify ALL subcontractors or assignees with a value of \$25,000 or greater. This is a WRA requirement.
- iii. The prime bidder must submit its original signature document with its proposal showing all DBEs it intends to use on the project.

- iv. If the bidder does not intend to use any DBEs on the project, the bidder should complete the space provided to identify the bidder and the project; insert NONE in the space provided for the Company Name, Address, Phone No. and e-mail address of the DBE subcontractor to be used on this project and/or in the space provided for Type of Work to be Performed; and sign in the space provided for Signature of Prime Contractor and complete the spaces for the identification of the person signing the document on behalf of the bidder.
 - v. This attachment must be submitted with the proposal.
- f. **Attachment 6, DBE Subcontractor Participation Form - Additional information and Clarification.**
- i. This form is NOT required to be submitted with the bid.
 - ii. This form is for the voluntary use of the DBE subcontractor, and if utilized should be submitted directly to the US EPA as stated on the bottom of the form.
- g. **Attachment 7, Other Federal Requirements Language.** These attachments are self-explanatory; however, 7 (B) is the Federal Labor Standards Provisions, which referenced Davis-Bacon prevailing wage rates. General Wage Decision IA20220028 06/03/22 shall apply to this project and is included in Attachment 11.
- h. **Attachment 8, Right of Entry and Records Retention.** This attachment is self-explanatory.
- i. **Attachment 9, Use of American Iron and Steel.** Iron and steel items used on the project as noted in the attachment shall be produced in the United States.
- j. **Attachment 10, Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment.** Certain equipment, systems or services are prohibited as noted in the attachment.
- k. **Attachment 11, Davis-Bacon Prevailing Wage Rates** General Wage Decision General Wage Decision IA20220003 02/25/2022 shall apply to this project and is included in Attachment 11.

SRF Required Front-End Specifications

PLEASE NOTE: Attachment 10 is a new program requirement and is effective for all SRF projects bid after January 2021.



- 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
- Attachment 10: Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment
(to be completed and signed by Prime Contractor and submitted with the bid)
- Attachment 11: Davis-Bacon Prevailing Wage Rates

****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 original, 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 will be prohibited from the bidding process. The excluded parties records search engine is located at the System for Award Management (SAM) website: <https://www.sam.gov/SAM/>. Pursuant to 2 CFR Part 180, as supplemented by 2 CFR 1532, any entity submitting a bid while the SAM website lists that entity as having an active exclusion will be determined by the DNR to be a non-responsive bidder and will not be able to receive SRF funding.

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 or 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 for cause or default.

I understand that a false statement on this certification may be grounds 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.

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 know 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 <https://secure.iowadot.gov/DBE/Home/Index/>.

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: <input type="checkbox"/> Minority-Owned <input type="checkbox"/> 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/offerors 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)

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 <input type="checkbox"/> DOT <input type="checkbox"/> SBA <input type="checkbox"/> Other: _____		Meets/exceeds EPA certification standards? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> 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.

**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

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)

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.

**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

Attachment 6
SRF Required Front-End Specifications
(This form is for the voluntary use of DBE Subcontractors)

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. **The use of this form by DBE subcontractors is voluntary and is not required for bidding.** 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.

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 Offerors 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	
IA Benton, IA Cedar, IA Iowa, IA Johnson, IA, Jones, IA, Washington	1.5
101 Waterloo, IA:	
SMSA Counties:	
8920 Waterloo-Cedar Falls, IA	4.7
IA Black Hawk	
Non-SMSA Counties	
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	2.0
102 Fort Dodge, IA:	
Non-SMSA Counties	
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	0.4
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/whd/programs/dbra/forms.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 subcontractors 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 (and 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 search engine is located at the System for Award Management (SAM) website: <https://www.sam.gov/SAM/>.

**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.

567 Iowa Administrative Code paragraph 92.8(2).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: <https://www.epa.gov/cwsrf/state-revolving-fund-american-iron-and-steel-ais-requirement>. 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 (XXXXXXXXXXXX)

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 Minimis incidental components of eligible water and wastewater infrastructure projects. Funds used for such De Minimis 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 Minimis 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.

In consultation with their contractors, assistance recipients should determine the items to be covered by this waiver and must retain relevant documentation (i.e. invoices) as to those items. Assistance recipients 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 iron and steel 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 - January 2021
 Based on EPA Memorandum (4/15/2014): De Minimis Waiver of Section 436 of P.L. 113-76, Consolidated Appropriation Acts (CAA), 2014

Project:

Bidder: Date:

*Covered Product Categories 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 Category*	Description of Covered Products	Documentation Will be Obtained	Item is Incidental and will be claimed under De Minimis Waiver**	Bid Amount Covered Products	Bid Amount Incidentals
1	Choose an item.	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
2	Choose an item.	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
3	Choose an item.	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
4	Choose an item.	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
5	Choose an item.	<input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>

At the end of construction, the contractor will submit a final list showing covered items being claimed as incidental components under the De Minimis Waiver. Assistance recipients will complete a De Minimis Waiver Incidental Components List for the entire project to demonstrate compliance with the De Minimis Waiver cost requirements outlined above.

American Iron and Steel - De Minimis Waiver Incidental Components List							
Iowa Department of Natural Resources – January 2021							
Based on EPA Memorandum (4/15/2014): De Minimis Waiver of Section 436 of P.L. 113-76, Consolidated Appropriation Acts (CAA), 2014							
<i>This form is to be used by the State Revolving Fund (SRF) applicant to identify all non-domestic iron and steel incidental components permanently incorporated into an SRF project that meet the requirements of the public interest De Minimis Waiver. This form can also be used by individual contractors to submit their final incidental components list to the SRF applicant.</i>							
SRF Applicant:							
SRF Project #:				Submitted By:			
Date:				Individual Contractor De Minimis List	<input type="checkbox"/>	Final De Minimis List for SRF Project	<input type="checkbox"/>
Total Materials Cost:			Total amount claimed as De Minimis Incidental Components:			Percent: <i>(must be 5% or less of total materials cost)</i>	
	Contractor Name	Covered Products	Description of Covered Products <i>(list each item type separately)</i>	Date Purchased	Individual Item/Unit Cost	Quantity Claimed as Incidental	Dollar Amount Incidental Components
<i>Example</i>	<i>JB Construction</i>	<i>Construction materials</i>	<i>Steel Doors</i>	<i>1-21-2020</i>	<i>\$500</i>	<i>5</i>	<i>\$2500</i>
1		Choose an item.					
2		Choose an item.					
3		Choose an item.					

These documents are available on-line at http://www.iowasrf.com/about_srf/use-of-american-iron-and-steel/.

Attachment 10
SRF Required Front-End Specifications
(This form must be completed and signed by Prime Contractor and submitted with the bid)

**PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE
SERVICES OR EQUIPMENT**

This term and condition implements 2 CFR 200.216 and is effective for obligations and expenditures of EPA financial assistance funding on or after 8/13/2020. EPA recipients and subrecipients, including borrowers under EPA funded revolving loan fund programs, are prohibited from obligating or expending loan or grant funds to:

- (a) Procure or obtain, extend or renew a contract to procure or obtain;
- (b) Enter into a contract (or extend or renew a contract) to procure; or
- (c) Obtain the equipment, services, or systems that use “covered telecommunications equipment or services” identified in the regulation as a substantial or essential component of any system, or as critical technology as part of any system.

Certain equipment, systems, or services, including equipment, systems, or services produced or provided by entities subject to the prohibition are recorded in the [System for Award Management](https://www.sam.gov/SAM/) exclusion list, website: <https://www.sam.gov/SAM/>.

(1) As described in Public Law 115-232, section 889, covered telecommunications equipment or services includes:

- (i) Telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).
- (ii) For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).
- (iii) Telecommunications or video surveillance services provided by such entities or using such equipment.
- (iv) Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

(2) Consistent with 2 CFR 200.471, costs incurred for telecommunications and video surveillance services or equipment such as phones, internet, video surveillance, and cloud servers are allowable except for the following circumstances:

- (i) Obligating or expending EPA funds for covered telecommunications and video surveillance services or equipment or services to procure (enter into, renew or extend contracts) or obtain the equipment, services, or systems as described in 2 CFR 200.216.

I understand the above prohibitions and certify that the project will be in compliance with all the requirements.

Typed Name & Title of Authorized Representative

Signature of Authorized Representative

Date

Attachment 11
Davis-Bacon Prevailing Wage Rates

"General Decision Number: IA20220003 02/25/2022

Superseded General Decision Number: IA20210003

State: Iowa

Construction Type: Heavy Sewer/Water Treating Plant

Counties: Iowa Statewide.

EXCEPT SCOTT COUNTY

SEWER AND WATER TREATMENT PLANTS ONLY

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least \$15.00 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 2022.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least \$11.25 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2022.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <https://www.dol.gov/agencies/whd/government-contracts>.

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 counties 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 <https://www.dol.gov/agencies/whd/government-contracts>.

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 National Office because National Office has 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 DECISIO"

ENGINEERING DEPARTMENT
CITY OF DES MOINES, IOWA

**SPECIAL PROVISION
TECHNICAL SPECIFICATIONS FOR
PROJECT MANUAL
ON**

**WRF CLARIFIER IMPROVEMENTS PHASE 2
ACTIVITY ID 04-2022-024**



Des Moines Municipal Wastewater
Reclamation Authority

WRF Clarifier Improvements - Phase 2

**Construction Documents
Technical Specifications**

Issued for Bid

06/27/2022




WRA Activity ID No. 04-2022-024

HDR Project No. 10098434



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Project Seals

	<p>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.</p> <p><i>Ronald J. Sova</i> <i>6/27/2022</i></p> <hr/> <p>Ronald J. Sova 06/27/2022</p> <p>License number: 12055</p> <p>My license renewal date is December 31, 2024</p> <p>Specifications covered by this seal:</p> <p>Coordinating Professional</p>
	<p>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.</p> <p><i>Adam A. Smith</i> <i>06/27/2022</i></p> <hr/> <p>Adam A. Smith 06/27/2022</p> <p>License number: 26134</p> <p>My license renewal date is December 31, 2023</p> <p>Specifications covered by this seal:</p> <p>Divisions: 01 (except 01 14 16), 02, 31, 32, 41</p> <p>Sections: 06 82 00, 40 05 50, 40 05 51, 40 05 52, 40 05 59, 40 05 59.16</p>
	<p>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.</p> <p><i>Rodney A. Kirkland</i> <i>6/27/22</i></p> <hr/> <p>Rodney A. Kirkland 06/27/2022</p> <p>License number: 15326</p> <p>My license renewal date is December 31, 2023</p> <p>Specifications covered by this seal:</p> <p>Divisions: 46</p> <p>Sections: 01 14 16, 06 85 14</p>



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.

Svein Magnussen 6/27/2022

Svein K. Magnussen 06/27/2022

License number: 23213

My license renewal date is December 31, 2023

Specifications covered by this seal:

Divisions: 03



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.

John S. Rickert 6.27.2022

John S. Rickert 06/27/2022

License number: 07169

My license renewal date is June 30, 2023

Specifications covered by this seal:

Divisions: 05, 07, 09, 10



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.

James A. Zavadil 06/27/2022

James A. Zavadil 06/27/2022

License number: 14165

My license renewal date is December 31, 2024

Specifications covered by this seal:

Divisions: 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.

Kaitlyn Elizabeth Rohloff 06/27/22

Kaitlyn E. Rohloff

06/27/2022

License number: 26651

My license renewal date is December 31, 2024

Specifications covered by this seal:

Sections: 40 61 13, 40 61 93, 40 61 93A, 40 67 00, 40 72 00, 40 90 05

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- 32 92 00 - SEEDING, SODDING AND LANDSCAPING

DIVISION 40 — PROCESS INTERCONNECTIONS

- 40 05 50 - ELECTRIC ACTUATORS
- 40 05 51 - VALVES - BASIC REQUIREMENTS
- 40 05 52 - MISCELLANEOUS VALVES
- 40 05 59 - FABRICATED STAINLESS STEEL SLUICE GATES
- 40 05 59.16 - FIBERGLASS REINFORCED PLASTIC STOP LOGS
- 40 61 13 - PROCESS CONTROL SYSTEMS GENERAL REQUIREMENTS
- 40 61 93 - PROCESS CONTROL SYSTEM INPUT-OUTPUT LIST
- 40 61 93A - I-O List
- 40 67 00 - CONTROL SYSTEM EQUIPMENT PANELS AND RACKS
- 40 72 00 - LEVEL INSTRUMENTATION
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DIVISION 41 — MATERIAL PROCESSING AND HANDLING EQUIPMENT

- 41 22 20 - DAVIT CRANES

DIVISION 46 — WATER AND WASTEWATER EQUIPMENT

46 13 19 - EFFLUENT LAUNDER COVERS

46 43 22 - SECONDARY CLARIFIER SOLIDS COLLECTION EQUIPMENT - CIRCULAR TANK
SUCTION HEADER TYPE

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DIVISION 01

GENERAL REQUIREMENTS



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SECTION 01 04 00
SPECIAL PROVISIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. These Special Provisions amend or supplement the Division One, General Provisions and Covenants and Division 2-11, Technical Specifications of the SUDAS Standard Specifications for Public Improvements and other provisions of the Contract Documents as indicated herein.
1. All provisions which are not so amended or supplemented remain in full force and effect.
 2. In case of discrepancy between these Special Provisions and the General Provisions and Covenants, these Special Provisions shall govern.

1.2 MODIFICATIONS TO DIVISION 1, GENERAL PROVISIONS AND COVENANTS, SECTION 1010 - DEFINITIONS

- A. Modify Paragraph 1.03, "Contract Documents", by adding the following:

“Approved Shop Drawings, other Contractor’s submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.”

- B. Modify Paragraph 1.03, "Definition and Terms", by adding the following:

"Work Change Directive—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Jurisdiction, which may be recommended by Engineer, ordering an addition, deletion, or revision in the Work. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

Field Order—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.

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."

- C. Modify Paragraph 1.03, "Engineer", to stipulate that HDR Engineering, Inc., 1917 S. 67th Street, Omaha, Nebraska is the Engineer.
- D. Modify Paragraph 1.03, "Plans", to stipulate that the term “Drawings” shall have the same meaning as “Plans.”
- E. Delete Paragraph 1.03, "Specialty Items", in its entirety.

1.3 MODIFICATIONS TO DIVISION 1, GENERAL PROVISIONS AND COVENANTS, SECTION 1020 - PROPOSAL REQUIREMENTS AND CONDITIONS

- A. Modify Paragraph 1.03 by adding the following at the end of the paragraph:

"E. Bid Form Description of Measurement and Payment.

1. Item 1, Base Bid Price for Des Moines Wastewater Reclamation Facility Clarifier Improvements – Phase 2: Under this item, Contractor shall be paid Lump Sum Bid Price on the Bid Form as full compensation for all work associated with the Des Moines Wastewater Reclamation Facility Clarifier Improvements – Phase 2 project, excluding the unit price bid items listed on the bid form, and Alternate Number 1 if selected by the Jurisdiction.
2. Item 2, Unit Price for Concrete Surface Repair: Unit Price Bid for a base bid quantity of concrete surface repair in existing concrete of 100 square feet. This bid item is for unanticipated concrete surface repairs identified, authorized by the Owner, and performed during construction. Payment for this item shall be made on the basis of the actual total square footage of concrete surface repair measured as marked and approved by the Owner. Unit price bid to include all costs for material, labor, equipment, surface preparation, and incidental items for concrete surface repair in accordance with the plans and specifications. Adjustment to bid price for the actual square footage of concrete surface repaired to be made in accordance with unit prices on the Bid Form.
3. Item 3, Unit Price for Concrete Crack Repair by Injection: Unit Price Bid for a base bid quantity of concrete crack repair by injection in existing concrete of 100 linear feet. This bid item is for unanticipated concrete crack repairs identified, authorized by the Owner, and performed during construction. Payment for this item shall be made on the basis of the actual total lineal footage of concrete crack repair by injection measured from start to end of each crack as marked and approved by the Owner. Unit price bid to include all costs for material, labor, equipment, surface preparation, and incidental items for concrete crack repair by injection in accordance with the plans and specifications. Adjustment to bid price for the actual length of cracks repaired to be made in accordance with unit prices on the Bid Form.
4. Alternate Number 1 – Fiberglass (FRP) Launder Covers: Deductive Alternative Price for providing new FRP launder covers in lieu of aluminum launder covers for the 12 Final Clarifiers (FC No. 1 through FC No. 12) to be deducted from the Base Bid Price, if selected by Jurisdiction.”

B. Modify Paragraph 1.05 by adding the following at the end of the paragraph:

“A. Interpretations and Addenda:

1. All questions about the meaning or intent of the Bidding Documents are to be directed to the Jurisdiction with a copy to the Engineer in writing. Interpretations or clarifications considered necessary by Jurisdiction and Engineer in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Jurisdiction as having received the Bidding Documents. Questions received less than 10 days prior to the date for opening of Bids may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

Address questions to:

Patrick Brown
WRA Wastewater Reclamation Facility
3000 Vandalia Road
Des Moines, Iowa 50317
Email: PABrown@dmgov.org

with copy to:

HDR Engineering, Inc.
300 E Locust Street Suite 210
Des Moines, IA 50309-1823
Attn: Adam A. Smith
Email: Adam.Alonzo.smith@hdrinc.com

Addenda may also be issued to modify the Bidding Documents as deemed advisable by Jurisdiction or Engineer.”

**1.4 MODIFICATIONS TO DIVISION 1, GENERAL PROVISIONS AND COVENANTS,
SECTION 1040 - SCOPE OF WORK**

A. Modify Paragraph 1.01B. by adding the following subparagraphs:

- "1. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
2. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work, not involving a change in Contract Price or Contract time, may be authorized by one or more of the following ways:
 - a. A Field Order;
 - b. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Section 01 33 00, Paragraph 1.4B.8.h. and documented in a Field Order)."

B. Modify Paragraph 1.01C. by adding the following subparagraphs:

- "1. The following are reports of explorations and tests of subsurface conditions at or continuous to the Site the Engineer is aware of:
 - a. "Geotechnical Engineering Report, Combined Sewer Solids Separation Facility, Des Moines Wastewater Treatment Facility, Des Moines, Iowa", Terracon Project No. 08085025-02, July 13, 2009, prepared by Terracon Consultants, Inc., Des Moines, Iowa.
 - b. "Geotechnical Engineering Report, Standby Power Generator Building (Nos. 71 and 72), Des Moines, Iowa", Terracon Project No. 08095062-01, August 28, 2009, prepared by Terracon Consultants, Inc., Des Moines Iowa.
 - c. "Addendum to Geotechnical Engineering Report, Standby Power Generator Buildings No. 72, Des Moines, Iowa", Terracon Project No. 08095062-03, September 1, 2009, prepared by Terracon Consultants, Inc., Des Moines Iowa.
 - d. "Geotechnical Engineering Report - Stabilization Evaluation, Des Moines Wastewater Treatment Facility, Des Moines, Iowa", Terracon Project No. 08085036-02, December 22, 2008, prepared by Terracon Consultants, Inc., Des Moines, Iowa.
 - e. "Logs for 13 Borings", Terracon Project No. 08085036, (Additional boring logs in general vicinity of the WRA New Main Outfall and the access road to the Combined Sewer Separation Facility), March 13, 2009, prepared by Terracon Consultants, Inc., Des Moines, Iowa.
 - f. "Terracon (2016a), "Draft Subsurface Exploration & Laboratory Testing Report, WRF Flood Improvements Project, Des Moines, Iowa," prepared by Terracon, dated July 18, 2016.
 - g. "Terracon (2016b), "Report of Existing Subsurface Information, Wastewater Reclamation Facility (WRF) Flood Improvements, Des Moines, Iowa," prepared by Terracon, dated July 18, 2016.
 - h. "Terracon (2018), "Site Characterization Report, WRF Flood Improvements Project - Design Services Phase, Des Moines, Iowa," prepared by Terracon, dated March 6, 2018.
 - g. "Terracon (2022), "Geotechnical Engineering Report, WRF Phosphorus Recovery Facility Site Characterization, Des Moines, Iowa," prepared by Terracon, dated January 13, 2022.
2. The following are Drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that Engineer has used in preparing the Contract Documents:

- a. Revised to Conform to Construction Records Drawings dated December 1990 entitled ‘Des Moines ICA Plans for Phase 1 Regional Wastewater Treatment Plant, Des Moines, Iowa, Segments 3A & 3B, Secondary Treatment Facilities and Blower Building.’
- b. Revised to Conform to Construction Records Drawings dated March 1991 entitled ‘Des Moines ICA Plans for Phase 1 Regional Wastewater Treatment Plant, Des Moines, Iowa, Segments 6 & 7, Secondary Treatment Facilities Expansion and Nitrification Facilities.’
- c. Various “As-Built” Drawings, Shop Drawings, and Contract Drawings of previous construction projects at the facility.”

C. Modify Paragraph 1.01 by adding the following at the end of the paragraph:

“E. No provision of any referenced standard, standard specification, manual or code, or any instruction of a supplier shall be effective to change the duties or responsibilities of Jurisdiction, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Jurisdiction or Engineer 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 Contract Documents.”

D. Modify Paragraph 1.03 by adding the following at the end of the paragraph:

“C. The Specifications may vary in form, format, and style. Some Specification Sections are written in varying degrees of streamlined or declarative style and some Sections may be relatively narrative by comparison. Omissions of such words and phrases as "the Contractor shall," "in conformity with," "as shown," or "as specified" are intentional in streamlined sections. Omitted words and phrases shall be supplied by inference. Similar types of provisions may appear in various parts of a Section or Articles within a part depending on the format of the Section. The Contractor shall not take advantage of any variation of form, format, or style in making claims for extra Work.

D. The cross referencing of specification sections under the subparagraph heading "Related Sections include but are not necessarily limited to: "and elsewhere within each Specification Section is provided as an aid and convenience to the Contractor. The Contractor shall not rely on the cross referencing provided and shall be responsible to coordinate the entire Work under the Contract Documents and provide a complete Project whether or not the cross referencing is provided in each Section or whether or not the cross referencing is complete.

E. The contractual standing of electronic documents and data shall be as follows:

1. The data furnished by Jurisdiction or Engineer to Contractor, or by Contractor to Jurisdiction or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user’s sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
2. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data’s creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.

3. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator."

E. Modify Paragraph 1.07 by deleting Paragraph 1.07 in its entirety and substituting the following:

"1.07 CHANGES IN THE WORK

A. Authorized Changes in the Work

1. Without invalidating the Contract and without notice to any surety, Jurisdiction may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

a. Change Proposal Request:

- 1) When Jurisdiction requests Contractor to present a proposal to accomplish a change in the Work, the request will be made in the form of a Change Proposal Request (CPR) prepared by Engineer. The CPR will describe the change and request Contractor to propose a cost and Contract Price and/or Contract Time change. Contractor will propose cost and/or time changes, if any, sign the CPR and return it to Engineer. If requested by Jurisdiction or Engineer, Contractor shall provide an itemized breakdown of the cost of the change. Engineer will make recommendations to Jurisdiction concerning acceptance. If the CPR is approved by Jurisdiction, the CPR will be included in a Change Order. Contractor is not authorized to proceed with a change contained in a CPR until the Change Order is properly signed and issued.
- 2) When the Contractor desires to propose changes to the Work, it may initiate a CPR in the same form as provided in Paragraph 1.07A.1.a.1. and submit the CPR to the Engineer for the Engineer's review and recommendation."

B. Payment for Changes in the Work

1. Payment for changes in the Work shall be as stipulated in SUDAS Section 1090, Paragraph 1.04.
2. Contractor's fee for overhead and profit will be limited to the percentages stipulated in Paragraph 1.07C.3.a.
3. If Jurisdiction and Contractor are unable to agree to payment under the terms of SUDAS Section 1090, Paragraph 1.04B.2. and 3., and Paragraph 1.04B.1. does not apply, Work shall be performed on a Force Account Change Order (time and material) basis administered as provided for in Paragraph 1.07C.

C. Cost of the Work for Force Account Change Orders

1. Costs Included: The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 1.07C.2., necessarily incurred and paid by Contractor in the proper performance of Force Account change Order Work. When the value of any Work covered by a Force Account Change Order is determined on the basis of Cost of the

Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Work. Except as otherwise may be agreed to in writing by Jurisdiction, such costs 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 1.07C.2., and shall include only the following items:

- a. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Jurisdiction 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, 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 Jurisdiction.
- b. 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 Jurisdiction deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Jurisdiction. All trade discounts, rebates and refunds, and returns from sale of surplus materials and equipment shall accrue to Jurisdiction, and Contractor shall make provisions so that they may be obtained.
- c. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Jurisdiction, Contractor shall obtain competitive bids from subcontractors acceptable to Jurisdiction and Contractor and shall deliver such bids to Jurisdiction, 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 1.07C.
- d. 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.
- e. Supplemental costs including the following:
 - 1) The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - 2) 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.

- 3) Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Jurisdiction 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.
 - 4) Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - 5) 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.
 - 6) The cost of utilities, fuel, and sanitary facilities at the Site.
 - 7) Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.
 - 8) The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.
2. Costs Excluded: The term Cost of the Work shall not include any of the following items:
- a. 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 1.07C.1.a. or specifically covered by Paragraph 1.07C.1.d., all of which are to be considered administrative costs covered by the Contractor's fee.
 - b. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
 - c. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
 - d. 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.
 - e. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 1.07C.1.

3. Contractor's Fee: When the value of any Work covered by a Force Account Change Order is determined on the basis of Cost of the Work, Contractor's fee shall be determined as follows:
 - a. Contractor's Fee: The Contractor's fee for overhead and profit shall be determined as follows:
 - 1). a fee based on the following percentages of the various portions of the Cost of the Work:
 - a) for costs incurred under Paragraphs 1.07C.1.a. and 1.07C.1.b., the Contractor's fee shall be 10 percent;
 - b) for costs incurred under Paragraph 1.07C.1.c., 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 1.07C.3.a.1) and 1.07C.3.a.2) is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 10 percent of the costs incurred by such Subcontractor under Paragraphs 1.07C.1.a. and 1.07C.1.b. and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
 - d) no fee shall be payable on the basis of costs itemized under Paragraphs 1.07C.1.d., 1.07C.1.e., and 1.07C.2.;
 - e) the amount of credit to be allowed by Contractor to Jurisdiction 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.
4. Documentation: Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 1.07C.1. and 1.07C.2., 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.
 - a. All Cost of the Work documentation shall be subject to daily reconciliation between the Contractor and Engineer or Engineer Resident Project Representative."

F. Modify Paragraph 1.10 by adding the following to the end of the paragraph:

"H. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Jurisdiction. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 1.10 or as Jurisdiction and Contractor may otherwise agree in writing."

G. Modify Section 1040 - Scope of Work by adding Paragraph "1.14" at the end of the section:

“1.14 REUSE OF DOCUMENTS

- A. Contractor and any Subcontractor or Supplier or other individual or entity performing or furnishing all of the Work under a direct or indirect contract with Contractor, 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 Engineer’s consultants, including electronic media editions; or
 - 2. reuse any of such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Jurisdiction and Engineer and specific written verification or adaptation by Engineer.
- B. The prohibition of this Paragraph 1.14 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.”

1.5 MODIFICATIONS TO DIVISION 1, GENERAL PROVISIONS AND COVENANTS, SECTION 1050 - CONTROL OF WORK

A. Modify Paragraph 1.03 by adding the following at the end of the paragraph:

“E. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These Record Documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these Record Documents, Samples, and Shop Drawings will be delivered to Engineer for Jurisdiction. Contractor shall include accurate locations for buried and imbedded items.

B. Modify Paragraph 1.10C by adding the following at the end of the paragraph:

- 1. All Work shall be done to the lines, grades, and elevations indicated on the Drawings.
- 2. Basic horizontal and vertical control points will be established or designated by Engineer to be used as datums for the Work. All additional survey, layout, and measurement of Work shall be performed by Contractor as part of the Work.
- 3. Contractor shall provide an experienced instrument person, competent assistants, and such instruments, tools, stakes, and other materials required to complete the survey, layout, and measurement of work. In addition, the Contractor shall furnish, without charge, competent persons and such tools, stakes, and other materials as Engineer may require in establishing or designating control points or in checking survey, layout, and measurement work performed by Contractor.
- 4. Contractor shall keep Engineer informed, a reasonable time in advance, of the times and places at which it wishes to do Work, so that horizontal and vertical control points may be established and any checking deemed necessary by Engineer may be done with minimum inconvenience to Engineer and a minimum delay to Contractor.
- 5. Contractor shall remove and reconstruct work which is improperly located.”

- C. Delete Paragraph 1.14 from SUDAS Division 1 Section 1050 in its entirety and replace with the following:

“1.14 Project Completion and Acceptance

A. Substantial Completion:

1. 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.
2. 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.
3. 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.
4. 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.
5. 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.
6. 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.

B. Final Inspection and Acceptance:

1. Upon written notice from Contractor that the entire Work 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 is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.
2. 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, and other documents, Contractor may make application for final payment.
3. If, on the basis of 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 indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable."

1.6 MODIFICATIONS TO DIVISION 1, GENERAL PROVISIONS AND COVENANTS, SECTION 1060 - CONTROL OF MATERIALS

A. Delete Paragraph 1.02 in its entirety and substitute the following:

“1.02 SUBSTITUTES AND EQUIVALENT/OR-EQUALS

- A. General: 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 Specification or description 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 or no substitution is permitted, other items of material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.
1. “Or-Equal” Items: If in Engineer’s sole discretion 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, it may be considered by Engineer as an “or-equal” item, in which case review and approval of the proposed item may, in Engineer’s sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. 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
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Jurisdiction or increase in Contract Times, and

- 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. Substitute Items:

- a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item it will be considered a proposed substitute item.
- b. Contractor shall submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
- c. The requirements for review by Engineer will be as set forth in Paragraph 1.02A.2.d. as Engineer may decide is appropriate under the circumstances.
- d. 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:
 - 1) shall certify that the proposed substitute item will:
 - a) perform adequately the functions and achieve the results called for by the general design,
 - b) be similar in substance to that specified, and
 - c) be suited to the same use as that specified;
 - 2) will state:
 - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time;
 - b) whether or not 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 Jurisdiction for other work on the Project) to adapt the design to the proposed substitute item; and
 - c) whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
 - 3) will identify:
 - a) all variations of the proposed substitute item from that specified, and
 - b) available engineering, sales, maintenance, repair, and replacement services;
 - 4) and shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other Contractors affected by any resulting change,

B. Substitute Construction Methods or Procedures:

If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 1.02A.2.

B. Engineer's Evaluation:

Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 1.02A. and 1.02B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be

the sole judge of acceptability. No “or equal” or substitute will be ordered, installed or utilized until Engineer’s review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an “or equal.” Engineer will advise Contractor in writing of any negative determination.

C. Special Guarantee:

Jurisdiction may require Contractor to furnish at Contractor’s expense a special performance guarantee or other surety with respect to any substitute.

D. Engineer’s Cost Reimbursement:

Engineer will record Engineer’s costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 1.02.A.2. and 1.02.B. Whether or not Engineer approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Jurisdiction for the charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Jurisdiction for the charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Jurisdiction) resulting from the acceptance of each proposed substitute.

E. Contractor’s Expense:

Contractor shall provide all data in support of any proposed substitute or “or-equal” at Contractor’s expense.

G. See Specification Section 01 25 00 - Product Substitutions.”

**1.7 MODIFICATIONS TO DIVISION 1, GENERAL PROVISIONS AND COVENANTS,
SECTION 1070 - LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC, PART 1
- LEGAL RELATION**

A. Modify Paragraph 1.04 to include the Engineer as an additional indemnified party.

B. Delete Paragraph 1.05 from SUDAS Division 1 Section 1070 in its entirety and replace with the following:

“1.05 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 as a Project Classified System in Section 01 75 00 of 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 Section 1050, Paragraphs 1.14A.1. through 1.14A.5. 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 Section 1050. Paragraph 1.14 will apply with respect to certification of Substantial Completion of that part of the Work, the division of responsibility in respect thereof and access thereto, and identifying start date of associated equipment warrantee.”

**1.8 MODIFICATIONS TO DIVISION 1, GENERAL PROVISIONS AND COVENANTS,
SECTION 1070 - LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC,
PART 2 - RESPONSIBILITIES TO THE PUBLIC**

A. Modify Paragraph 2.02 by deleting Subparagraph E. in its entirety and adding the following:

“E. Safety And Protection

1. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - a. all persons on the Site or who may be affected by the Work;
 - b. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - c. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
2. 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 owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
3. All damage, injury, or loss to any property 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 (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Jurisdiction 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).
4. Contractor’s duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Jurisdiction and Contractor that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
5. 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.

6. 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. 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.

F. Project Area

The Engineer may assign some or all of the duties and responsibilities of the Engineer to an authorized representative for a given Project. Nothing contained in this Section or in the Contract Documents shall be construed as requiring or permitting the Engineer to direct the means, methods, sequences, or procedures, including safety measures, of performing any work under the Contract of Contract Documents, except to assure that the quality of Work conforms to these Specifications and other provisions of the Contract Documents and that the Contract will be completed as scheduled.

G. Hazard Communication Programs

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.

H. Emergencies

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, and the Jurisdiction agrees, 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.”

1.9 MODIFICATIONS TO DIVISION 1, GENERAL PROVISIONS AND COVENANTS, SECTION 1080 - PROSECUTION AND PROGRESS

- A. Modify Subparagraph 1.03B. by adding the following at the end of the paragraph:

“See critical path method schedule requirements in Section 01 32 16 - Construction Progress Schedule.”

- B. Modify Paragraph 1.03 by adding the following at the end of the paragraph:

“D. No Work shall be done between 3:30 p.m. and 7 a.m. Monday through Friday or anytime on Saturday, Sunday, or any legal holiday without permission of Jurisdiction. However, emergency work may be done without prior permission.”

- C. Modify Paragraph 1.04 by adding the following:

“At this conference Contractor 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 instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.”

D. Modify Paragraph 1.05 by adding the following at the end of the paragraph:

“D. Before Starting Construction and within 10 days after the Effective Date of the Agreement, Contractor shall submit to Engineer for timely review:

1. a preliminary Construction 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 Documents;
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.”

E. Delete Paragraph 1.08 in its entirety.

F. Delete Paragraph 1.09.B and Subparagraph 1.09.B.1 in their entirety and replace with the following:

“B. Request for Extension of Time: Whenever the Contractor becomes aware of its inability to complete the work under the contract within the contract period, it shall request an extension in writing. Such request shall be submitted to the Engineer within 30 calendar days from the event. The submission or acceptance of a request for extension of time shall not guarantee such extension will be granted. The following items may be justification for extension of time:

1. Weather Delays:

- a. Time extensions will not be granted for rain, snow, wind, flood, or other natural phenomena of normal intensity for the locality where the Work is performed. The Contractor’s claim due to adverse weather delays shall clearly demonstrate that the weather conditions are adverse, would not have been reasonably anticipated given local weather conditions, that such conditions negatively affected 50 percent or more of the Contractor’s workday, and delayed work on the critical path as demonstrated by the schedule. No consideration for a time extension with regard to adverse weather shall be provided if the Contractor fails to provide a baseline schedule and updated schedules as required by the Contract Documents.

As measured by the National Oceanic and Atmospheric Administration (NOAA) at the closest weather station to the project site, adverse weather shall be defined as:

- Rainfall greater-than or equal to 0.10” (inch).
 - Snow fall with accumulation of greater-than or equal to 1” (inch).
 - Sleet or ice accumulation 0.20” (inch).
- b. The Contract duration set forth in the Contract Documents takes into account that a number of calendar days will be lost due to adverse weather. The Contractor’s schedule should include lost time due to normal weather events. The following chart is historical data identifying the number of calendar days anticipated for adverse weather in each month. The chart will constitute the base line for monthly adverse weather evaluations.

MONTHLY ANTICIPATED ADVERSE WEATHER CALENDAR DAYS

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
16	10	5	6	8	7	6	5	5	4	4	11

Only the number of days lost due to adverse weather as requested by the Contractor, that exceeds the above-anticipated number of days lost for the month, shall be considered for granting a delay claim. For the Contractor to get relief from adverse weather events, the number of actual days impacted by the weather event(s) shall be tracked and submitted as a claim on a monthly basis for comparison to the above chart. The Contractor will only be granted a time extension for the day the event actually affects those tasks critical to progression of the work for 50 percent or more of the Contractor’s normal workday. For events occurring on non-work days (weekends or holidays), if clean up or other conditions outside the Contractor’s control prevents work to be completed on the task(s) critical to progression of the work for 50 percent or more of the Contractor’s normal work day those days shall be deemed an adverse weather day in the same way as the following days of the event mentioned previously. For partial months at the beginning or end of a contract, anticipated adverse weather days shall be prorated. The number of Monthly Anticipated Adverse Weather Days will be calculated by dividing the number of calendar days in the month that the Contractor is scheduled to work by the total calendar days then multiplied by the number of anticipated adverse weather days for the month, rounded to the nearest whole number. An increase in the Contract duration for adverse weather delay will be approved by change order. No additional compensation shall be allowed for direct and indirect expenses associated with any such contract time extensions.”

G. Modify Section 1080 - Prosecution and Progress by adding the following Paragraph “1.15” to the end of the section:

“1.15 HAZARDOUS ENVIRONMENTAL CONDITIONS AT PROJECT SITE

A. Encountering a Hazardous Environmental Condition on the Project Site:

1. There are no known Hazardous Environmental Conditions (defined below) in the areas affected by the proposed construction. The Contractor shall not be responsible for any Hazardous Environmental Condition uncovered on the Project Site (defined below) which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. If Contractor discovers a Hazardous Environmental Condition the Contractor shall, upon recognizing the condition, immediately stop work in the affected area, secure or otherwise isolate such condition, report the condition to the Engineer and the Jurisdiction in writing, and take any reasonable precautions to prevent foreseeable bodily injury or death to persons resulting from a Hazardous Environmental Condition encountered on the Project Site by the Contractor.

2. The Jurisdiction with the assistance of the Engineer shall determine the necessity of obtaining a qualified expert to evaluate such condition. The Jurisdiction shall furnish in writing to the Contractor, the names of persons or entities that are to perform tests verifying the presence or absence of such Hazardous Environmental Condition. Jurisdiction shall decide with the assistance of the Engineer, and environmental expert if required, what action needs to be taken with respect to the Hazardous Environmental Condition. When a determination on how to proceed as to the Hazardous Environmental Condition has been reached, Contractor shall resume work in the affected area upon written notice from Jurisdiction.

3. The WRA reserves the right to hire another company to remediate the Hazardous Environmental Condition. Contractor shall not be entitled to any damages as a result of encountering a Hazardous Environmental Condition, but may be entitled to a Change Order for an adjustment in the Contract Time and the cost of the Work. If Contractor and Jurisdiction cannot agree as to the amount of an adjustment in the cost of the Work or in the Contract Time related to Contractor's reasonable expense for taking any precautionary measures and remediating the Hazardous Environmental Condition to the extent necessary for the Work to proceed, the Contractor may file a claim as provided in Section 1040, Paragraph 1.09. Once the Jurisdiction has directed the Contractor to resume the Work and/or take corrective action regarding the Hazardous Environmental Condition, the failure or delay of the Contractor and Jurisdiction to reach an agreement on any adjustment to the cost of the Work or the Contract Time shall not relieve the Contractor from proceeding with such Work.
4. Notwithstanding the foregoing, Contractor shall be responsible for a Hazardous Environmental Condition created or caused by the Contractor, or any of its Subcontractors, suppliers, or anyone else for whom Contractor is responsible.

B. Indemnification.

1. To the fullest extent permitted by law, Jurisdiction shall indemnify and hold harmless Contractor, its Subcontractors and suppliers, 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: (i) was not shown or indicated in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Section 1080, Paragraph 1.15 shall obligate Jurisdiction to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
2. To the fullest extent permitted by law, Contractor shall indemnify and hold harmless Jurisdiction 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 a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Section 1080, Paragraph 1.15 shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

C. Definitions used in this Section 1080, Paragraph 1.15 are as follows:

1. The term "Project Site" shall mean that area of real property owned by the Jurisdiction which is the location of the Project where the Contractor is to perform the Work.
2. A "Hazardous Environmental Condition" means any condition related to: (A) any petroleum substance, petroleum product, underground storage tank, underground cistern, radioactive material, asbestos in any form that is or could become friable, urea formaldehyde foam insulation, PCB-containing Material; (B) any Hazardous Materials (defined below), or any other material, substance, chemical, waste, contaminant or pollutant which is now or hereafter defined as or determined to be hazardous, extremely hazardous, toxic, dangerous, restricted, or a nuisance, or words of similar import, under

any Environmental Laws (defined below); or (C) any other material, substance, chemical, waste, contaminant, pollutant or exposure to which is now prohibited, limited or regulated by any governmental authority. As used herein, "Hazardous Materials" means (i) any hazardous substances within the meaning of Section 101(14) of CERCLA, 42 U.S.C. § 9601(14), or any pollutant or constituent that is regulated under any Environmental Laws; (ii) friable asbestos-containing material; (iii) polychlorinated biphenyls; (iv) highly toxic materials as defined by OSHA in 29 C.F.R. § 1910.1200; (v) radioactive materials; and (vi) all substances defined as Hazardous Substances, Oils, Pollutants, or Contaminants in the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. § 300.5, or defined as such by, or regulated as such under, any Environmental Laws. "Environmental Laws" means any applicable federal, state, or local laws relating to pollution or protection of human health, safety, or the environment."

**1.10 MODIFICATIONS TO DIVISION 1, GENERAL PROVISIONS AND COVENANTS,
SECTION 1090 - MEASUREMENT AND PAYMENT**

A. Modify Paragraph 1.04.B. by adding the following:

"4. Force Account Change Order Work. By reimbursement of the actual documented and approved allowable costs and fees."

B. Modify Paragraph 1.05A. by adding the following subparagraph:

"1. 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 Jurisdiction 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 or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Jurisdiction."

C. Modify Paragraph 1.05 by adding the following at the end of the paragraph:

"D. 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."

E. Lump Sum Breakdowns:

1. If the Contract is based on a lump-sum price bid or contains one or more lump-sum price items for which progress payments are to be made, the Contractor shall prepare and submit a breakdown estimate covering each lump-sum price item to the Jurisdictional Engineer for approval. The breakdown estimate shall show the estimated value of each kind or item of work, and further broken down to show costs for materials, labor, and startup, training, and O&M manuals. The sum of the lump-sum price items listed in the breakdown estimates shall equal the contract lump-sum price or prices. Overhead and profit shall not be listed as separate items.
2. The breakdown estimate shall be approved by the Jurisdictional Engineer before any progress payments are prepared. An unbalanced breakdown estimate providing for overpayment to the Contractor for items of work to be performed first will not be approved but shall be revised by the Contractor and resubmitted until acceptable to the

Jurisdictional Engineer. The approved schedule of values will serve as the basis for progress payments during performing of the work.”

1.11 COORDINATION WITH DIVISIONS OF THE IOWA STATEWIDE URBAN DESIGN AND SPECIFICATIONS (SUDAS)

- A. “SUDAS Division 2-11 is superseded by Division 3-46 Specification Sections with these Contract Documents, except that some Sections may incorporate portions of SUDAS Division 2-11 by specific cross reference.”

END OF SECTION

SECTION 01 11 00
SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Location and description of Work.
 - 2. Others retained by Owner for the Project.
 - 3. Work by others under Owner's control on other projects.
 - 4. Work by Owner.
 - 5. Sequence and progress of Work.
 - 6. Contractor's use of the Site.
- B. Related Sections include, but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 01 14 16 - Coordination with Owner's Operations.

1.2 LOCATION AND DESCRIPTION OF WORK

- A. The Work is located at the Des Moines Wastewater Reclamation Facility, 3000 Vandalia Road, Des Moines, Iowa 50317.
- B. The Project includes constructing the Work broadly described below, in accordance with the Contract Documents, with all related appurtenances. Work shown on the Drawings, or indicated in the Specifications, or indicated elsewhere in the Contract Documents is part of the Work, regardless of whether indicated below. The Work includes, but is not limited to, the following:
 - 1. Final Clarifiers:
 - a. Replacement of mechanisms and bridges on final clarifiers.
 - b. Replacement of sidewall relief valves in final clarifiers.
 - c. Installation of launder and effluent box covers on final clarifiers.
 - d. Installation of effluent drop box stop logs on final clarifiers.
 - e. Closed-circuit Television CCTV inspection of Final Clarifier Influent Pipes (48-ML) and Final Clarifier Return Sludge Pipes (24-RSL).
 - 2. Secondary Effluent Channel:
 - a. Effluent channel structural repairs.
 - b. Installation of FRP effluent channel covers.
 - 3. Sluice Gate Replacement:
 - a. Replacement of 48 IN x 48 IN final clarifier influent sluice gates and installation of new electric open/close actuators and SCADA controls.
 - b. Replacement of 12 IN x 12 IN secondary scum sluice gates and installation of new electric open/close actuators and SCADA controls.
 - c. Replacement of 36 IN x 36 IN return sludge wet well equalization sluice gates and installation of new electric open/close actuators and SCADA controls.

1.3 OTHERS RETAINED BY OWNER (WRA) FOR THE PROJECT

- A. Engineer:
 - 1. Engineer is identified in the Agreement.
 - 2. Engineer's responsibilities for the Project, relative to Contractor, are indicated throughout the Contract Documents.
 - 3. Whether the Engineer will furnish the services of a Resident Project Representative (RPR) for the Project is indicated in the Agreement.

- B. Non-Professional Services Contracted by Owner: Owner will retain services of the following entities to perform the services indicated relative to the Project. Contractor shall coordinate and schedule the Work with, and cooperate with, the entities performing the following services for Owner.
 - 1. Code-Required Special Inspections and Testing:
 - a. Owner has, or will, retain the services of a qualified testing laboratory to perform code-required testing and special inspections for the Work, in accordance with Specification Section 01 45 33 - Special Inspections and Testing Program, and selected other provisions of the Contract Documents related to field testing.
 - b. Identification: Code-required special inspections retained by Owner will be performed by Terracon Consultants Inc., 600 SW 7th Street, Des Moines, Iowa 50309.

1.4 WORK BY OTHERS UNDER OWNER’S (WRA’S) CONTROL - OTHER PROJECTS

- A. Other construction projects have been or will be awarded by Owner that are in close proximity to or border on the Work of this Project at the Wastewater Reclamation Facility which may require coordination for completion include the following list below. The list and information provided may not be all-inclusive and dates and project information may be subject to change:
 - 1. WRF Grit Improvements Project:
 - a. This project is currently under construction and anticipated to be completed by the end of 2023.
 - b. This project includes construction of new grit removal system near Buildings 05 and 14, and may require coordination of road/site access, and cause temporary lane closure and/or detours.
 - 2. WRF Flood Improvements:
 - a. This project is currently under construction and anticipated to be completed in 2023.
 - b. This project includes construction of new Standby Power Building 73 east of the Administration Building 91 and floodwall around Building 05, and may require coordination of road/site access, and cause temporary lane closure and/or detours.
 - 3. WRF Site Security and Access Improvements:
 - a. This project is currently in design and construction is tentatively scheduled begin in 2023 and complete by end of 2024.
 - b. This project includes construction of a new plant entrance road and entrance gate east and south of new Standby Power Building 73, a new Septage Sample Building 86 west of Building 12, a new Hauled Waste Sampling Building 87 west of Building 70, improvements to ACC-1 control room in Building 70, and building security improvements, and may require coordination of road/site access, and cause temporary lane closure and/or detours.
 - 4. WRF Phosphorus Recovery Facility:
 - a. This project is currently in design and construction is tentatively scheduled to begin in 2023 and complete by end of 2025.
 - b. This project includes construction of new Phosphorus removal facilities east of Maintenance Building 92 and reconstruction of the East-West roadway south of the new Standby Power Building 73.
 - 5. WRF Effluent Pump Station:
 - a. This project is currently in design and construction is tentatively scheduled to begin in 2023 and complete by end of 2026.
 - b. This project includes construction of a new effluent pump station south of the final clarifiers and west of the chlorine contact basin, a new diversion structure west of chlorine contact basin, a new electrical ductbank from Building 73 to the new pump station, and modifications to the existing chlorine contact basin and associated site piping, and may require coordination of road/site access, cause temporary road closures and/or detours, and temporary utility shutdowns.
 - 6. City of Des Moines Levee Improvements Project:
 - a. This project is currently in design and construction is tentatively scheduled to begin in 2024 and complete by end of 2027.

- b. This project includes improvements to the existing levee along the entirety of the WRF site including construction of seepage wells, utility work, levee earthwork, levee walls, and gate well modifications, and may require coordination of road/site access, and cause temporary road closure and/or detours.
- 7. WRF Aeration Basin Improvements Project:
 - a. This project is tentatively scheduled to start design in 2023 with construction is tentatively scheduled to begin in 2024 and complete in 2026.
 - b. This project includes improvements to the existing aeration basins and Building 35 north of the final clarifiers and may require coordination of road/site access, cause temporary road closures and/or detours, and temporary utility shutdowns.
- 8. Other small miscellaneous projects throughout the site including near work area.

1.5 WORK BY OWNER (WRA)

- A. Owner will perform the following in connection with the Work:
 - 1. Operate all existing valves, gates, pumps, equipment, and appurtenances that will affect Owner's operations or facility processes, unless otherwise specified or indicated.

1.6 SEQUENCE AND PROGRESS OF WORK

- A. Sequencing:
 - 1. Incorporate sequencing of the Work into the Progress Schedule.
 - 2. Requirements for sequencing and coordinating with Owner's operations, including maintenance of facility operations during construction, and requirements for tie-ins and shutdowns, are in Specification Section 01 14 16 - Coordination with Owner's Operations.

1.7 CONTRACTOR'S USE OF SITE

- A. Use of Site - General:
 - 1. Contractor shall share use of the Site with other Contractors and others specified in Articles 1.4 and 1.5 of this Specification Section, and as may be shown on the Drawings.
 - 2. Relocate stored materials and equipment that interfere with operations of Owner, other contractors, and others performing work for Owner.
- B. Owner will occupy the Site jointly with Contractor during construction for performance of Owner's typical operations. Coordinate with Owner in all construction operations to minimize conflicts between Contractor and Owner's employees and others under Owner's control.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

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SECTION 01 14 16
COORDINATION WITH OWNER'S OPERATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Requirements for coordinating with Owner's operations during the Project.
 2. Requirements for tie-ins and shutdowns necessary to complete the Work without impact on Owner's operations except as allowed in this Specifications Section.
- B. Scope:
1. Contractor shall provide all labor, materials, equipment, tools, and incidentals shown, specified, and required to coordinate with Owner's operations during the Work in accordance with this Specifications Section.
 2. Except for shutdowns specified in this Specifications Section, perform the Work such that Owner's facilities remain in continuous, satisfactory operation during the Project. Schedule and perform the Work such that the Work does not: Impede Owner's production or processes, create potential hazards to operating equipment and personnel, reduce the quality of the facility's products or effluent, cause odors or other nuisances, does not affect the public health, safety, welfare, and convenience, and does not adversely affect the environment resulting in violation of Laws or Regulations.
 3. Work not specifically addressed in this Specifications section or in referenced sections may, in general, be performed, to be completed within the Contract Times, at any time during regular working hours in accordance with the Contract Documents, subject to the requirements in this Section.
- C. Related Sections include, but are not necessarily limited to:
1. SUDAS Division 1.
 2. Division 01 - General Requirements.
 3. Section 01 04 00 - Special Provisions.
 4. Section 01 11 00 - Summary of Work.
 5. Section 01 73 29 - Cutting and Patching.
 6. Section 01 75 00 - Checkout and Startup Procedures.

1.2 REFERENCES

- A. Terminology:
1. Terminology indicated below are not defined terms and are not indicated with initial capital letters, but when used in this Specifications Section have the meaning indicated below:
 - a. The term "Owner" is used throughout this Section. When the facility is operated or managed by an entity other than Owner, references in this section to "Owner" as the operator or manager of the facility will be interpreted as referring to the facility manager.
 - b. A "shutdown" is when a portion of the normal operation of Owner's facility, whether equipment, systems, conduit (including piping and ducting), has to be temporarily suspended or taken out of service to perform the Work.
 - c. A "tie-in" is a connection of new Work to existing facilities, including connecting to existing conduits (including piping and ducting), electrical systems, structural elements, process/mechanical elements, and other physical connections. Some tie-ins may require that the tie-in be made without an associated shutdown.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Review construction procedures under other Specifications sections and coordinate Work that will be performed with or before the Work indicated in this Section.
- B. Sequencing and Scheduling:
 - 1. Refer to this Specification Section articles on sequencing, tie-ins, and shutdowns.

1.4 SUBMITTALS

- A. Informational Submittals: Submit the following:
 - 1. Shutdown Planning Submittal:
 - a. For each shutdown, submit an inventory of labor, materials, and equipment required to perform the shutdown and tie-in tasks, an estimate of time required to accomplish the complete shutdown including time for Owner to take down and start up existing equipment, systems, or conduits, and written description of steps required to complete the Work associated with the shutdown.
 - b. Furnish submittal to Engineer not less than 30 days prior to proposed shutdown start date. Do not start shutdown until obtaining Engineer's acceptance of shutdown planning Submittal.
 - 2. Shutdown Notification:
 - a. After Engineer's acceptance of shutdown planning Submittal and prior to starting the shutdown, submit written notification to Owner and Engineer of date and time each shutdown is to start. Submit notification not less than 5 calendar days in advance of each shutdown and if acceptable Owner will review flow and weather conditions approximately 24 HRS prior to scheduled shutdown and confirm with Contractor.

1.5 GENERAL CONSTRAINTS

- A. Indicated in the Contract Documents are the sequence and shutdown durations, where applicable, for Owner's equipment, systems, and conduits (including piping and ducting) that are to be taken out of service temporarily for the Work. New materials and equipment may be used by Owner after the specified field quality control activities are successfully completed and the materials or equipment are substantially complete in accordance with the Contract Documents.
- B. The following constraints apply to coordination with Owner's operations:
 - 1. Wet Weather Events: If a wet weather event or situation occurs resulting in high flow rates at the treatment plant, the Owner may direct the Contractor to delay work that could adversely impact treatment plant operations until conditions at the treatment plant are acceptable for work to proceed.
 - 2. Operational Access: Owner's personnel shall have access to equipment and areas of the facility that remain in operation.
 - 3. Temporary Partitions and Enclosures: Provide temporary partitions and enclosures necessary to maintain dust-free, heated, and ventilated spaces in areas of the facility that are adjacent to the Work and that must be kept operational. Comply with Specification Section 01 51 05 -Temporary Utilities.
 - 4. Schedule and perform equipment and system start-ups in accordance with Specification Section 01 75 00 - Checkout and Startup procedures. Equipment and systems shall not be placed into operation on Friday, Saturday, Sunday, or holidays without prior approval of Owner, unless specifically indicated otherwise in the Contract Documents.
 - 5. Dead End Valves or Conduits:
 - a. Provide blind flanges, watertight bulkheads, or valve at temporary and permanent terminuses of conduits, including piping and ducting.
 - b. Blind flanges and bulkheads shall be suitable for the service and braced and blocked, as required, or otherwise restrained as necessary or as required by Engineer.
 - c. Temporary valves shall be suitable for their associated service. Where valve is provided at permanent terminus of conduit, including piping or ducting, also provide on downstream side of valve a blind flange with drain/flushing connection.

6. Owner will assist Contractor in dewatering process tanks, basins, conduits, and other work areas to be dewatered for shutdowns. Owner will operate existing gates/valves to dewater tanks/channels to extent possible with existing gates/valves. Contractor is responsible to remove any remaining water as required to complete the work. Contractor shall maintain clean, dry work area by pumping and properly disposing of fluid and other material that accumulates in work areas.
7. Draining and Cleaning of Conduits, Tanks, and Basins:
 - a. Unless otherwise shown or indicated in the Contract Documents, Contractor shall dewater process tanks, basins, conduits (including piping) at beginning of each shutdown. Flush, wash down, and clean tanks, basins, conduits (including piping), and other work areas.
 - b. Contractor shall remove liquids and solids and dispose of them at appropriate location at the Site as directed by Engineer. Unless otherwise specified or indicated, contents of tanks, basins, and conduits (including piping) undergoing modifications shall be transferred to existing process tanks or conduits at the Site with capacity sufficient to accept such discharges, using hoses, temporary piping, temporary pumps, and other means provided by Contractor. Discharge of fluids across floors is not allowed.
 - c. If drainage point is not available on the conduit (including piping) to be drained, provide a wet tap using tapping saddle and valve or other method approved by Engineer. Uncontrolled spillage of contents of conduits (including piping) is not allowed.
 - d. Spillage shall be brought to Engineer's attention immediately, both orally and in writing, and reported in accordance with Laws and Regulations. Contractor shall wash down spillage to floor drains or sumps or other appropriate location and flush the system to prevent clogging and odors. If spillage is not suitable for discharge to the drainage system, such as chemical spills, as determined by Engineer, Contractor shall remove spillage by other means, such as vactor truck, sorbents, or other method acceptable to Engineer.

1.6 SEQUENCE OF WORK

- A. Perform the Work in the indicated sequence. Certain phases or stages of the Work may require working 24 HR days or work during hours outside of regular working hours with prior Owner approval. Work may be accelerated from a later stage to an earlier stage if Owner's operations are not adversely affected by proposed substitute sequence, with Engineer's approval. Stages specified in this article are sequence-dependent.
- B. To maintain operation of the existing facilities during construction of the Work, the improvements in each clarifier shall be sequential. The following requirements are identified to help the Contractor understand the sequence of construction required to maintain sufficient treatment capacity and to assist in the development of a construction schedule. Only major or critical construction tasks required for schedule development have been identified. It will be the responsibility of the Contractor to develop a detailed construction schedule as required in Specification Section 01 32 16 - Construction Progress Schedule.
- C. General Requirement:
 1. There are 12 final clarifiers. The final clarifier system consists of three groups of four final clarifiers fed by a splitter structure at each group. Each group of four final clarifiers are associated with one of the Return Sludge Pump Stations (Building 50, 51, or 52) as shown on the Drawings. A total of 10 final clarifiers shall be capable to be placed in service at all times during construction. This includes the associated final clarifier influent channels, final clarifier influent splitter boxes, scum collection and pumping, return sludge collection and pumping, and final clarifier effluent system. Owner will operate the in-service final clarifiers. The Contractor shall provide adequate access, acceptable to the Owner, at all times to the final clarifier bridges for Owner's operation and maintenance staff during construction of adjacent facilities.

2. Temporary shutdowns of flow to a group of final clarifiers and associated facilities are limited to a total of 72 HRS that starts once flows are stopped. It will take approximately 24 HRS to drain the final clarifiers and mixed liquor channel before Contractor can access the areas. Contractor shall coordinate any temporary shutdowns of the facilities with the Owner and provide detail schedule of the work to be completed during the shutdown for review 30 days prior to shutdown. Contractor may propose temporary shutdowns at any time of year provided conditions are acceptable for the work. The Owner may allow duration of temporary shutdowns to be extended based on predicted flows to the WRF. Dry periods with low flows and wet periods with high flows can occur throughout the year. Typically, lower flows and dry weather conditions occur July through September or December through February.
 3. Temporary shutdowns of flow to all the final clarifiers and associated facilities are limited to a maximum total of 8 HRS that starts once flows are stopped. Contractor shall coordinate any temporary shutdowns of the facilities with the Owner and provide detail schedule of the work to be completed during the shutdown for review 30 days prior to shutdown. If work is coordinated with the Owner to be completed at low flow conditions, dry weather periods (July through September or December through February), the Owner may allow the duration of the temporary shutdown to be extended based on predicted peak flows to WRF.
- D. Final Clarifier Influent, Secondary Scum, and Return Sludge Wet Well Equalization Sluice Gate Replacements:
1. At each return sludge pump station (Buildings 50, 51, 52), there are four sluice gates in the final clarifier influent splitter box, one sluice gate at the scum pit, and one sluice gate between the return sludge pump wet wells that shall be removed and replaced as indicated on the drawings. This work will require the influent channel, splitter box, scum pit, return sludge wetwells, and the associated final clarifiers to be drained.
 2. The Contractor may proceed with this work during low flow conditions at the facilities and there is no rain or snow melt in the forecasted for 48 HRS at the approval and discretion of the Owner. All eight final clarifiers at the other two return sludge pump stations must be capable of being placed in-service before this work can begin.
 3. Contractor shall coordinate schedule for the work with the Owner for the shutdown and provide detail schedule of the work to be completed during the shutdown for review a minimum of 30 days prior to shutdown.
 4. The sluice gate removal and replacement work shall be completed within 48 HRS from start of shutdown of flow in the influent channel. Scheduling multiple shutdowns will be allowed, at the approval and discretion of the Owner, if all the sluice gates cannot be removed and replaced within 48 HRS. No shutdown will be extended longer than 48 HRS without approval by the Owner. Extension of shutdown time will be determined by the Owner based on current wastewater flow into the WWTF and weather forecast at the time the work is scheduled. Contractor may propose temporary shutdowns at any time of year provided conditions are acceptable for the work. The Owner may allow duration of temporary shutdowns to be extended based on predicted flows to the WRF. Dry periods with low flows and wet periods with high flows can occur throughout the year. Typically, lower flows and dry weather conditions occur July through September or December through February.
 5. A period of 48 HRS will be allowed to perform the following:
 - a. Contractor shall coordinate temporary shutdown of the influent channel with the Owner.
 - b. Owner will drain the influent channel, splitter boxes, associated final clarifiers, scum pit, and return sludge wet wells.
 - 1) Contractor shall be responsible for pumping remaining wastewater from the structures down to level required for Contractor to complete the work. Wastewater shall be pumped to mix liquor channel at adjacent return sludge pump station.
 - 2) Contractor shall be responsible for hosing down and cleaning work areas to acceptable condition to complete the work.

- 3) Contractor to make provisions to accommodate wastewater leakage through any sluice gates, valves, stop logs, and/or pipe plugs utilized to stop flow from getting into the areas of work.
 - c. The Contractor shall complete removal and replacement of the sluice gates and appurtenances, remove tools, materials and temporary plug, and ready influent channel to be placed back in service.
 - d. Contractor shall coordinate with the Owner in placing the influent channel back in-service.
- E. Improvements to Final Clarifiers (FC No. 1 through FC No. 12):
1. The Contractor may proceed with this work at any time.
 2. Coordinate with Owner on the current operational status of the final clarifiers so that work on inoperable final clarifiers are scheduled to be completed first. It is required that 10 final clarifiers must be available for service at all times.
 3. Contractor shall coordinate schedule for this work with the Owner for the shutdown of each final clarifier.
 - a. A period of two days per final clarifier shall be allowed for the Owner to:
 - 1) Close gate to final clarifier at splitter box.
 - 2) Drain final clarifier.
 - 3) Wash down the inside of the final clarifier basin with hose (any additional cleaning required above this will be the Contractor's responsibility).
 4. Complete improvements to a final clarifier.
 - a. Complete clarifier mechanism acceptance testing.
 - b. Complete electrical and instrumentation inspection and testing.
 - c. Provide Manufacturer's certification and copy of report and test results verifying completion of checkout, start-up, testing, and other related field services specified.
 - d. Place final clarifier into service for demonstration testing.
 - 1) Coordinate with Owner to open influent gates at the splitter box and place Final Clarifier back in service.
 - e. After Pre-demonstration and Demonstration Periods on a final clarifier is completed and accepted, all certificates and reports have been provided, and the final clarifier is accepted to be placed in continuous service by the Owner, then the next final clarifier may be taken out of service.
 5. Improvements to FC No. 1 through FC No. 12 may be declared substantially complete after items 1 through 3, the Pre-demonstration Periods, and the Demonstration Periods have been completed on all 12 final clarifiers.
- F. Secondary Effluent Channel Improvements:
1. Structural concrete repairs on the inside and outside of the secondary effluent channel shall be completed as indicated on the Drawings. The repair work inside the channel will require the channel to be empty and free of any wastewater flow.
 2. Temporary shutdowns of all flow to the effluent channel are limited to a maximum total of 8 HRS once flow is stopped.
 3. The repair work inside the Effluent Channel will need to be scheduled to be completed during the low flow, dry weather periods at WRF when flows to the effluent channel from FC No. 6, FC No. 7, FC No. 9, FC No. 10, FC No. 11, and FC No. 12 can be shut down. Scheduling the time and duration of the shutdown will need to be coordinated with WRA. Contractor may propose temporary shutdowns at any time of year provided conditions are acceptable for the work. The Owner may allow duration of temporary shutdowns to be extended based on predicted flows to the WRF. Dry periods with low flows and wet periods with high flows can occur throughout the year. Typically, lower flows and dry weather conditions occur July through September or December through February.

4. Contractor shall install temporary bulkheads to isolate the area(s) and maintain a clean, dry work area. Temporary bulkhead(s) will need to be installed during the 8 HR maximum shutdown period.
 - a. WRA will operate gates to drain channel to extent possible. Contractor will be required to pump water remaining at bottom of channel and to clean channel as required to complete repairs.
5. Contractor shall coordinate scheduling of repair work in while Final Clarifier No. 1 through No. 5 and No. 8 are in service for the clarifier mechanism replacement work.
6. The Contractor shall complete concrete repair work in an area, remove tools and materials, and ready effluent channel to be placed back in service.
7. Contractor shall coordinate with the Owner for placing the effluent channel back in service.

1.7 SHUTDOWNS

- A. Shutdowns shall be in accordance with this Specification Section. Work requiring service interruptions for tie-ins shall be performed during scheduled shutdowns.
- B. Work that may interrupt normal operations shall be accomplished at times convenient to Owner unless otherwise indicated in the Contract Documents.
- C. If Contractor's operations cause an unscheduled interruption of Owner's operations, immediately re-establish satisfactory operation for Owner.
- D. Fines and Penalties Imposed by Authorities Having Jurisdiction:
 1. Unscheduled shutdowns or interruptions of continued safe and satisfactory operation of Owner's facilities that result in fines or penalties by Authorities Having Jurisdiction shall be paid solely by Contractor if, in Engineer's opinion, Contractor did not comply with requirements of the Contract Documents, or was negligent in the Work, or did not exercise proper precautions in performing the Work and complying with applicable permits, Laws, and Regulations.
 2. Owner or Engineer may deduct as set-offs such amounts from payments due Contractor.
- E. Temporary, short-term shutdowns of smaller conduits (including piping and ducting), equipment, and systems: Coordinate requirements for such shutdowns with Engineer and Owner. Where necessary, obtain Engineer's interpretation or clarification before proceeding.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 SUBSTITUTE PROCEDURES

- A. Proposal of Substitute Sequencing, Shutdowns, and Tie-Ins:
 1. As a substitute to the procedures indicated in this Specifications Section, Contractor may propose providing additional temporary facilities that can eliminate or mitigate a constraint without additional cost to Owner, provided such additional temporary facilities: Do not present hazards to the public, personnel, structures, and equipment; that such additional temporary facilities do not adversely affect Owner's ability to comply with Laws and Regulations, permits, and operating requirements; that such temporary facilities do not generate or foster the generation of odors and other nuisances; and that requirements of the Contract Documents are fulfilled.
 2. Engineer will consider proposals for substitute procedures after the Effective Date of the Contract. All Bids shall be based on the requirements of the Contract Documents, including this section.
 3. Substitution Requests:
 - a. When proposing a substitute procedure for a tie-in or shutdown or other requirements of this section, comply with the requirements of the Contract Documents and Specification Section 01 25 00 - Substitution Procedures.

- b. When deviation from specified sequence or procedures is proposed, Contractor's proposal shall explain in detail the proposed sequence and procedures and associated effects, including evidence that Owner's operations will not be adversely affected, to an extent greater than originally contemplated in the Contract Documents, by proposed substitution. List benefits of proposed substitution, including benefits to Progress Schedule.

3.2 GENERAL PROVISIONS FOR COORDINATING WITH OWNER'S OPERATIONS

- A. When possible, combine multiple tie-ins into a single shutdown to reduce impacts on Owner's operations and processes.
- B. Operation of Existing Systems and Equipment during the Work:
 - 1. Do not shut off or disconnect existing operating systems or equipment, unless accepted by Engineer in writing.
 - 2. Operation of existing systems and equipment will be by Owner unless otherwise specified or indicated.
 - 3. Where necessary for the Work, Contractor shall seal or bulkhead Owner-operated gates and valves to prevent leakage that may affect the Work, Owner's operations, or both.
 - 4. Provide temporary watertight plugs, bulkheads, and line stops as necessary and as required. After completing the Work, remove seals, plugs, bulkhead, and line stops to satisfaction of Engineer.
- C. Bypassing: Diversion of flows around treatment processes is not allowed.
- D. Performing the Work of this section constitutes Contractor's approval of underlying work and field conditions prevailing at the time of the Work.

3.3 PREPARATION

- A. Coordinate preparations for removals with requirements of Specification Section 01 73 29 - Cutting and Patching as applicable.
- B. Shutdowns - General Preparation:
 - 1. Coordinate shutdowns with Owner and Engineer.
 - 2. Submit shutdown planning Submittals and shutdown notification Submittals in accordance with this Specifications section's "Submittals" Article.
 - 3. Furnish at the Site, in close proximity to the shutdown and tie-in work areas, tools, materials, equipment, spare parts, both temporary and permanent, necessary to successfully perform the shutdown. Complete to the extent possible, prefabrication of piping and other assemblies prior to commencing the associated shutdown. Demonstrate to Engineer's satisfaction that Contractor has complied with such requirements before commencing the shutdown.
 - 4. Engineer shall have no duty to Contractor to advise Contractor of inadequate preparations by Contractor; Contractor is solely responsible for the means, methods, procedures, techniques, and sequences of construction.
- C. Shutdowns of Electrical Systems:
 - 1. Comply with Laws and Regulations, including the National Electric Code.
 - 2. Contractor shall lock out and tag circuit breakers and switches operated by Owner and shall verify that affected cables and wires are de-energized to ground potential before starting other Work associated with the shutdown.
 - 3. Upon completion of shutdown Work, remove the locks and tags and advise Engineer or Resident Project Representative (RPR) that facilities are available for use.

END OF SECTION

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SECTION 01 25 00
SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements applicable to all substitution requests.
 - 2. Provisions specific to Contractor's substitution requests for:
 - a. Materials and equipment to be incorporated into the Work.
 - b. Methods, procedures, and sequences indicated in the Contract Documents.
- B. Scope:
 - 1. Contractor shall provide all labor, materials, equipment, tools, services, and incidentals, and pay all costs associated with requests for approval of substitutes.
 - 2. Where the Contract Documents expressly indicate that substitutes are not allowed, are unacceptable, or time-barred, do not submit substitution requests for such items or procedures.
 - 3. Requirements for Contractor's proposal of "or-equals", where allowed by the Contract, are in Specification Section 01 04 00 - Special Provisions.
- C. Related Sections include, but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.

1.2 REFERENCES

- A. Terminology: See Specification Section 01 04 00 - Special Provisions.

1.3 SUBSTITUTES - GENERAL

- A. This Article applies to all substitutes and substitution requests, whether for substitute materials or equipment, or for substitute methods, procedures, or sequences.
- B. This Section expands on the provisions on substitutes in the Contract Documents and Specification Section 01 04 00 - Special Provisions.
- C. Substitution will only be considered under the conditions stated herein and only after award of contract.
- D. Time Limits for Submitting Substitution Requests:
 - 1. Where the Contract allows Contractor's substitution requests, such proposals will be considered by Engineer only during a period of 60 days after the effective date of the Contract, unless otherwise indicated.
 - 2. Substitution requests will be accepted for consideration by Engineer after the time limit indicated in the paragraph above this, when materials or equipment shown or indicated, and all associated "or-equals", are either:
 - a. Unavailable; or
 - b. Despite Contractor's due diligence, are unavailable in time for the Work to be completed within the Contract Times.
 - 3. The foregoing notwithstanding, substitutes will not be approved when received by Engineer after Contractor has commenced the associated Work at the Site, where approval of the substitute would require rework or removing Work already installed.

- E. Design Professional:
1. Engineer is responsible for design of the completed Project as a functioning whole and has responsible charge of the Project except for Work for which design responsibility is expressly delegated by the Contract Documents.
 2. Do not retain services of any third-party design professional to prepare modifications of Engineer's design of the completed Project as a functioning whole without Engineer's express, written consent via an appropriate Contract modification setting forth appropriate performance and design criteria for delegating the design of the substitute.
- F. Contractor's Representations:
1. In submitting each substitution request, Contractor represents that:
 - a. Contractor has read and understands the Contract's provisions on substitutes, as indicated in Specification Section 01 04 00, this Specification Section, and elsewhere in the Contract Documents.
 - b. Substitution request is complete and includes all documents and information required by the Contract Documents.
 - c. Contractor certifications required by the Contract and this Specification Section are valid and made with Contractor's full knowledge, information, and belief.
 - d. Contractor will provide the same or better guarantees and warranties for substitute as for the specified materials, equipment, methods, procedures, and sequences (as applicable).
 - e. Contractor waives all rights for increasing the Contract Price or extending the Contract Times, related to the substitute, that subsequently may become apparent to Contractor after issuance of the associated Contract modification instrument approving such substitute, except for those associated with differing subsurface or physical conditions or discovery of a previously unforeseen Hazardous Environmental Condition associated with the Work involving the approved substitute.
- G. Submittal of Substitution Requests - General:
1. Substitution requests must be submitted by Contractor. Engineer will not accept or review substitution requests from prospective or bona-fide Subcontractors or Suppliers.
 2. Submit separate substitution request for each proposed substitute.
 3. Submit substitution requests in accordance with requirements for Shop Drawings and other Submittals, as indicated in Specification Section 01 33 00 - Submittal Procedures.
 4. Do not submit substitution requests as any of the following (such substitution requests will be returned by Engineer without review):
 - a. Shop Drawing, Sample, or other Submittal.
 - b. Request for approval of an "or-equal".
 - c. Request for interpretation (RFI) or clarification.
 - d. Change Proposal without all other, required substitution request elements indicated below.
 - e. Other oral or written communication not in accordance with this Specification Section.
 5. Each substitution request shall include:
 - a. Transmittal letter (one per substitution request) expressly indicating the communication is a substitution request.
 - b. Completed substitution request form, on the form attached to this Section.
 - c. Change Proposal Request submitted in accordance with the Contract Documents. Clearly indicate the proposed changes in Contract Price and Contract Times if substitute is approved; if none, clearly so indicate on the Change Proposal Request.
 - d. Certifications and written representations required by the Contract Documents to accompany substitution requests.
 - e. Other information: (1) required elsewhere in this Specification Section and in other elements of the Contract Documents, and (2) deemed appropriate by Contractor to support Contractor's substitution request.

6. When Engineer requires additional information to evaluate a substitution request, furnish such information within five days of receipt of Engineer's request, unless additional time is granted by Engineer, in writing.
 7. Engineer and Owner have the right to rely upon the completeness and accuracy of information, documents, certifications, and representations in Contractor's substitution request. Contractor accepts full responsibility for completeness and accuracy of substitution requests (except for Engineer's professional liability).
- H. Engineer's Review of Substitution Requests:
1. Engineer has no obligation to approve any substitute.
 2. Substitutes will not be approved unless all of the following are satisfied for the associated substitute:
 - a. The Contract supports submittal of such substitution request; and
 - b. Substitute is reasonably consistent with Engineer's design intent for the Project as a completed, functioning whole; and
 - c. As indicated in Paragraph 1.3.A.3 of this Specification Section.
 - d. Substitute will not have an adverse effect on the work of other contractors, or existing or proposed construction; and
 - e. Substitution request is complete in accordance with the Contract Documents and Engineer's requests, and
 - f. Owner agrees to the substitute; and
 - g. Associated changes in Contract Price and Contract Times, if any, are acceptable to Owner.
 3. Engineer is not obligated to approve any substitute where such approval is conditioned on an increase in the Contract Price, the Contract Times, or both.
 4. Timeliness of Engineer's Review:
 - a. Engineer will endeavor to perform timely review of substitution requests. However, Contractor is responsible for complying with the Contract Times, regardless of whether the substitute is approved.
 - b. Where approval of a substitute would necessitate other changes to the Project's design, additional time, beyond that indicated above, will be necessary for Engineer's preparation of revisions to the design.
 5. When Design Changes are Required with Approval of Substitute:
 - a. Engineer will advise Contractor promptly following Engineer's review (and Owner's comment, if any) on substitution request to indicate whether the substitute will be acceptable. Engineer's advisory to Contractor will indicate whether changes in Engineer's design are necessary and include a preliminary estimate of Engineer's fee and time required for modifying the design and preparing an associated Proposal Request to Contractor.
 - b. Engineer's preliminary estimates of fee and time for design modifications will be prepared in good faith but are not binding on Owner or Engineer.
 - c. Contractor shall reimburse Owner for costs incurred by Owner for design modifications necessitated by approval of substitute. Owner may deduct such amounts, as one or more set-offs, from payments due Contractor under the Contract.
 - d. Upon Contractor's receipt of Engineer's estimate of fee and time for design modifications, contractor shall advise Engineer, in writing, within three days whether Contractor will continue pursuing approval of the substitute.
 - e. Request to Contractor.
 - f. Engineer may reject a substitute that would require substantial changes in the Project's design.
- I. Approval of Substitutes:
1. Substitutes are approved only via issuance of an appropriate Field Order or Change Order in accordance with the Contract Documents.

2. Approval of a substitute does not relieve Contractor from obligation to comply with the Contract Documents, including submitting Shop Drawings, Samples, and other Submittals in accordance with the Contract Documents.

1.4 SUBSTITUTE MATERIALS AND EQUIPMENT

- A. In addition to other requirements of this Specification Section and elsewhere in the Contract Documents, substitution requests for substitute materials or equipment shall include:
 1. Manufacturer and Location:
 - a. Name and address of manufacturer of the proposed substitute. Indicate country where manufacturer is incorporated and owned.
 - b. Companies and brands owned by or affiliated with manufacturer.
 - c. Name of manufacturers of principal component items, such as motors, bearings, and similar items.
 - d. Location where the items would be manufactured, including country and address. Indicate the total percentage of the items' value that will be manufactured outside of the United States and its territories.
 - e. Name, address, and driving distance from the Site of:
 - 1) Manufacturer's sales representative.
 - 2) Nearest service center offering full array of service capabilities.
 - 3) Warehouse or other location where spare parts for the proposed substitute are available.
 - f. Number of years that manufacturer has actively participated the North American market.
 2. Proposed Materials and Equipment:
 - a. Model designation and quantity of each proposed for the Work.
 - b. Manufacturer's literature for proposed substitute, with description of the materials and equipment.
 - c. Performance information and representative test data.
 - d. Indication of reference standards with which materials and equipment comply.
 - e. Preliminary process and instrumentation diagrams (P&ID), where applicable.
 - f. Identification of hazardous materials, including Constituents of Concern, used in the materials and equipment, and associated permitting or licensing required.
 - g. Manufacturer's standard warranty and applicable, proposed special or extended warranties, including indication of specific entities that will be beneficiary of such warranties.
 - h. Complete list of proposed deviations from requirements of the Contract Documents.
 - i. Itemized comparison of specified materials and equipment and proposed substitute, indicating:
 - 1) Size (physical dimensions) when: item is in use, when not in use, and space required for routine and major maintenance.
 - 2) Weight and loading at supports, when item is full and empty.
Materials of construction.
 3. Operation requirements, including:
 - a. Anticipated consumption of each item of: Electricity, other energy sources, water, chemicals (indicate each), and other needs for operation at the Site.
 - b. Typical labor required for operation and associated skill level.
 - c. Description of remote monitoring and control capabilities, as applicable.
 4. Maintenance requirements, including:
 - a. Anticipated life in the service and environment required.
 - b. Frequency and general scope of routine and major maintenance typically necessary.
 - c. Typical labor requirements and general qualifications of personnel performing routine maintenance.
 - d. Major, associated equipment necessary for routing and major maintenance, including hoisting equipment type and capacity (when applicable).

- e. Availability, scope, cost, and general conditions of service and maintenance contracts, if any.
5. References for similar projects on which the materials and equipment were used. Indicate for each:
 - a. Project owner name, name of facility where installed, and name of project.
 - b. City, state, and country of installation.
 - c. Model number/size and quantity furnished and installed.
 - d. Year of installation.
 - e. Contact information for owner and design professional, including telephone numbers.
6. Other information required by the Contract Documents.
7. Other information reasonably requested by Engineer.

1.5 SUBSTITUTE CONSTRUCTION METHODS, PROCEDURES, OR SEQUENCES

- A. In addition to other requirements of this Specification Section and elsewhere in the Contract Documents, substitution requests for substitute methods, procedures, or sequences shall include:
 1. Clear identification of the method, procedure, or sequence shown or indicated in the Contract Documents for which substitute is requested.
 2. Detailed description of proposed substitute method, procedure, sequence, or combination thereof.
 3. Reasons why substitute is proposed and benefits to the Project should the substitute be approved.
 4. Detailed list of how the proposed substitute deviates from associated method, procedure, or sequence shown or indicated in the Contract Documents.
 5. Impact of the substitute, if approved, on Owner's or facility manager's operations, when the Work is at an existing facility.
 6. Effect on other contractors working at the Site, if substitute is approved.
 7. Description of temporary equipment and temporary facilities needed, should the substitute be approved, including quantity of items, capacities, performance characteristics, permitting and approvals required by authorities having jurisdiction, and proposed location at the Site.
 8. Written evaluation of how substitute method, procedure, or sequence complies with Laws and Regulations.
 9. Drawings illustrating method, procedure, or sequence.
 10. Materials to be used that contain Constituents of Concern or that have potential to cause or exacerbate a Hazardous Environmental Condition.
 11. Other information and data required by the Contract Documents.
 12. Other information reasonably required by Engineer.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The following, bound after this Specification Section's "End of Section" designation, are part of this Specifications Section:
 1. Exhibit A - Substitution Request Form (one page).

END OF SECTION

SECTION 01 26 13
REQUESTS FOR INFORMATION (RFI)

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section defines the process for handling Requests for Information (RFI).
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Section 01 04 00 - Special Provisions.
 - 3. Section 01 33 00 - Submittals.
- C. RFIs are intended to provide clarifications and interpretations of the Contract Documents and maintain progress of Work.
- D. RFIs are not intended for general communication, requesting substitutions, requesting proposed changes, resolution of nonconforming work, or coordination between Contractors.

1.2 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.
 - 1. 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.
 - 1. 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.
 - 1. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in the General Conditions.

1.3 RFI SUBMITTAL PROCEDURE

- A. All RFIs shall be submitted electronically on mutually agreeable forms via Submittal Exchange. See Section 01 33 00 for submittal requirements.
- B. When needed, the RFI shall include backup information to clarify the request.
 - 1. Backup information can include verified field measurements, quantities, dimensions, photos showing existing conditions, and any other information that will assist the Engineer or Owner in reviewing and responding to the RFI.
- C. Engineer will return a response to the RFI, request additional information, or will provide a schedule of when a response will be issued.

PART 2 - PRODUCTS - (NOT APPLICABLE TO THIS SPECIFICATION SECTION)

PART 3 - EXECUTION

3.1 REQUESTS FOR INFORMATION

- A. Review of Contract Documents and Field Conditions:
 - 1. Before starting each portion of Work, carefully study and compare Drawings, Specifications and other Contract Documents, Coordination Drawings, Shop Drawings, prior correspondence or documentation relative to that portion of Work, and any other information furnished by Engineer and Owner.
 - 2. Evaluate field conditions and take field measurements related to that portion of Work.
 - 3. Any inconsistencies discovered in the above review of the Contract Documents and Field Conditions should be submitted to the Engineer in an RFI.

- B. Contractor's Responsibilities:
 - 1. When interpretation, clarification, or explanation of portion of Construction Documents is needed by Contractor or its Subcontractor, Vendor, or Supplier, the request shall be processed through the Contractor.
 - a. Review the RFI for completeness, quality, proper referencing drawings, specification, or other contract documents.
 - b. When submitting RFI's generated from subcontractors, suppliers, and others, make every attempt to validate, resolve or respond to RFI by thoroughly researching and reviewing Contract Documents and field conditions before transmitting to the Engineer.
 - c. If the RFI is not clear, concise, complete, and easily understood, do not submit the RFI to Engineer for response.
 - 2. Follow these procedures in developing an RFI:
 - a. List relevant Contract Documents when seeking information being requested.
 - 1) Reference all applicable Contract Drawings by sheet number.
 - 2) Specifications by section and paragraph number.
 - 3) Reference any other relevant documents.
 - b. Clearly state any additional information needed so request can be fully understood, including sketches, photos or other reference material.
 - c. Suggest any reasonable solutions and recommendations which will aid in determining a solution or response.
 - d. Any critical RFI's requiring a rapid response shall clearly indicate such with an explanation as to why RFI is critical.
 - e. Priority for responses shall be indicated when multiple RFI's are submitted within short period of time.
 - 3. A response to RFI shall not be considered a notice to proceed with a change that may revise the Contract Sum or Contract Time, unless authorized by Owner in writing.
 - 4. If response to RFI is determined incomplete, it shall be resubmitted with reason response is unacceptable and any necessary additional information within five (5) days of time of receipt of response to RFI.

- C. RFI Submittal Numbering:
 - 1. RFI's shall be assigned unique numbers in sequential order (1, 2, 3, 4, etc.).
 - 2. A resubmitted RFI or a previously answered RFI requiring revising or further clarification shall be submitted using original RFI number preceded by ".1" to indicate revision one of RFI (i.e.: RFI No. 34.1 for revision 1 to RFI No. 34).

- D. Invalid RFI
 - 1. Engineer may return RFI without response for following reasons:
 - a. Request is unclear or incomplete.
 - b. Request was answered in a previous RFI.
 - c. Requested information is readily available in the Construction Documents.
 - d. Request is related to construction means, methods or techniques.
 - e. Request is related to health or safety measures.
 - f. Request is due to Contractor's lack of adequate coordination.
 - g. Issue relates to coordination between Subcontractors.

- h. Request is a "Substitution Request."
 - i. Request is a "Contractor Proposed Change."
 - j. Request is due to non-conformance.
2. Should the invalid RFIs continue to be provided, the Owner may deduct the cost of the Engineer's time to process, review, and return the RFI's.

END OF SECTION

SECTION 01 29 73
SCHEDULE OF VALUES (LUMP SUM PROJECTS)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Administrative and procedural requirements for the Schedule of values.
- B. Scope:
 - 1. Contractor shall prepare and submit to Engineer for acceptance a Schedule of Values that allocates cost to each item of the Work, Schedule of Value list of line items shall correspond to each aspect of the Work, establishing in detail the portion of the Contract Price allocated to each component of the Work.
 - 2. Upon request of Engineer, promptly furnish data and information that substantiates and supports the amounts indicated in the Schedule of Values.
 - 3. Submit preliminary Schedule of Values to Engineer for initial review. Contractor shall incorporate Engineer's comments into the Schedule of Values and resubmit to Engineer. Engineer may require corrections and re-submittals until Schedule of Values is acceptable.
 - 4. Schedule of Values may be used as a basis for negotiating price of changes, if any, in the Work.
- C. Related Sections include, but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 01 29 76 - Progress Payment Procedures.

1.2 SUBMITTALS

- A. Informational Submittals: Submit the following:
 - 1. Submit to Engineer the Schedule of Values in the form and quantity required in Specification Section 01 33 00 - Submittals.
 - 2. Content of Schedule of Values Submittals shall be in accordance with Article 1.3 of this Specifications Section.
 - 3. Timing of Submittals:
 - a. Submit preliminary Schedule of Values within time limit indicated Specification Section 01 04 00 - Special Provisions.
 - c. Submittal of the Schedule of Values for acceptance by Engineer shall be in accordance with the Contract Documents. Engineer will not accept Applications for Payment without an acceptable Schedule of Values.
 - d. When required by Engineer, promptly submit updated Schedule of Values to include cost breakdowns for changes in the Contract Price.

1.3 SCHEDULE OF VALUES FORMAT AND CONTENT

- A. Organization and Major Elements of Schedule of Values.
 - 1. Prepare Schedule of Values on the "progress estimate" or "continuation sheets", as applicable, of the Application for Payment form indicated in Specification Section 01 29 76 - Progress Payment Procedures.
 - 2. Include in Schedule of Values itemized list of Work for each major work area included in the Work, for each payment item included in the Contract. Group the Work in the Schedule of Values into the following areas:
 - a. Final Clarifiers.
 - b. Secondary Effluent Channel.
 - c. Sluice Gate Replacement.

3. Organization in Accordance with Specification Sections:
 - a. Within each work area, organize the Schedule of Values by the various Specifications section numbers and titles included in the Contract Documents.
 - b. Label each row in the Schedule of Values with the appropriate Specifications section number. Include an amount for each row in the Schedule of Values.
 - c. List sub-items of major materials, equipment, or systems, as appropriate or when requested by Engineer.
- B. Requirements for preliminary Schedule of Values Submittal and the Schedule of Values Submittal for acceptance by Engineer are:
1. Subcontracted Work:
 - a. Schedule of Values shall indicate division of Work between Contractor and each subcontractor.
 - b. Line items for Work to be performed by each subcontractor shall include the word, “(SUBCONTRACTED)” and the name of the subcontractor once the associated subcontract is signed and effective.
 2. Apportionment between Materials and Equipment, and Installation: Schedule of Values shall include separate apportionment of costs for:
 - a. Cost of materials and equipment to be incorporated into the completed construction.
 - b. Cost of delivery, handling, and storage of materials and equipment to be incorporated into the completed construction.
 - c. Cost of temporary materials (such as excavation supports, scaffolding, and other temporary materials), and their associated delivery, handling, and storage costs, if any.
 - d. Cost of rentals of construction equipment and machinery, whether owned by Contractor or subcontractor or leased from a third-party equipment rental entity.
 - e. Cost of installing materials and equipment.
 - f. Cost of startup, training, and O&M manuals.
 - g. Travel and subsistence costs, if any.
 - h. Other costs used in preparing the Bid by Contractor and each Subcontractor.
 3. Sum of individual line item amounts indicated on the Schedule of Values shall equal the total of associated bid/payment item. Sum of bid/payment item totals in the Schedule of Values shall equal the total lump sum component of the Contract Price.
 4. Overhead and Profit:
 - a. Include in each line item a directly proportional amount of Contractor’s overhead and profit in the Contract Price.
 - b. Do not include overhead and profit as separate line item(s).
 5. Allowances: Include separate line item for each allowance.
 6. Unit Price Work: Separately indicate items of Unit Price Work in the overall Schedule of Values. Where the required form (in accordance with Specification Section 01 29 76 - Progress Payment Procedures) includes a separate worksheet or page for Unit Price Work, indicate all items of Unit Price Work on such worksheet or page of the form.
 7. Bonds and Insurance Costs:
 - a. Include line item for bonds and insurance in Schedule of Values.
 - b. If amount proposed by the Contractor exceed 2.0% of the Contract Price, submit to Engineer documentation substantiating the proposed bonds and insurance costs. Submit to Engineer such documentation when otherwise requested by Engineer.
 - c. When Contractor has furnished bonds and evidence of insurance acceptable to Owner and in accordance with the Contract Documents, entire amount for bonds and insurance may be applied for in the first Application for Payment.
 8. “Site Overhead” and Administrative Cost Elements:
 - a. Include in the Schedule of Values relevant line items and amounts for work and services required by the Contract Documents and specific Division 01 Specifications sections, such as but not limited to:
 - 1) Superintendence and supervision costs and other costs.

- 2) Itemized list of Work by work area, as applicable, for costs associated with coordination with the Owner's operations, including required sequencing, as set forth in the Contract Documents.
 - 3) Construction Progress Schedule and scheduling, schedule updates, time impact analyses, and preparation of recovery schedules.
 - 4) Construction photographic documentation.
 - 5) Permits (when applicable).
 - 6) Temporary utilities and temporary facilities.
 - 7) Field offices (monthly rental and maintenance) and storage facilities (excluding costs of establishment and removal, which are part of mobilization and demobilization).
 - 8) Site maintenance, such as temporary controls (dust, air pollution, water pollution, solid waste control, pest and rodent control, temporary erosion and sediment controls, and others), snow and ice removal, and similar activities.
 - 9) Field engineering and surveying.
 - 10) Progress cleaning and cleaning for Substantial Completion.
 - 11) Record documents (preparation, maintenance, and submittal).
 - a) If adequate record documents are maintained, up to 50% of the value of the record documents line item will be eligible for payment, spread evenly over those progress payments in which construction at the Site is performed.
 - b) Remainder of Project record documents line item will be eligible for payment when complete record documents are submitted in accordance with the Contract Documents. If record documents submitted are unsatisfactory to Engineer, amount may be reduced via set-offs in accordance with the Contract Documents.
 - 12) Other items required by Engineer.
- b. Include such items in Applications for Payment on payment schedule acceptable to Engineer
 - c. Such line items in the Schedule of Values shall exclude any and all costs associated with Contractor's permanent place(s) of business, personnel stationed at permanent office(s), salaries and bonuses of executive and administrative personnel not directly performing work on the Project, and general business expenses, all of which are part of Contractor's overhead costs.
9. Mobilization and Demobilization: In accordance with Specification Section 01 71 14 - Mobilization and Demobilization.
 10. Costs for Submittals, field quality control activities, and training of operations and maintenance personnel shall be as follows, unless otherwise accepted by Engineer:
 - a. Submittals: Up to 8.0% of cost (including all associated overhead and profit) of each equipment item, exclusive of transportation and installation costs associated therewith, may be allocated to preparation of Shop Drawings, Samples, and other Submittals required for release for purchase, fabrication, or delivery (as applicable) and may be included in the Application for Payment following Engineer's approval of Shop Drawings (and acceptance of other Submittals, as applicable) required for fabricating or purchasing for that item for the Work.
 - b. Field Quality Control: Up to 3.0% of total cost of each item (including all associated overhead and profit), including materials and equipment, and installation, may be apportioned to specified or required field quality control activities (including required testing and inspections) and included in the Application for Payment following Engineer's acceptance of the associated written field quality control report Submittal(s).

- c. O&M Manual Submittals and Training: Up to a total of 4.0% of equipment cost (including all associated overhead and profit), exclusive of transportation and installation costs, may be apportioned to operations and maintenance manuals and training of operations and maintenance personnel, which may be included in the Application for Payment following completion of training for the associated item.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 29 76
PROGRESS PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Administrative and procedural requirements for Contractor's progress payments.
- B. Scope:
 - 1. Contractor's requests for payment shall be in accordance with the Agreement, Contract Documents, and the Specifications.
 - 2. Form: Applications for Payment shall be the Engineers Joint Contract Documents Committee (EJCDC) document EJCDC C-620, "Contractor's Application for Payment" (2018 edition or later) or other form acceptable to the Owner and Engineer.
- C. Related Sections include, but are not necessarily limited to SUDAS Division 1.
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 01 29 73 - Schedule of Values.

1.2 CONTENT AND PROCEDURE FOR REQUESTING PROGRESS FOR PAYMENTS

- A. Procedure:
 - 1. Review with Engineer and Resident Project Representative (RPR) quantities and the Work proposed for inclusion in each progress payment request. Application for Payment shall cover only the Work and quantities recommended by the RPR.
 - 2. Contractor will review with Engineer and/or RPR the status of Project Record Documents, in connection with Engineer's review of each Application for Payment. Failure to maintain record document current will be cause for Engineer to recommend a reduction in payment for record documents in accordance with Specification Section 01 29 73 - Schedule of Values, and will entitle Owner to set-offs in accordance with the Contract Documents.
 - 3. Submit to Owner three printed originals, each with Contractor's signature, of each complete Application for Payment and other documents to accompany the Application for Payment.
 - 4. Engineer will act on request for payment in accordance with the Contract Documents.
- B. Content: Each request for payment shall include:
 - 1. Completed Application for Payment form, including summary/signature page, progress estimate sheets, and stored materials summary. Progress estimate sheets shall have the same level of detail as the Schedule of Values.
 - 2. Documentation for Stored Materials and Equipment:
 - a. For materials and equipment not incorporated in the Work but suitably stored, submit documentation in accordance with Specification Section 01 04 00 - Special Provisions and the Contract Documents.
 - b. Materials and equipment stored off-site are not eligible for payment.
 - c. Photographs of the stored items at the storage location, in accordance with requirements for progress photographs in Specification Section 01 30 00 - Special Conditions. Submit photographs sufficient to clearly indicate each stored item, clearly showing marking of Owner's property in accordance with Paragraph 1.2.C.1 of this Specification Section. Such photographs do not count as photographs required under Specification Section 01 30 00 - Special Conditions. For each month that such item(s) are stored, take and submit monthly new photographs of each stored item, with date-stamp on each photograph.

- d. Legibly indicate on invoice or bill of sale the specific stored materials or equipment included in the payment request and corresponding bid/payment item number for each and the Supplier price for each item.
 - e. In addition to the foregoing, attach the following to each Application for Payment in which payment for stored items, not yet installed at the Site, is requested:
 - 1) Certificate of Insurance.
 - 2) Ownership letter.
3. For Payment on the Basis of Cost of the Work plus a Fee:
- a. When Work included in an Application for Payment will be compensated on the basis of Cost of the Work plus a fee, whether when the entire Contract is compensated on the basis of Cost of the Work plus a fee or when the Application for Payment includes Change Order Work to be compensated on the basis of Cost of the Work plus a fee, the Application for Payment shall include documentation of the costs, including not less than the following:
 - 1) Number of and labor classifications of workers employed and hours worked. Separately indicate overtime and holiday hours, when applicable.
 - 2) Construction equipment used, including manufacturer, model, and year of manufacture, and number of hours such equipment was onsite and used for the Work compensated on the basis of Cost of the Work. Where such equipment was used on overtime, separately indicate overtime hours.
 - 3) Consumables and similar materials used.
 - 4) Receipts, bills, or invoices for, and descriptions of, materials and equipment incorporated into the Work.
 - 5) Invoices and breakdowns of labor, construction equipment, and materials and equipment incorporated into the Work by Subcontractors, and Suppliers' onsite time, if any.
 - 6) Invoices or receipts for other expenses included in the Application for Payment, such as travel and subsistence expenses, costs for bonds and insurance, and all other eligible costs and expenses for which compensation is sought in the subject Application for Payment on the basis of Cost of the Work.
 - 7) Other information and documents required by Owner or Engineer.
 - b. Costs for which progress payment is requested on the basis of Cost of the Work plus a fee and for which documentation acceptable to Engineer is not submitted will not be eligible for payment.
4. Listing of Subcontractors and Suppliers:
- a. Submit not less than monthly updated listing of all Subcontractors and Suppliers known to Contractor, whether or not such entities have a contract directly with Contractor.
 - b. Submit complete information using the form attached to this Specification Section.
- C. Final Payment:
- 1. Requirements for request for final payment are in the Contract Documents, Specification Section 01 04 00 - Special Provisions, and Specification Section 01 77 19 - Closeout Requirements.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The forms listed below, following this Specifications Section's "End of Section" designation, are part of this Specifications Section:
 - 1. List of Subcontractors and Suppliers form (two pages).

END OF SECTION

LIST OF SUBCONTRACTORS AND SUPPLIERS

Owner: _____
Project Name: _____

Contractor: _____ Date: _____
Contract Designation: _____

Indicate below complete information for each Subcontractor and Supplier known to Contractor, regardless of whether the firm has a direct contract with Contractor. Include all lower-tier Subcontractors and associated Suppliers. Copy and paste the paragraphs below as required to indicate all Subcontractors and Suppliers.

SUBCONTRACTORS

1. **Subcontractor Name:**
 - Address:
 - Contact Person:
 - Telephone No.:
 - E-mail Address:
 - Work Under Specifications Section Nos.:
 - Brief Description of Work:
 - Current Subcontract Price:
 - Approximate Subcontract Start Date:
 - Approximate Subcontract End Date:

2. **Subcontractor Name:**
 - Address:
 - Contact Person:
 - Telephone No.:
 - E-mail Address:
 - Work Under Specifications Section Nos.:
 - Brief Description of Work:
 - Current Subcontract Price:
 - Approximate Subcontract Start Date:
 - Approximate Subcontract End Date:

3. **Subcontractor Name:**
 - Address:
 - Contact Person:
 - Telephone No.:
 - E-mail Address:
 - Work Under Specifications Section Nos.:
 - Brief Description of Work:
 - Current Subcontract Price:
 - Approximate Subcontract Start Date:
 - Approximate Subcontract End Date:

Total of Subcontract Prices for all subcontracts equals approximately ___ percent of the Contract Price (Contractor to fill in blank monthly)

SUPPLIERS

1. **Supplier Name:**

- *Address:*
- *Contact Person:*
- *Telephone No.:*
- *E-mail Address:*
- *Furnishing Items Under Specifications Section Nos.:*
- *Brief Description of Items:*
- *Current Purchase Order Amount:*
- *Approximate Purchase Order Date:*
- *Approximate Purchase Order End Date:*

2. **Supplier Name:**

- *Address:*
- *Contact Person:*
- *Telephone No.:*
- *E-mail Address:*
- *Furnishing Items Under Specifications Section Nos.:*
- *Brief Description of Items:*
- *Current Purchase Order Amount:*
- *Approximate Purchase Order Date:*
- *Approximate Purchase Order End Date:*

3. **Supplier Name:**

- *Address:*
- *Contact Person:*
- *Telephone No.:*
- *E-mail Address:*
- *Furnishing Items Under Specifications Section Nos.:*
- *Brief Description of Items:*
- *Current Purchase Order Amount:*
- *Approximate Purchase Order Date:*
- *Approximate Purchase Order End Date:*

SECTION 01 30 00
SPECIAL CONDITIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Administrative and procedural requirements for:
 - a. Contractor's field office.
 - b. Drawings and Contract Documents for Contractor use.
 - c. Project photographic documentation.
 - d. Special considerations related to adjacent properties and facilities.
 - e. Historical and archaeological finds.
 - 2. Related Sections include, but are not necessarily limited to:
 - a. SUDAS Division 1.
 - b. Division 01 - General Requirements.
 - c. Section 01 04 00 - Special Provisions.
 - d. Section 01 52 13 - Contractors' Field Office and Sheds.

1.2 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. References in the Contract Documents to local code(s) means the following:
 - a. National Electric Code in effect at the location of the Project.
 - b. NFPA 101 - Life Safety Code.

1.3 SUBMITTALS

- A. See Specification Section 01 30 00 for requirements for the mechanics and administration of the submittal process.
- B. Action Submittals:
 - 1. Shop Drawings:
 - a. Project Signage: Location, materials, mounting hardware or mounting method, layout, and colors of required Project signage.
- C. Informational Submittals:
 - 1. Project Photographic Documentation:
 - a. Preconstruction photographic documentation.
 - b. Progress photographic documentation, submitted at the frequency indicated in this Specification Section.
 - c. Final photographic documentation.

1.4 CONTRACTOR'S FIELD OFFICE

- A. Establish at Site of Project the Contractor's field office, structurally sound and in accordance with Laws and Regulations, sufficient for Contractor's needs at the Site.
- B. Coordinate field office location with Owner prior to delivery to the site.
- C. Equipment: Telephone, copier/scanner, internet access, sanitary facilities, and as deemed necessary by the Contractor appropriate computer equipment.
- D. Contractor's personnel will be reasonably present at Contractor's office during working days.

- E. At Contractor's field office, maintain complete file of the Contract Documents, Shop Drawings, Submittals approved or accepted (as applicable) by Engineer, interpretations and clarifications issued by Engineer, copies of Contractor's daily field reports, all necessary and required safety data sheets, copies of documents comprising Contractor's safety program, Record Documents required by the Contract Documents, up to date copy of "As Recorded Drawings", and other files of field operations deemed appropriate by Contractor and as required by the Contract Documents.
- F. Remove Contractor's field office from site upon acceptance of the entire work by the Owner.
- G. Completely remove Contractor's field office, all appurtenances, and associated site work such as walkways or sidewalks to the field office, temporary parking areas, temporary utilities serving the field office, and field office structure.
- H. Restore area of the Contractor's field office to conditions required by the Contract Documents. If not expressly required by the Contract Documents, restore area of field office to condition equal to or better than that at the time the Contract Times started to run.
- I. Comply with Specification Section 01 52 13.

1.5 DRAWINGS AND CONTRACT DOCUMENTS FOR CONTRACTOR USE

- A. Refer to Agreement and Specification Section 01 04 00 - Special Provisions.
- B. Pick up all "no-charge" documents within 10 days from date of Notice to Proceed.
- C. Additional documents after "no-charge" documents will be furnished to Contractor at cost.

1.6 PROJECT PHOTOGRAPHS

- A. Contractor shall furnish photographic documentation as required and as directed by Engineer or Resident Project Representative. Required under this Article is "still" photographs only.
- B. Types of Construction Photographic Documentation Required:
 - 1. Preconstruction photographs.
 - a. Sufficient to document preconstruction conditions of the site, buildings, structures, and facilities.
 - b. Obtain and submit to Engineer prior to performing any mobilization or Work at the Site.
 - 2. Construction progress photographs.
 - a. Obtain at frequency of not less than monthly during construction of the Work. Obtain not less than 24 ground-level photographs for the purpose of obtaining construction progress photographic documentation.
 - b. Submit to Engineer within five days of the date the associated progress photograph was taken.
 - 3. Final photographs.
 - a. All taken after completion of the Work and demobilization from the Site, and prior to submittal of Contractor's final Application for Payment.
- C. Construction Photography - General:
 - 1. Obtain required photographic documentation using a digital camera of not less than 16 megapixel resolution.
 - 2. Photographs shall be digital and submitted to Engineer and Owner.
 - 3. Each photograph shall be JPG, TIFF, or PNG files.
 - 4. Each electronic file of a photograph shall be titled with the date and brief description of the view; for example: "2022-10-15 - Final Clarifier No. 12 Mechanism.jpg."
 - 5. All photographs shall be in color, properly lit and illuminated, and adequately framed to fully illustrate the subject of the photograph.
 - 6. Schedule and coordinate photographs with Engineer, RPR, and OSR, as applicable. Locations at which photographs are taken and view shall be mutually agreeable to Contractor and Engineer, RPR, or OSR as applicable.

1.7 SPECIAL CONSIDERATIONS RELATED TO ADJACENT PROPERTIES AND FACILITIES

- A. Contractor shall be responsible for negotiations of any waivers or alternate arrangements required to enable transportation of materials to the site.
- B. Access, Traffic Control, and Parking:
 - 1. Maintain conditions of access road to site such that access is not hindered as the result of construction related deterioration.
 - 2. Do not permit driving across or transporting materials or equipment across areas outside the construction limits shown on the Drawings.
 - 3. Provide access routes for emergency vehicles at all times.
 - 4. Provide daily sweeping of hard-surface roadways to remove soils tracked onto roadway.

1.8 HISTORICAL AND ARCHAEOLOGICAL FINDS

- A. If during the course of construction, evidence of deposits of historical or archeological interest is found, cease operations affecting the find and shall notify the Owner.
 - 1. No further disturbance of the deposits shall ensue until the Contractor has been notified by Owner that Contractor may proceed.
 - 2. Owner will issue a notice to proceed after appropriate authorities have surveyed the find and made a determination to the Owner.
 - 3. Compensation to the Contractor, if any, for lost time or changes in construction resulting from the find, shall be determined in accordance with changed or extra work provisions of the Contract Documents.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION – (NOT USED)

END OF SECTION

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SECTION 01 31 13
PROJECT COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. General requirements for:
 - a. Project coordination when the Project is implemented using a single prime construction Contract.
 - b. Coordination meetings.
 - c. Coordination Drawings and Layout Drawings.
- B. Scope:
 - 1. Contractor shall coordinate the Work, whether performed by Contractor's employees or by Subcontractors, Suppliers, or others for whom Contractor is responsible, to provide Work in accordance with the Contract Documents.
 - 2. Coordinate the Work with testing entities and inspectors (whether hired by Contractor, Owner, or others) employed on the Project, forces of Owner and facility manager (if other than Owner), and other contractors retained by Owner or facility manager, and other entities with which the Work needs to be coordinated.
 - 3. Requirements for preconstruction meetings are in the General Conditions (as may be modified by the Supplementary Conditions) and Section 01 31 19 - Project Meetings.
 - 4. Requirements for construction progress meetings are in Section 01 31 19 - Project Meetings.
- C. Related Requirements:
 - 1. Include, but are not necessarily limited to, the following:
 - a. Section 01 11 00 - Summary of Work.
 - b. Section 01 31 19 - Project Meetings.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordination – General:
 - a. In accordance with the General Conditions as may be modified by the Supplementary Conditions, and Section 01 11 00 - Summary of Work, Contractor shall coordinate the Work with, and cooperate with, other Contractors, utility owners and their contractors, owners of transportation facilities and their Contractors, Owner's and facility manager's workers at the Site, and other entities working at or adjacent to the Site.
 - 2. Advise other contractors (if any) of schedule for the Work to allow other contractors sufficient time to perform their work that must be performed prior to the Work. Coordinate and communicate with other contractors and other entities when the Work must be performed prior to the work of others and make good-faith efforts to avoid delaying work of Others.
 - 3. Coordination, Inspection, and Observation to Ensure Quality:
 - a. Contractor shall continuously inspect the Work throughout the Project to ensure that the Work complies with the Contract Documents.
 - b. Inspect (including testing, where required or necessary) substrates and surfaces on which the Work will be constructed, applied, adhered, or attached, to ensure substrate and surface conditions are appropriate for providing Work in accordance with the Contract Documents.
 - 4. Contractor is not responsible for, or liable for, damage or loss unless damage or loss resulted from action, inaction, or negligence of Contractor, or Subcontractor(s), Supplier(s), or other entity for whom Contractor is responsible. This provision does not mitigate or reduce Contractor's responsibility for security for the Work, in accordance with the Contract.

- B. Coordination Meetings:
1. Contractor's Coordination Meetings:
 - a. Schedule, attend, chair, and actively participate in coordination meetings deemed appropriate by Contractor for purposes of coordinating the Work of Contractor's employees, Subcontractors, Suppliers, and others for whom Contractor is responsible.
 - b. Frequency, location, date, time, and duration of Contractor's coordination meetings are at Contractor's discretion. Record and distribute to attendees and other members of Contractor's team a record of topics discussed, decisions made, and other relevant matters at Contractor's coordination meetings.
 - c. Engineer, Resident Project Representative (if any), Owner, and Owner's Site Representative (if any) will not attend Contractor's coordination meetings.
 2. Coordination Meetings with Other Contractors:
 - a. When Section 01 11 00 - Summary of Work, indicates that others, whether or not under Owner's control, will be performing work at or adjacent to the Site, coordination meetings between the separate contractors may be necessary. When such meetings are deemed necessary by Owner, either Owner or Engineer will advise Contractor in writing of the location, date, time, duration, and frequency of such coordination meetings.
 - b. Such coordination meetings, when held, are anticipated to be [once per month] or less-often and held either at the Site or in reasonable proximity to the Site. During periods when increased coordination among the separate projects is necessary, such as when adjacent contractors are in close proximity to each other, the potential exists that more-frequent coordination meetings may be necessary, although such increased frequency is not anticipated to be for extended periods.
 - c. Contractor's project manager and site superintendent shall attend such coordination meetings required by Owner.
 - d. Purpose of such coordination meetings will be to discuss scheduling and coordination of work by separate contractors and others as appropriate, sharing of space at the Site, and other coordination matters.
 - e. Owner and others deemed appropriate by Owner will attend such coordination meetings.
 - f. Owner or others for whom Owner is responsible will chair the meetings and prepare and distribute to participants a record of the topics discussed and decisions made at such meetings.
- C. Coordination Drawings and Layout Drawings:
1. Maintain sufficient, competent personnel; drafting implements; computer-aided drafting/design (CAD) or building information modeling (BIM) equipment, software, systems; and supplies at Contractor's office and at the Site (as deemed appropriate by Contractor) for preparing Layout Drawings and Coordination Drawings.
 2. With the Contract Documents and Shop Drawings, use Coordination Drawings and Layout Drawings for coordinating the Work of various trades.
 3. Where such coordination drawings or layout drawings are to be prepared by Subcontractors such as [structural-architectural, fire suppression, plumbing, HVAC, civil-site, process-mechanical,] or other Subcontractors, ensure that each such Subcontractor maintains required personnel, implements, equipment, and systems at Subcontractor's office and at the Site (as deemed appropriate by Contractor).

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 31 19
PROJECT MEETINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Pre-construction, progress, and other project meetings.
- B. Related Sections include, but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.

1.2 PRE-CONSTRUCTION MEETING

- A. Meet with the Owner and Engineer for a pre-construction conference at a time mutually agreed upon after the contract is awarded, but before any work is performed.
- B. The Engineer will schedule a meeting of the Owner, Contractor, Contractor's Subcontractors, and their respective representatives.
 - 1. The purpose of the meeting will be to clarify construction contract administration procedures, to establish lines of authority and communication and identify duties and responsibilities of the parties.
- C. The Engineer will schedule the pre-construction conference after receipt of the Contractor's draft proposed schedule.
- D. Agenda:
 - 1. Procedural and Administrative:
 - a. Personnel and Teams:
 - 1) Designation of roles and personnel.
 - 2) Limitations of authority of personnel, including personnel who will sign Contract modifications and make binding decisions.
 - 3) Subcontractors and Suppliers in attendance.
 - 4) Authorities having jurisdiction.
 - b. Procedures for communications and correspondence, including electronic communication protocols.
 - c. Copies of the Contract Documents and availability.
 - d. The Work and Scheduling:
 - 1) General scope of the Work.
 - 2) Contract Times, including Milestones (if any).
 - 3) Phasing and sequencing.
 - 4) Preliminary Progress Schedule.
 - 5) Critical path activities.
 - e. Safety:
 - 1) Responsibility for safety.
 - 2) Contractor's safety representative.
 - 3) Emergency procedures and accident reporting.
 - 4) Emergency contact information.
 - 5) Confined space entry permits.
 - 6) Hazardous materials communication program.
 - 7) Impact of Project on public safety.
 - f. Permits.
 - g. Review of insurance requirements and insurance claims.
 - h. Coordination:
 - 1) Coordination of Subcontractors and Suppliers.

- 2) Construction coordinator (for projects with multiple prime construction contracts).
 - 3) Coordination with Owner's operations.
 - 4) Progress meetings: Schedule and frequency.
 - 5) Coordination meetings.
- i. Submittals:
- 1) Current critical Submittals:
 - a) Preliminary Schedule of Submittals.
 - b) Progress Schedule.
 - c) Schedule of Values.
 - d) Pre-construction photographic documentation.
 - e) List of proposed Subcontractors and Suppliers.
 - f) List of emergency contact information.
 - g) Notice of elements of Contractor's safety program with which Owner and Engineer are to comply.
 - h) Site use plan.
 - i) Form of Contractor's site superintendent's daily reports.
 - 2) Work not eligible for payment without approved or accepted Submittals (as applicable).
 - 3) Submittal procedures.
 - a) Compliance with accepted Schedule of Submittals.
 - b) Actions required of Contractor prior to furnishing Shop Drawings and other Submittals
 - c) Contractor's Submittal approval stamp required; Contractor's coordination of Submittals.
 - d) Furnishing of Submittals.
 - e) Submittal types and meaning of Engineer's action on each.
 - f) Resubmittals - responsibility for, limitations on quantity.
 - 4) Identification of initial, critical Shop Drawings and product data.
 - 5) Construction photographic documentation.
- j. Substitutes and "Or-Equals":
- 1) Product options.
 - 2) Procedures for proposing "or-equals".
 - 3) Procedures for proposing substitutes.
- k. Contract Modification Procedures:
- 1) Requests for interpretation.
 - 2) Written clarifications.
 - 3) Field Orders.
 - 4) Proposal Requests.
 - 5) Change Proposals.
 - 6) Work Change Directives.
 - 7) Change Orders.
 - 8) Differing site conditions or discovery of Hazardous Environmental Condition.
 - 9) Substantiating and documenting Change Proposals and Claims.
 - 10) Claims.
- l. Progress Payment:
- 1) Owner's Project financing and funding, as applicable.
 - 2) Owner's tax-exempt status.
 - 3) Preliminary Schedule of Values.
 - 4) Retainage.
 - 5) Progress payment procedures; documents to accompany Applications for Payment.
 - 6) Payment for stored items not yet installed.
 - 7) Date of Owner's payments; payment is due.
 - 8) Prevailing wage rates and certified payrolls.
- m. Subcontractors and Suppliers:
- 1) List of proposed Subcontractors and Suppliers; monthly updates.

- 2) Coordination and management.
- 3) Subcontracts and purchase orders.
- 4) Diversity Business Enterprises (MBE, WBE, DBE, VBE, etc.) when applicable:
 - a) Goals.
 - b) Progress reports.
 - c) Requests for waivers.
- n. Testing and inspections:
 - 1) Owner-hired and contractor-hired.
 - 2) Identification of Owner-hired testing entity and special inspectors.
 - 3) Responsibility for advising testing entity and special inspectors of need for services.
 - 4) Results of code-required special inspections and tests.
 - 5) Prompt remedy of apparent defects.
 - 6) Notice of defective Work.
 - 7) Remedy of defective Work.
 - 8) Defective Work not eligible for payment.
 - 9) Covering up defective Work.
 - 10) Cost responsibility for defective Work and retesting/re-inspection.
- o. Disposal of demolition materials.
- p. Record documents.
- q. Preliminary discussion of Contract closeout:
 - 1) Procedures for Substantial Completion.
 - 2) Partial utilization procedures; property insurance.
 - 3) Contract closeout requirements.
 - 4) Correction period; duration of Contractor's general warranty and guarantee.
 - 5) Duration of bonds and insurance.
2. Authorities Having Jurisdiction (if not covered in a separate meeting):
 - a. Municipal licenses.
 - b. Municipal permits required.
 - 1) Permits required and status.
 - 2) Inspections for building code official.
 - 3) Code-required special inspections and tests (if not covered in Administrative and Procedures part of meeting).
 - c. Right-of-way work permits; status of occupancy permit(s).
 - d. Environmental permits:
 - 1) Storm water discharges during construction.
 - 2) Erosion and sediment control permit.
 - 3) Spill prevention control and countermeasures plan (40 CFR 112).
3. Site Mobilization (if not covered in a separate meeting):
 - a. Working days, working hours, and overtime.
 - b. Use of Site and other areas; use of existing facilities.
 - c. Field offices, storage trailers, and staging areas.
 - d. Temporary facilities.
 - e. Temporary utilities and limitations on utility use (where applicable).
 - f. Utility company coordination (if not done as a separate meeting).
 - g. Access to Site, access roads, and parking for construction vehicles.
 - h. Traffic controls.
 - i. Temporary controls:
 - 1) Erosion and sediment control; storm water pollution prevention plans.
 - 2) Dust control and air pollution control (including emissions control).
 - 3) Water control (storm water, surface water, groundwater).
 - 4) Water pollution control; spill prevention control and countermeasures plan.
 - 5) Solid waste control.
 - 6) Other temporary controls.
 - j. Security; temporary security fencing (where required).

- k. Storage of materials and equipment to be incorporated into the Work.
 - l. Protection of the Work and property; protective barriers.
 - m. Field engineering:
 - 1) Reference points and benchmarks.
 - 2) Surveys and layouts.
 - 3) Professional services for Contractor's means and methods (not delegated design).
 - 4) Contractor's site superintendent's daily records and submittal requirements.
 - n. Site maintenance during the Project:
 - 1) Progress cleaning; removal of trash and debris.
 - 2) Snow and ice removal.
 - 3) Maintenance and cleaning of existing access roads and parking areas.
 - o. Restoration.
 - 4. Next meeting.
 - 5. Site visit, as necessary.
- E. The Engineer will compile meeting minutes from the transcribed record of the meeting and electronically distribute copies to all participants.
- F. Pre-Construction Conference Submittals:
- 1. The names and telephone numbers of Contractor's Superintendent and Project Manager.
 - 2. List of personnel authorized to sign change orders and receive progress payments.
 - 3. The name, address, and telephone numbers of two or more persons employed by the Contractor who can be reached at any time of the day or night to handle emergency matters.
 - 4. A list of all subcontractors that will work on the project, a description of work they will perform, and a contact list for each subcontractor with phone numbers and addresses.
 - 5. A list of materials suppliers and products over \$5,000.
 - 6. A draft proposed Construction Schedule.
 - 7. Material Safety Data Sheets for all hazardous chemical products to be used by the Contractor on this project.
 - 8. Temporary Erosion and Sediment Controls Plan.
 - 9. Traffic Control Plan.

1.3 PROGRESS MEETINGS

- A. Engineer, Owner, and Contractor shall schedule and hold weekly progress meetings at a location determined by the Owner, unless otherwise arranged.
- B. Contractor's Project Manager, Contractor's Superintendent, Owner's Representative(s), Engineer's Representative(s), and all subcontractors active on the site or as appropriate of work in progress shall be represented at each meeting. Contractor may at his discretion, or at the request of the Owner and/or Engineer, have representatives of suppliers, manufacturers, other subcontractors, and other interested or affected parties attend progress meetings.
- C. The Engineer shall preside at the progress meetings, compile minutes of each progress meeting, and furnish electronic copies to the Contractor and Owner.
- D. The purpose of these meetings will be to review the progress of the Work, maintain coordination of efforts, discuss changes in schedule, and resolve other problems which may arise.
- E. Preliminary Agenda: Be prepared to discuss in detail the topics indicated below. Revised agenda, if any, will be furnished to Contractor and Owner prior to associated progress meeting(s). Progress meeting agenda may be modified by Engineer during the Project as necessary.
 - 1. Review, comment, and amendment (if necessary) of minutes of previous progress meeting.
 - 2. Review of progress since the previous progress meeting.
 - 3. Planned progress through next progress meeting.
 - 4. Review of Progress Schedule:
 - a. Review of the Contract Times; Contractor's ability to comply with Contract Times.
 - b. Identification of critical path activities.

- c. Schedules for fabrication and delivery of materials and equipment.
 - d. Corrective measures, if necessary, including recovery schedule(s).
 - 5. Submittals:
 - a. Review status of critical Submittals.
 - b. Review revisions to Schedule of Submittals.
 - 6. Contract Modifications:
 - a. Requests for interpretation.
 - b. Written clarifications.
 - c. Field Orders.
 - d. Proposal Requests.
 - e. Change Proposals.
 - f. Work Change Directives.
 - g. Change Orders.
 - h. Claims.
 - 7. Applications for progress payments:
 - a. Status and deadline for submittal.
 - b. Stored materials and equipment; observation by Engineer or RPR; documents required.
 - c. Set-offs to which Owner is entitled (as applicable).
 - d. Other matters related to progress payments.
 - 8. Problems, conflicts, and observations.
 - 9. Quality standards, testing, and inspections.
 - 10. Coordination between Project participants.
 - 11. Site management issues, including vehicular access and parking, traffic control, security, status of temporary controls and temporary utilities, site maintenance and cleaning, and other Site matters.
 - 12. Safety and protection.
 - 13. Permits.
 - 14. Construction photographic documentation.
 - 15. Record documents status.
 - 16. Completion matters (as appropriate):
 - a. Status of checkout, startup, field quality control activities.
 - b. Status of training of facility O&M personnel and O&M manuals.
 - c. Partial utilization; inspection for Substantial Completion.
 - d. Punch list status (as applicable).
 - e. Other closeout matters (if any).
 - 17. Other business.
- F. Bring a three-week look ahead schedule to each meeting, including the following items:
- 1. Work completed last week.
 - 2. Work anticipated for the next three weeks ("Look Ahead").
 - 3. Subcontractors on site the prior week.
 - 4. Subcontractors scheduled on site for the next two weeks.
 - 5. Contract document deficiencies or questions noted during prior week.
 - 6. Anything that could impede the progress of the work or affect the critical path on the project schedule.
 - 7. Corrective measures and procedures planned to regain planned schedule, cost or quality assurance, if necessary.
 - 8. Report of any accidents, and any site safety issues that need to be addressed.
- G. Other Agenda items to be discussed:
- 1. Review and revise as necessary and approve minutes of previous meetings.
 - 2. Status of submittals of equipment and shop drawings.
 - 3. Identify problems that impede planned progress.
 - 4. Other current business.

H. Revision of Minutes:

1. Unless published minutes are challenged in writing prior to the next regularly scheduled progress meeting, they will be accepted as properly stating the activities and decisions of the meeting.
2. Persons challenging published minutes shall reproduce and distribute copies of the challenge to all indicated recipients of the particular set of minutes.
3. Challenge to minutes shall be settled as priority item of "old business" at the next regularly scheduled meeting.

1.4 OTHER MEETINGS

- A. Other meetings will be required to facilitate progress of the Work. These include, but are not limited to the following:
1. Pre-Installation Conferences:
 - a. Coordinate and schedule with Engineer, RPR, and Owner for each material, product, or system specified.
 - 1) Conferences to be held prior to initiating installation, but not more than two weeks before scheduled initiation of installation.
 - 2) Conferences may be combined if installation schedule of multiple components occurs within the same two week interval.
 - 3) Review manufacturers recommendations and Contract Documents Specification Sections.
 2. Facility Startup Planning and Coordination Meeting. See Specification Section 01 75 00 - Checkout and Startup Procedures.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 32 16
CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Administrative and procedural requirements for Contractor's construction Progress Schedules and related Submittals, including:
 - a. Administrative requirements regarding progress Schedules.
 - b. Qualifications of Progress Schedule preparer and related personnel.
 - c. Submittals of Progress Schedules and associated schedule-related Submittals.
 - d. Initial Progress Schedules.
 - e. Look-ahead schedules.
 - f. Progress Schedule updates.
 - g. Narrative reports.
 - h. Recovery schedules.
- B. Scope:
1. Contractor shall prepare and submit to Engineer required Progress Schedules and related Submittals, as required by this Section and elsewhere in the Contract Documents. Maintain and update Progress Schedules and related Submittals throughout the Project.
 2. Owner, facility manager (if other than Owner), Engineer, and others involved with the Project have the right to rely on accuracy of Contractor-prepared Progress Schedule.
 3. Engineer's review or acceptance of the Progress Schedule or related Submittals, and Engineer's comments on and expressed opinions concerning activities in the Progress Schedule and related Submittals, and progress of the Work, does not control Contractor's independent judgment concerning construction means, methods, techniques, sequences and procedures, unless the associated means, method, technique, sequence, or procedure is required by the Contract Documents. Contractor is solely responsible for complying with the Contract Times.
- C. Related Sections include, but are not necessarily limited to:
1. SUDAS Division 1.
 2. Division 01 - General Requirements.
 3. Section 01 04 00 - Special Provisions.
 4. Section 01 11 00 - Summary of Work.
 5. Section 01 31 19 - Project Meetings.

1.2 REFERENCES.

- A. Defined Terms and Terminology:
1. Defined terms, indicated with initial capital letters, are indicated in the Contract Documents.
 2. Terminology: The following are not defined terms and are not indicated with initial capital letters but, when used in this Section, have the meaning indicated below, whether applied to the singular or plural thereof.
 - a. "Activity" is an element of the Work that has the following specific characteristics: consumes time, requires resources, has a definable start and finish, is assignable, and is measurable.
 - b. "Baseline Progress Schedule" means, in addition to the General Conditions' definition of "Progress Schedule", the version of the Progress Schedule (for the entire Project) initially accepted by the Engineer. In the event of subsequent modifications to the Project, Contractor and Engineer may mutually agree that a subsequent revision of the Progress Schedule constitutes a new baseline Progress Schedule that supersedes the prior baseline Progress Schedule.

- c. “Constraint” means an imposed date on the Progress Schedule or an imposed time between activities. The Contract Times are constraints.
- d. “CPM Progress Schedule” means, in addition to the General Conditions’ definition of “Progress Schedule”, a computerized Progress Schedule in critical path method (CPM) format, for the entire Work, indicating interrelationships between elements of the Work; indicates sequences, dates, and durations for Work performed to date; indicates sequences, dates, and duration for incomplete Work yet to be performed; indicates constraints; and indicates the critical path for the Work.
- e. “Critical path” is the continuous chain of activities, from start to completion of the Work, with the longest duration for completion within the Contract Times.
- f. “Early finish” means the earliest date an activity can finish according to the assigned relationships among the activities in the Progress Schedule.
- g. “Early start” means the earliest possible date an activity can start according to the assigned relationships among activities in the Progress Schedule.
- h. “Float” means the time difference between the calculated duration of an activity chain on the Progress Schedule and the critical path.
- i. “Late finish” means the latest date an activity on the Progress Schedule can finish without extending the Contract Times.
- j. “Late start” means the latest date an activity on the Progress Schedule can start without extending the Contract Times.
- k. “Network diagram” means a time-scaled logic diagram showing the durations and relationships of the activities on the Progress Schedule.
- l. “Schedule date” (and similar terms, whether used in this Section or Project communications related to Progress Schedules) mean the “early start” and “early finish” date for the associated activity. “Late start” and “late finish” dates are for determining float and do not represent the schedule dates.
- m. “Total float” means the total number of days an activity (or chain of activities) on the Progress Schedule can be delayed without affecting the Contract Times.
- n. “Work areas” and “work system” means a logical breakdown of the Work elements or a group of activities which, when collectively assembled, are readily identifiable on the Project (for example: Yard piping, a structure or building, a treatment process, or other logical grouping).

1.3 ADMINISTRATIVE REQUIREMENTS

- A. General Provisions on Progress Schedules:
 - 1. This Section augments requirements for the Progress Schedule, and Contractor’s control of the Work, indicated in the Contract Documents.
- B. Use of Float:
 - 1. Float belongs to the Project and may be used by Contractor or Owner to accommodate changes in the Work, or to mitigate the effect of events delaying the Work or compliance with the Contract Times.
 - 2. Changes or delays that influence activities that have float and do not extend the critical path do not justify changes in the Contract Times.
 - 3. Float Suppression: Pursuant to float sharing requirements of this Section, use of float suppression techniques in Progress Schedules, such as preferential sequencing logic, special lead/lag logic restraints, and extended activity durations are unacceptable.

- C. Factors Affecting the Progress Schedule:
1. In preparing and updating the Progress Schedule, take into consideration: Preparing and signing subcontracts and purchase orders, complying with Submittal requirements and Submittal review times, fabricating materials and equipment, source quality control (including required shop tests and inspections), shipping and deliveries, field quality control (including required field tests and inspections at the Site), Work by Subcontractors, coordination with others (such as other contractors including those indicated in Section 01 11 00 - Summary of Work, utility owners, and owners of transportation facilities), compliance with Laws and Regulations and permits, availability of construction equipment and machinery, abilities of workers, weather conditions, condition of the Site, seasonal restrictions, restrictions in operations at the Site and coordination with Owner's (or facility manager's) operations, training of facility operation and maintenance personnel, checkout, startup, adjusting and balancing, and other factors that have the potential to affect completion of the Work within the Contract Times.
- D. Scheduling Workshop Conferences:
1. Prior to preparing the preliminary Progress Schedule, Contractor shall participate with Engineer in one workshop conference, up to two hours in duration, to discuss technical requirements relative to sequencing and organizing the Work, Progress Schedule development, and Progress Schedule procedures.
 2. Contractor and Engineer will mutually agree on the date, time, and location of scheduling workshop conference(s).
 3. Required Attendees:
 - a. Contractor's project manager, site superintendent, and Progress Schedule preparer.
 - b. Engineer.
 - c. Owner or facility manager (if other than Owner) may attend scheduling workshop conferences.
 4. Engineer will prepare minutes of the scheduling workshop conferences and distribute minutes to conference attendees and others as deemed appropriate by Engineer.

1.4 QUALITY ASSURANCE

- A. Qualifications:
1. Progress Schedule Preparer.
 - a. Contractor shall retain services of a scheduling consultant to, or shall self-perform, preparation and updating of the Progress Schedule using qualified personnel experienced in: (1) construction scheduling, (2) the scheduling software required for the Project, and (3) serving as Progress Schedule preparer on construction projects of similar type, size, and complexity as the Project.
 - b. Progress Schedule preparer shall have not less than five years' experience using the required schedule software on construction projects of similar type, size, and complexity as the Project.
 - c. Prior to engaging a scheduling consultant or using a qualified, experienced employee, submit to Engineer the following qualifications information:
 - 1) Name, employer, and business address of proposed Progress Schedule preparer and names, employer(s), and business address(es) of personnel who will be assigned to assist the preparer in developing and updating the Progress Schedule.
 - 2) Information sufficient to demonstrate that proposed Progress Schedule preparer and scheduling assistant personnel possess qualifications complying with this Section. For each person assigned, submit list of similar type, size, complexity, and construction contract amount for each project, together with project name, owner, location, and dates, and name(s) of scheduling personnel involved.
 - d. Engineer's Review of Qualifications:
 - 1) Engineer will complete review of Progress Schedule preparer qualifications within five days of Engineer's receipt of such qualifications.
 - 2) If qualifications are unacceptable, submit qualifications of acceptable personnel within five days of Contractor's receipt of Engineer's non-acceptance.

- 3) Engineer's acceptance or non-acceptance of qualifications does not reduce or mitigate Contractor's obligations under the Contract Documents.
- e. If Contractor intends to replace any Progress Schedule preparer personnel previously acceptable to Engineer, submit qualifications of proposed replacement(s) in accordance with this Article.

1.5 SUBMITTALS

- A. Informational Submittals: Submit the following:
 1. Qualifications Statements:
 - a. Submit qualifications of Progress Schedule preparer, and other personnel that will assist Progress Schedule preparer in preparing and updating the Progress Schedule.
 - b. Obtain Engineer's acceptance of qualifications prior to starting preparation of preliminary Progress Schedule.
 2. Planned Work Schedule:
 - a. Submit initial and updated (as necessary) planned work schedule, in accordance with this Section's "Progress Schedule" Article.
 3. Progress Schedule:
 - a. Preliminary Progress Schedule with associated narrative report.
 - b. Acceptable Progress Schedule ("baseline Progress Schedule") with associated narrative report.
 4. Look-Ahead Schedules:
 - a. Submit 21-day look-ahead schedule at each construction progress meeting, in accordance with this Section's "Look-Ahead Schedules" Article.
 5. Progress Schedule Updates:
 - a. Progress Schedule updates shall comply with requirements of this Section, and shall include updated Progress Schedule and narrative report.
 - b. Submit updated Progress Schedule prior to each associated construction progress meeting. When a Progress Schedule remains unchanged from one construction progress meeting to the next, submit written statement expressly so stating. In addition to monthly Progress Schedule update Submittals, also bring to construction progress meetings the number of paper copies of the updated Progress Schedule indicated in Section 01 31 19 - Project Meetings.
 6. Recovery Schedules: Submit in accordance with this Section.

1.6 INITIAL PROGRESS SCHEDULES

- A. Applicability of this Article:
 1. This Article addresses the initial Progress Schedules and selects related Submittals required at the outset of the Project's construction phase, through Engineer's acceptance of the Progress Schedule and its related Submittals.
 2. Subsequent Progress Schedule Submittals, including Progress Schedule updates, recovery schedules, and other schedule-related Submittals, shall comply with software, type, organization, content, and similar requirements of this Article.
- B. Type and Organization of Progress Schedules:
 1. Prepare Progress Schedules using Oracle Primavera P6 software, unless other scheduling software is acceptable to Engineer.
 2. Sheet Size: 22 by 34 IN, unless otherwise accepted by Engineer.
 3. Time Scale: Indicate first date of each work week.
 4. Activity Assignments and Designations:
 - a. Limit activities, where possible, excluding fabrication of materials and equipment, to durations not longer than 20 days. Activities shall be definable and measurable. For example, an activity described only as "Concrete" will likely be unacceptable.
 - b. Assign to each activity an appropriate, unique numerical designation and description.
 - c. Numerical designation shall incorporate the associated Specifications Section number.
 - d. Activity description shall include sufficient detail to clearly communicate the intended activity. Descriptions shall include identifiers for physical locations of work area or

- work system, such as (where appropriate): column lines, stationing (for linear projects), and elevations. Indicate unique description for each activity.
- e. Group deliveries of materials and equipment into a separate sub-schedule that is part of the Progress Schedule.
 - f. Group construction into work area sub-schedules (that are part of the Progress Schedule) by activity.
 - g. Clearly indicate, as activities separate from installation, necessary and required curing periods.
5. Organization of Progress Schedules:
 - a. Indicate interfaces and dependencies with preceding, concurrent, and follow-on activities, including those associated with the Work, other contractors at the Site, Owner and facility manager, Owner's consultants (including Engineer), authorities having jurisdiction, and others as appropriate. Clearly indicate activities not under Contractor's control.
 - b. Progress Schedules shall be CPM Progress Schedules.
 - c. Indicate on the separate Schedule of Submittals dates for submitting and reviewing Shop Drawings, product data Submittals, Samples, and other required Submittals. Coordinate Progress Schedule with the Schedule of Submittals.
 - d. Clearly indicate the critical path on the Progress Schedule.
- C. Planned Work Schedule:
1. Within 30 days of the Effective Date of the Contract, indicate to Engineer the workdays and hours proposed by Contractor. Also indicate planned non-workdays, such as Contractor's holidays, weekends, and the like.
 2. Enforce Subcontractors' and Suppliers' (when at the Site) compliance with Contractor's work schedule submitted to Engineer.
 3. In the event of changes, submit to Engineer revised work schedule. Furnish such Submittal not less than five days prior to changing Contractor's work schedule, except in event of unanticipated emergency.
- D. Preliminary Progress Schedule:
1. Within 30 days after the Contract Times commence running, Contractor shall submit to Engineer the preliminary Progress Schedule covering the entire Project, with associated schedule-related Submittals required in this Section's "Submittals" Article.
 2. Submit preliminary Progress Schedule in accordance with Section 01 33 00 - Submittal Procedures. Also submit preliminary Progress Schedule in its native (executable) format generated by the scheduling software.
 3. Engineer will perform timely review of the preliminary Progress Schedule.
 4. Preliminary Progress Schedule shall comply with the Contract Documents relative to Progress Schedules.
- E. Initial Acceptance of Progress Schedule:
1. Not less than 10 days before submission of the first Application for Payment, a scheduling conference attended by Contractor, Progress Schedule preparer, Engineer, and others as appropriate will be held at the Site to review for acceptability to Engineer the preliminary Progress Schedule and associated schedule-related Submittals. Following the scheduling conference, Contractor shall have five days to make corrections and adjustments and to complete and resubmit the Progress Schedule and associated schedule-related Submittals. Contractor will not be eligible for first progress payment until acceptable Progress Schedule and associated schedule-related Submittals are submitted to Engineer and are acceptable to Engineer.

2. Submit acceptable Progress Schedule, together with associated schedule-related Submittals in accordance with this Section’s “Submittals” Article and Section 01 33 00 - Submittal Procedures. Also submit acceptable form of Progress Schedule in its native (executable) format generated by the scheduling software.
 3. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times, in accordance with the Contract Documents.
 4. Initially-accepted Progress Schedule shall be identified as the baseline Progress Schedule.
- F. Planned Completion Different from the Contract Times:
1. If the Progress Schedule accepted by Engineer indicates completion date(s) different than the Contract Times, the Contract Times are not thereby changed.
 2. Where the Progress Schedule accepted by Engineer indicates date(s) by which the Work, or designated portion thereof, will (a) achieve a Contractually stipulated Milestone, or (b) be substantially complete, or (c) all the Work will be complete and ready for final payment, earlier than the Contract Times (“early completion date”), Contractor shall, not less than 180 days prior to the associated Contract Time, prepare and submit a Change Proposal setting forth Contractor’s request to modify the Contract Times to an earlier date, which may or may not be the same as the scheduled early completion date. The Contract Times can be modified only via a Change Order.
 3. In the event the Progress Schedule accepted by Engineer indicates one or more early completion dates and the Contract Times have not been reduced, Owner may, at Owner’s option, use available float without Owner being liable for Contractor’s costs to remain onsite, mobilized, and working (whether on the original scope of the Work or for modified Work) beyond the scheduled early completion date(s), as long as the Work will be completed within the Contract Times.
 4. When the Work will not be completed within the Contract Times, the Contract Documents’ provisions concerning delays and changes in the Contract Times govern.
- G. Weather Delays:
1. Contractor’s initial progress schedule shall include lost time due to normal weather delays as outlined in Specification Section 01 04 00.

1.7 LOOK-AHEAD SCHEDULES

- A. Look-Ahead Schedules – General:
1. Look-ahead schedules are short-duration, often more-detailed, time-based schedules for the Work to be performed during the coming month or other required span of the look-ahead schedule.
 2. Purpose of look-ahead schedules is to present, for Project stakeholders, including Owner, facility manager (if other than Owner), Engineer, Owner-hired testing and inspection entities, other contractors working at or adjacent to the Site, utility owners, transportation facility owners, and others as necessary, Contractor’s detailed, time-based plan for performing the Work during the period covered by the time span of the look-ahead schedule.
 3. This Section’s “Submittals” Article indicates the required span and frequency of look-ahead schedules.
 4. Each look-ahead schedule shall be fully coordinated and consistent with the current Progress Schedule update.
 5. Submit look-ahead schedules concurrent with construction progress meetings, in accordance with Section 01 33 00 - Submittal Procedures. Also submit look-ahead schedules in native (executable) format.
 6. As handouts, bring to each construction progress meeting the quantity of paper copies of the new look-ahead schedule indicated in Section 01 31 19 - Project Meetings. If quantity is not indicated in Section 01 31 19 - Project Meetings, furnish quantity equal to typical number of attendees of progress meetings.

- B. Organization and Content of Look-Ahead Schedules:
1. Look-ahead schedules shall be prepared from the current Progress Schedule update, of the same type, using the same software, content, and organization required in this Section for initial Progress Schedules.
 2. Activity designations on look-ahead schedules shall incorporate the associated activity designations from the Progress Schedule.
 3. Sheet Size: Format look-ahead schedules to sheet size of 11 by 17 IN, unless other sheet size is acceptable to Engineer.
 4. Look-ahead schedules should generally be more-detailed than the Progress Schedule. Activity durations on look-ahead schedules should not exceed five days.

1.8 PROGRESS SCHEDULE UPDATES

- A. Updates – General:
1. Update the Progress Schedule not less-often than once per month. If during progress of the Work events develop that necessitate changes in the initially accepted Progress Schedule (baseline Progress Schedule), identify updated Progress Schedules sequentially as “Progress Schedule Revision “1”, “2”, “3”, and continuing in sequence as required. Number the Progress Schedule submittals in accordance with Section 01 33 00 - Submittal Procedures.
 2. Progress Schedule updates shall comply with this Section’s requirements for initial progress Schedule, relative to type, required software, organization, content, and related matters.
 3. Starting with first Progress Schedule update, and continuing with each subsequent update, indicate on the Progress Schedule the actual start and finish dates of each activity that is completed or is currently underway. Inaccurate representation of completed or in-progress activities will be grounds for Engineer’s non-acceptance of the Progress Schedule update.
 4. Contractor’s Progress Schedule update shall include a narrative report in accordance with this Section. Narrative report shall include description of: Progress achieved to date and status of each work area of the Project, planned progress for the upcoming period, identification of the critical path, current or potential delays, Change Orders (pending and approved since the previous Progress Schedule update), and other problems associated with performing the Work in accordance with the baseline Progress Schedule and complying with the Contract Documents, including the Contract Times. Indicate in the narrative report delays that have occurred since the previous updated Progress Schedule.
 5. The update to the Progress Schedule shall be based on retained logic. Progress override logic is not allowed.
 6. Submit to Engineer updated Progress Schedule, together with associated schedule-related Submittals, in accordance with this Section’s “Submittals” Article and Section 01 33 00 - Submittal Procedures. Also submit updated Progress Schedule in its native (executable) format generated by the scheduling software.
- B. Monthly Schedule Meeting:
1. During the month, utilizing the previous month’s look-ahead schedule. Contractor shall record the percent complete, start and finish dates of each scheduled activity with the remaining duration for each activity started but not completed, including activities associated with procurement of materials and equipment.
 2. On the same day each month, not less than one week prior to a progress meeting, Contractor, Progress Schedule preparer, Engineer (or Resident Project Representative), and others as appropriate shall meet at the Site to tour the Work to review and recommend updates to the Progress Schedule and progress information gathered by Contractor during the month. After discussion of Contractor’s current progress information and attendees’ review of the current status of the Work, Progress Schedule preparer shall appropriately and accurately update the Progress Schedule.

1.9 NARRATIVE REPORTS

- A. Narrative Reports – General:
1. Prepare and include with the preliminary Progress Schedule Submittal and each subsequent Progress Schedule Submittal, written narrative report describing the schedule-related

constraints required by the Contract Documents and Contractor's plan and schedule for complying with such requirements. Narrative reports shall also include required content indicated above in this Section's "Progress Schedule Updates" Article.

2. Narrative report shall describe the methods of sequencing and operation, resources to be employed, time frames for the construction of each of the major work area or work system on the Project, and time frames for complying with the Contract Times and Contractor's interim schedule milestones.
3. Prepare narrative reports on Contractor's company letterhead and clearly indicate the Progress Schedule revision and date associated with the narrative report.
4. Narrative reports shall be written in English and typed. Use clear, concise, complete, and accurate language in narrative reports. Clearly indicate in narrative report the name of person preparing the narrative report and date of preparation
5. Narrative report Submittals do not constitute contractual Change Proposals, nor are they notice of a Claim.
6. Engineer's receipt, review, and acceptance of narrative reports does not mitigate or reduce Contractor's obligations to furnish contractually required notices.

1.10 RECOVERY SCHEDULES

A. Recovery Schedules – General:

1. When updated Progress Schedule indicates the ability to comply with the Contract Times falls 10 working days or more behind schedule, and there is no excusable delay, Change Order, or Work Change Directive to support an extension of the Contract Times, Contractor shall prepare and submit to Engineer Contractor's recovery schedule.
2. Recovery schedule is a Progress Schedule demonstrating Contractor's plan to accelerate the Work to achieve compliance with the Contract Times. If achieving the Contract Times is not feasible, Contractor's recovery schedule shall indicate Contractor's plan to recover as much of the lost time as possible to complete the Work as close as possible to the Contract Times.
3. Submit recovery schedule within 10 days after submittal of updated Progress Schedule where need for recovery schedule is indicated.

B. Recovery Schedule Report:

1. With each recovery schedule Submittal, include recovery schedule narrative report, manually prepared by Contractor, on Contractor's company letterhead, indicating name of person responsible for preparing the recovery schedule and report.
2. Recovery schedule report shall verbally indicate Contractor's plan for accelerating the Work and recovering lost time and shall indicate the total number of days expected to be recovered by Contractor's implementation of the recovery schedule. Clearly indicate how the intended actions will recover lost time.
3. Contractor is fully responsible for complying with the Contract Documents, including the contract Times.

C. Implementation of Recovery Schedule:

1. At no additional cost to Owner, do one or more of the following, as appropriate: (a) furnish additional labor, (b) provide additional construction equipment and machinery, (c) provide suitable materials to accelerate the Work, (d) employ additional work shifts, (e) expedite procurement of materials and equipment to be incorporated into the Work or otherwise expedite delivery of such items, (f) provide other needed resources, and (g) provide other measures necessary to complete the Work within the Contract Times.
2. Upon acceptance of recovery schedule by Engineer, incorporate recovery schedule into the next Progress Schedule update.

D. Contractor's Failure to Recover Lost Time:

1. Contractor's refusal, failure, or neglect to take appropriate measures to recover lost time, or to submit a recovery schedule, shall constitute reasonable evidence that Contractor is not prosecuting the Work, or designated part of the Work, with diligence to ensure completion in accordance with the Contract Times. Such action or inaction by Contractor shall

constitute sufficient basis for Owner to exercise remedies available to Owner under the Contract Documents.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

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SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Definition of various types of Submittals.
 2. Coordination requirements for Submittals.
 3. General provisions concerning Submittals.
 4. Schedule of Submittals.
 5. Contractor's preparation of Submittals, including:
 - a. Numbering.
 - b. Marking.
 - c. Organization and content.
 - d. Proposed "or-equals", substitutes, and deviations from Contract requirements.
 - e. Electronic Documents Submittals.
 - f. Contractor's review and approval of each Submittal.
 - g. Resubmittals.
 6. Contractor's transmittal of Submittals, including transmittal forms, transmittal and delivery method, and delivery of Samples, Closeout Submittals, and Maintenance Materials Submittals.
 7. Engineer's review, including:
 - a. Timing.
 - b. Meaning of Engineer's Submittal action code(disposition) assigned.
 - c. Delivery of Engineer's responses on Submittals.
- B. Scope:
1. Contractor shall provide all labor, materials, equipment, tools, services, incidentals, and other effort necessary to furnish Shop Drawings, product data Submittals, Samples, and other Submittals in accordance with the Contract Documents.
 2. This Section's Article, "General Provisions Concerning Submittals" includes a summary of the Contract Documents' locations of Submittals requirements.
 3. Shop Drawings, product data Submittals, Samples, and other Submittals, whether or not approved or accepted by Engineer, are not Contract Documents. Engineer's approval or acceptance, as applicable, of a Submittal does not alter or modify the Contract Documents.
 4. Engineer and Owner have the right to rely on Contractor's representations and certifications made regarding each Submittal.
- C. Related Sections include, but are not necessarily limited to:
1. SUDAS Division 1.
 2. Division 01 - General Requirements.
 3. Section 01 04 00 - Special Provisions.
 4. Section 01 25 00 - Substitution Procedures.
 5. Section 01 32 16 - Construction Progress Schedule.
 6. Section 01 78 23 - Operations and Maintenance Manuals.

1.2 COST OF SUBMITTAL EXCHANGE

- A. The Contractor shall include the project subscription cost for Submittal Exchange, a web-based service provided by Oracle that will be utilized on this project for transmitting construction submittals and documentation in their bid. Bid shall include a sufficient project subscription length intended to cover the duration of project construction plus 3 months after final completion. Contractor is responsible for the cost to extend the project subscription if the project is delayed.

1.3 REFERENCES

A. References - Introduction:

1. This Article presents definitions and terminology used in this Section and throughout the Contract Documents.
2. Applicability of the Term “Submittals”: Where reference is made to Shop Drawings, product data Submittals, Samples, or other Submittals in this Section and elsewhere in the Contract Documents, the term “Submittals”, as defined in the Contract Documents, is intended. The foregoing applies regardless of whether such term is indicated with an initial capital letter, unless context of the subject provision clearly indicates otherwise.
3. Types of Submittals:
 - a. Submittal types are classified as follows: (1) Action Submittals, (2) Informational Submittals, (3) Closeout Submittals, and (4) Maintenance Materials Submittals.
 - b. Type of each required Submittal is indicated in the associated Specifications Section. When Submittal type is not clearly indicated in the associated Specifications Section, Submittal will be classified as indicated in this Article. Submit request for interpretation when Contractor is uncertain of required Submittal type.

B. Action Submittals:

1. Action Submittals require an explicit, written approval or other appropriate action by Engineer (or other entity to whom the Submittal is required to be furnished, in accordance with the Contract Documents) before Contractor may release the associated item(s) for raw materials procurement, fabrication, production, and shipping.
2. Unless otherwise indicated in the Contract Documents, Action Submittals include the following:
 - a. Shop Drawings.
 - b. Product data.
 - c. Samples.
 - d. Testing plans for quality control activities required by the Contract Documents.
 - e. Delegated Designs: Delegated design professional’s “instruments of service” Submittals required by the Contract Documents. Engineer’s approval or other appropriate action on such delegated design Submittals will be only for the limited purposes set forth in the Contract Documents.
 - 1) These submittals include but are not necessarily limited to:
 - a) Design Drawings, design Specifications, calculations, reports, and other instruments of service sealed and signed by Design Professional retained by Contractor, Subcontractor, or Supplier for a portion of the completed Work as part of the completed Project.
3. Contract Documents’ requirements for Shop Drawings and Samples hereby apply to all Action Submittals.

C. Informational Submittals:

1. Informational Submittals are so indicated in the Contract Documents. Unless otherwise indicated, representative types of Informational Submittals include but are not limited to:
 - a. Certifications.
 - b. Evaluation reports.
 - c. Results of source quality control activities.
 - d. Results of field quality control activities.
 - e. Supplier instructions.
 - f. Reports of Suppliers’ visits to the Site.
 - g. Sustainable design Submittals (that are not Closeout Submittals).
 - h. Shop Drawings, product data, samples, and testing plans submitted as a requirement for delegated designs and sealed by the associated Design Professional retained by the Contractor, Subcontractor, or Supplier.
2. Informational Submittals, when submitted in accordance with the Contract and indicating full compliance with the Contract Documents, do not require explicit response from Engineer; Engineer’s acceptance thereof will be indicated in the Engineer’s Submittals log.

3. When Informational Submittal does not indicate full compliance with the Contract Documents, Engineer will indicate the non-compliance in a written response to Contractor.
 4. For-Information-Only submittals upon which the Engineer is not expected to conduct review or take responsive action may be so identified in the Contract Documents.
- D. Closeout Submittals:
1. Closeout Submittals are so indicated in the Contract Documents and are, in general, required before the associated Work is completed, unless earlier submittal is required by the Contract Documents.
 2. Unless indicated otherwise in the Contract Documents, Closeout Submittals include maintenance and service contracts, operation and maintenance data, warranties, bonds (other than performance and payment bonds required prior to the start of construction), record documents, sustainable design closeout Submittals, software, keys, and others.
 3. Closeout Submittals are processed in the same manner as described above for Informational Submittals.
- E. Maintenance Materials Submittals:
1. Maintenance materials include spare parts, extra materials, tools, and similar items required to be furnished in accordance with the Contract Documents.
 2. Furnish required physical maintenance materials, delivered to Owner or facility manager (if other than Owner), as applicable, at the location(s) indicated in the Contract Documents, for the corresponding required Maintenance Materials Submittals.
 3. Maintenance Materials Submittals are documentation of delivery to Owner's or facility manager, and their acceptance of, required physical maintenance materials.
 4. Maintenance Materials Submittals are processed in the same manner as described above for Informational Submittals.
- F. Additional Terms:
1. The following terms have the meanings indicated below, regardless of whether such terms are indicated using initial capital letters, and apply to singular and plural of each:
 - a. "Product data" means illustrations, standard schedules, performance charts, Supplier's published instructions, brochures, diagrams, and other information furnished by Contractor to illustrate or describe materials or equipment for some portion of the Work. In general, product data are manufacturers' pre-published information on the items proposed to be incorporated into the Work. Product data includes manufacturer's catalog pages and similar documents with contractor-made markings and indications of proposed products and proposed options.
 - b. The term "Shop Drawings", defined in the Contract Documents, is supplemented by the following: Shop Drawings include: (1) Fabrication and Assembly Drawings, usually having a title block, or (2) schedules, prepared specifically for the Project. Here, "schedules" means a Project-specific summary of systems and components, such as a schedule of HVAC equipment, schedules of doors and door hardware, or windows, or a schedule of paint systems by room and surface, or other, similar Project information in a tabular format. In contrast, construction Progress Schedules, Schedules of Submittals, and Schedules of Values are not Shop Drawings.
 - c. "Samples" mean 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.
 - d. "Schedule of Submittals" means a schedule, prepared and maintained by the Contractor, of required submittals and time requirements for Engineer's review of the submittals.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Furnish Submittals well in advance of need for the associated material or equipment, or procedure (as applicable), in the Work and with ample time necessary for delivery of materials and equipment and to implement procedures following Engineer's approval or acceptance of the associated Submittal.
 - 2. Work covered by a Submittal will not be included in payments by Owner until approval or acceptance (as applicable) of related Submittals has been obtained in accordance with the Contract Documents.
- B. Time Requirements:
 - 1. All Action Submittals shall be submitted and approved prior to 50% completion of the Project as determined by the Schedule of Values.
 - 2. Information Submittals:
 - a. All reports and certifications shall be submitted within ten working days of conducting testing, installation, and/or examination.
 - b. All Informational Submittals showing compliance with required qualifications shall be submitted 15 working days prior to any Work commencing that utilizes the subject qualifications.

1.5 GENERAL PROVISIONS CONCERNING SUBMITTALS

- A. Locations of Requirements:
 - 1. Requirements concerning Submittals are generally located as follows:
 - a. Contract Documents applicable to the Project.
 - b. This Specification Section, which presents general requirements for Submittals applicable to the Project.
 - c. Other Division 01 Specifications that include general requirements for certain types of Submittals, such as Specification Section 01 04 00 - Special Provisions, Section 01 78 23 - Operation and Maintenance Data, and others.
 - d. The "Submittals" Article of the various Specifications Sections, which indicates the required Submittals for the associated Work. Furnish all Submittals required by the Contract Documents regardless of whether explicitly indicated in the associated Specifications' "Submittals" Article.
- B. This Specification Section is written to supplement the requirements of the Contract Documents relative to Submittals.

1.6 SCHEDULE OF SUBMITTALS

- A. Informational Submittals: Submit the following:
 - 1. Schedule of Submittals:
 - a. Timing:
 - 1) Furnish Schedule of Submittals within the time frame required in Specification Section 01 04 00 - Special Provisions.
 - 2) Submit updated Schedule of Submittals with each submittal of the updated Progress Schedule.
 - b. Content: In accordance with the Contract Documents, Specification Section 01 04 00 - Special Provisions, and this Specification Section. Requirements for content of preliminary Schedule of Submittals and subsequent Submittals of the Schedule of Submittals are identical. Identify on Schedule of Submittals all Submittals required in the Contract Documents. Updates of Schedule of Submittals shall show scheduled dates and actual dates for completed tasks. Clearly indicate Submittals that are on the Project's critical path. Indicate the following for each Submittal:
 - 1) Date by which Submittal will be received by Engineer.
 - 2) Whether Submittal will be for a substitution or "or-equal."

- 3) Date by which Engineer’s response is required. Allow not less than 14 days for Engineer’s review, starting on Engineer’s actual receipt of each Submittal. Allow increased time for large or complex Submittals.
- 4) For Submittals for materials or equipment, date by which material or equipment must be at the Site to avoid delaying the Work and to avoid delaying the work of others (if any).
- c. Prepare Schedule of Submittals using same software, and in same format, specified for Progress Schedules in Section 01 32 16 - Construction Progress Schedule.
- d. Coordinate Schedule of Submittals with the Progress Schedule.
- e. Schedule of Submittals that is not compatible with the Progress Schedule, or that does not indicate Submittals on the Project’s critical path, or that places extraordinary demands on Engineer for time and resources, is unacceptable. Do not include Submittals not required by the Contract Documents.
- f. In preparing Schedule of Submittals:
 - 1) Considering the nature and complexity of each Submittal, allow sufficient time for reviews and revisions.
 - 2) Allow reasonable time for Engineer’s review and processing of Submittals, for Submittals to be revised and resubmitted, and for returning Submittals to Contractor.
 - 3) Identify and accordingly schedule Submittals that are expected to have long anticipated review times.
 - 4) Account for time requirements set forth in “Administrative Requirements” Article in this Specification Section.

B. The submittal schedule shall include the following columns at a minimum:

Submittal Section	Submittal Description	Planned Submittal Date	Submittal Needed Date	Actual Submittal Date	Actual Return Date	Disposition

1.7 PREPARATION OF SUBMITTALS

A. Prior to Submittal Preparation:

1. The Contract Documents address Contractor’s responsibility for submitting for Owner’s acceptance identification of Subcontractors and Suppliers. Obtain Owner’s acceptance before entering into subcontracts and purchase orders for the Work.
2. Comply with the Contract Documents relative to terms and conditions of subcontracts and purchase orders for the Work.
3. Contractor’s responsibilities for the following are set forth in the Contract Documents and as may be augmented elsewhere in the Contract Documents:
 - a. Obtaining field measurements and dimensions.
 - b. Determining and verifying required quantities.
 - c. Verifying compatibility of materials.
 - d. Apportioning the Work among Subcontractors, Suppliers, and Contractor.
 - e. Reconciling required materials, equipment, and other Contract requirements with Contractor’s means, methods, techniques, sequences, and procedures of construction and with Contractor’s safety and protection programs and precautions incident thereto.
 - f. Reviewing applicable provisions of the Contract Documents and obtaining from Engineer necessary interpretations or clarifications.

B. Submittal Identification:

1. Submittal Number:
 - a. A unique number shall be assigned to each individual Submittal.

- b. Assign Submittal numbers as follows:
 - 1) First part of Submittal number shall be the applicable Specifications section number, followed by a hyphen.
 - 2) Second part of Submittal number shall be a two-digit number (sequentially numbered from 01 through 99) assigned to each separate Submittal furnished under the associated Specifications Section.
 2. Review Cycle Number:
 - a. Each resubmittal of a given Submittal shall be indicated with an upper-case letter designation:
 - 1) No letter designation for initial (first) submittal of the Submittal number.
 - 2) No hyphen between Submittal number and review cycle number.
 - 3) "A" shall indicate first resubmittal of the Submittal number.
 - 4) "B" shall indicate second resubmittal of the Submittal number.
 3. Submittal Title:
 - a. A unique title shall be assigned to each individual Submittal.
 - 1) Hyphen between review cycle number and title.
 - 2) "Resubmittal of" shall be first words of Submittal title to indicate first resubmittal.
 - 3) "Resubmittal 2 of" shall be first words of Submittal title to indicate second resubmittal.
 4. Examples of Submittal number, review recycle number, and Submittal title:
 - a. Initial (first) review cycle of the third Submittal furnished under Specification Section 10 14 00 - Identification Devices, would be as follows:
 - 1) "10 14 00-03 - Identification Register."
 - b. Second (first resubmittal) review cycle of the third Submittal furnished under Specification Section 10 14 00 - Identification Devices, would be as follows:
 - 1) "10 14 00-03A - Resubmittal of Identification Register."
 - c. Third (second resubmittal) review cycle of the third Submittal furnished under Specification Section 10 14 00 - Identification Devices, would be as follows:
 - 1) "10 14 00-03A - Resubmittal 2 of Identification Register."
- C. Marking of Submittals:
1. Mark on each page of each Submittal and each individual component submitted with Submittal number and applicable Specification paragraph.
 2. Mark each page of each Submittal with the Submittal page number.
 3. Each Shop Drawing sheet shall have title block with complete identifying information satisfactory to Engineer.
 4. For product data Submittals, operation and maintenance data Submittals, and other Submittals:
 - a. Mark options to be furnished using broad, dark arrows, or "clouds" clearly drawn around the relevant text or diagrams. Do not use highlighter for indicating options and features.
 - b. Indicate options and features not furnished using clear strikeouts through the text or diagrams.
- D. Submittal Organization and Content - General:
1. Page or Sheet Size; Furnish Submittals with one or more of the following page or sheet sizes: (a) 8.5 IN by 11 IN; (b) 11 IN by 17 IN; (c) 22 IN by 34 IN; unless another sheet size is acceptable to Engineer.
 2. Language: All parts of each Submittal shall be in the English language.
 3. Units of Measurement: Clearly indicate units of measurement on Shop Drawings, product data Submittals, record documentation, and operation and maintenance data Submittals.
 4. Organize each Submittal logically to facilitate ease of understanding and review.
 5. To the extent practicable, arrange Submittal information in same order as requirements are written in the associated Specifications Section.
 6. Each Submittal shall cover Work under only one Specifications section.

7. To the extent practicable, package together Submittals for the same Specifications Section. Do not furnish required information piecemeal.
 8. For large or complex Submittals, include a title page and table of contents.
 9. Include appropriately labeled fly sheets to separate distinct parts of each Submittal.
 10. Ensure legibility of all pages in each Submittal.
 11. Minimize extraneous and unnecessary information in Submittals for materials and equipment. Do not submit information not relevant to the Submittal and associated requirements of the Contract Documents.
 12. Contractor's, Subcontractor's, and Supplier's written comments on Shop Drawings and product data diagrams shall be colored blue.
 13. Do not submit under Specifications sections with title that include "Basic Requirements", unless the subject material or equipment is specified, in total, in a Specifications Section with the words, "Basic Requirements" in its title.
- E. Electronic Documents Submittals:
1. Format: Electronic Documents Submittals shall be "portable document format" (.PDF) files unless expressly required otherwise by applicable provisions of the Contract Documents.
 2. Electronic Documents Submittals must be electronically searchable when delivered to Engineer and other recipients.
 3. Organization and Content:
 - a. Each Electronic Documents Submittal shall be one file; do not divide individual Submittals into multiple Electronic Documents files each unless file size will exceed 30 MB.
 - b. When Submittal is large or contains multiple parts, furnish PDF file with suitably titled electronic bookmark for each section of the Submittal.
 - c. Content shall be identical to paper or other original Submittal. First page of each Electronic Documents Submittal shall be transmittal form required in this Specification Section.
 4. Quality and Legibility: Electronic Documents Submittal files shall be made from the original and shall be clear and legible. Markings applied by Contractor, Subcontractor, or Supplier shall be clear, distinct, and readily apparent. Electronic Documents file shall be full size of original documents. Properly orient all pages for convenient reading on a computer display; do not furnish pages sideways or upside-down.
 5. Provide sufficient internet service, software, and systems for Contractor with capability appropriate for transmitting the necessary files and receiving responses from Engineer or other entities.
 6. Check not less than once per day for distribution of Electronic Documents Submittals responses and related Electronic Documents correspondence.
- F. Proposed "Or-Equals", Substitutes, and Deviations from Contract Requirements:
1. "Or-Equals":
 - a. The meaning of "or-equal" is addressed in Specification Section 01 04 00 - Special Provisions and Specification Section 01 25 00 - Substitution Procedures.
 - b. Contractor's request for approval of "or-equals" is to be presented via the associated Action Submittal(s) and shall include the information required in Specification Section 01 04 00 - Special Provisions.
 - c. Expressly and prominently indicate, "Proposed Or-Equal" on the associated Action Submittals when Submittal is for an "or-equal".
 - d. Submittals requesting approval of an "or-equal" but not accompanied by the required, supplemental information will be deemed incomplete by Engineer and returned to Contractor without approval.
 2. Substitutes:
 - a. The meaning of "substitute" is indicated in Specification Section 01 04 00 - Special Provisions and Specification Section 01 25 00 - Substitution Procedures.
 - b. Requests for approval of substitutes shall comply with Section 01 25 00 - Substitution procedures, and other relevant provisions of the Contract Documents.

- c. Contractor's request for approval of substitute is separate from the associated Action Submittal(s). Action Submittals that request approval of a substitute when a separate, formal substitution request (furnished in accordance with the Contract Documents) was not previously furnished to Engineer, followed by formal approval in via an appropriate contract modification (typically either a Field Order or Change Order), will be deemed by Engineer as non-compliant with the Contract Documents and will be returned to Contractor without approval.
 - d. Contractor is solely responsible for delays incurred due to substitutes proposed via Submittals that have not been previously duly approved via an appropriate Contract modification.
 - e. Action Submittals for items or procedures approved via an appropriate Contract modification shall include a copy of the Contract modification in which the substitute was approved.
3. Submittals with Proposed Deviations from Contract Requirements:
- a. When Submittal proposes deviations from requirements of the Contract Documents, the Submittal shall clearly and expressly indicate each proposed deviation.
 - b. Also comply with this Section's provision, in the Article below, on Contractor's transmittal form expressly alerting Engineer to the proposed deviations.
 - c. Comply with requirements of the Contract regarding substitutes and "or-equals".
 - d. When deviation is proposed, also appropriately revise text of Contractor's approval, from that required below in this Article.
 - e. When Submittal includes deviations from Contract requirements and either the Submittal itself, Contractor's transmittal form, or both, do not comply fully with Contract requirements for indicating deviations in Submittals and giving separate written notice thereof, Engineer's approval of such deviations will be deemed null and void unless Engineer's written response to the Submittal has expressly acknowledged such deviation and indicated Engineer's approval thereof.
 - f. Contractor is solely responsible for delays and costs incurred due to any and all Submittals with deviations from Contract requirements that were not properly, expressly indicated and approved in accordance with the Contract Documents. Deviations not duly approved in accordance with the Contract Documents may be deemed defective Work. Contractor is solely responsible for remedying defective Work and all associated cost and time impacts.
- G. Contractor's Approval of Submittals:
- 1. Contractor's Review: Before transmitting Submittals to Engineer, review each Submittal to:
 - a. Ensure proper coordination of the Work.
 - b. Determine that each Submittal is in accordance with Contractor's desires.
 - c. Verify that Submittal contains sufficient information for Engineer to determine compliance with the Contract Documents.
 - 2. Incomplete or inadequate Submittals will be returned without detailed review by Engineer.
 - 3. Contractor's Approval Stamp and Signature:
 - a. Each Submittal furnished shall bear Contractor's approval stamp (or facsimile thereof) and signature, as evidence that the Submittal has been reviewed and approved by Contractor and verified as complete and in accordance with the Contract Documents.
 - b. Submittals without Contractor's approval and signature (as required by the contract Documents) will be returned to Contractor without further review by Engineer and deemed incomplete.
 - c. Engineer reserves the right to reject as incomplete Submittals where Contractor's approval signature appears computer-generated or reproduced without the active involvement or review of Contractor's signatory.

d. Contractor's approval shall contain the following text:

Project Name: _____
Contractor's Name: _____
Contract Designation: _____
Date: _____

----- Reference -----

Submittal Title: _____
Specifications: _____
Section: _____
Page No.: _____
Paragraph No.: _____
Drawing No.: _____ of _____
Location of Work: _____

Submittal No. and Review Cycle: _____
Coordinated by Contractor with Submittal Nos.: _____

I hereby certify that Contractor has satisfied Contractor's obligations under the Contract Documents relative to Contractor's review and approval of this Submittal, including: (1) reviewed and coordinated the Submittal with other Submittals and with the requirements of the Work and the Contract Documents; (2) determined and verified all: field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal. (b) 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 (c) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; (3) confirmed the Submittal is complete with respect to all related data included in the Submittal; and (4) clearly and expressly indicated all proposed deviations (if any) from the requirements of the Contract Documents both in the Submittal itself and in the Submittal's transmittal form. Accordingly, this Submittal is hereby approved for Contractor by:

Approved for Contractor by: _____

H. Resubmittals:

1. Refer to the Contract Documents for requirements regarding resubmitting required Submittals.
2. Contractor shall furnish Submittals with such completeness, accuracy, and compliance with the Contract Documents to obtain Engineer's approval or acceptance, as applicable, with no more than two submittals (original and one resubmittal), and without the total quantity of Submittals furnished, including all initial Submittals and all resubmittals, exceeding 125% of the number of Submittals indicated on the Schedule of Submittals initially accepted by Engineer, plus a corresponding percentage of the quantity of Submittals required by Change Orders, Work Change Directives, and Field Orders.
3. Engineer will record Engineer's time for reviewing a third 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.
4. Do not increase the scope of prior review cycle of the same Submittal.
5. Indicate on Contractor's transmittal form how Submittal was revised from previous review cycle of the Submittal and where the revisions or corrections are located within the resubmittal.

6. Expressly address and provide response for all components previously transmitted by Engineer on prior review cycles of the subject Submittal. Where resubmittal lacks complete response to Engineer's prior comments, Engineer may deem such resubmittal as incomplete and return it to Contractor without further review.
7. Where part of the Submittal's prior review cycle was expressly approved or accepted, as applicable, by Engineer, do not include such items in subsequent resubmittals.
8. Resubmittal of Previously Approved or Accepted Items:
 - a. Do not resubmit on a given item previously approved or accepted, as applicable, by Engineer, without Engineer's advance consent. Consent will be given for bona-fide unavailability of a previously approved or accepted item where Contractor has acted in good faith in a timely manner with due diligence to comply with the Contract Times.
 - b. Destroy or conspicuously mark "SUPERSEDED" on all documents having previously received Engineer's approval or acceptance, as applicable, that are superseded by a resubmittal.

1.8 TRANSMITTAL OF SUBMITTALS BY CONTRACTOR

A. Contractor's Transmittal for Submittals:

1. Furnish separate transmittal form with each Submittal. Use transmittal form attached to this Specification Section (as Exhibit 01 33 00-A) unless other transmittal form is acceptable to Engineer and Owner at the start of the Project's construction.
2. When transmittal form other than this Section's Exhibit 01 33 00-A is acceptable to Engineer, at beginning of each transmittal, include a reference heading indicating: Contractor's name, Owner's name, Project designation, Contract designation, transmittal number, and Submittal number (with review cycle).
3. "Or-Equals": When the Submittal is proposing an "or-equal", expressly so indicate on transmittal form submitted by Contractor.
4. Proposed Deviations from Contract Requirements: When the Submittal proposes deviations from requirements of the Contract Documents, transmittal form shall specifically describe each proposed deviation:

B. Submittal Delivery Method:

1. This provision presents general requirements for delivery of all Submittals unless otherwise required elsewhere in the Contract Documents.
2. Furnish Submittals as Electronic Documents delivered in accordance with the Contract Documents to Submittal Exchange.
3. Furnish Submittals to Engineer and each other entity indicated in the Contract Documents as receiving a Submittal directly from Contractor.
4. Address Submittals to Engineer as follows: HDR, 300 East Locust St, Suite 210, Des Moines, IA 50309, to attention of Adam A. Smith, Adam.Alonzo.Smith@hdrinc.com.

C. Samples - Transmittal and Delivery:

1. Labeling and Tagging Samples:
 - a. Securely label or tag each Sample with Submittal identification number.
 - b. Label or tag shall include clear space at least 4 IN by 4 IN in size for affixing Engineer's review stamp indicating disposition assigned by Engineer.
 - c. Label or tag shall not cover, conceal, or alter Sample's appearance or features.
 - d. Label or tag shall not be separated from the Sample.
2. Timing: Deliver required Samples concurrently with other Action Submittals required for the same element of the Work, unless other delivery time frame is indicated in the Schedule of Submittals accepted by Engineer.
3. Quantity Required:
 - a. Where the Contract Documents require a Sample as a field mock-up, provide Sample at the Site or in the Work at location acceptable to Engineer. Provide the quantity of field mock-ups required by the contract Documents; if not otherwise shown or specified, provide one of each required field mock-up.

- b. For reasonably portable Samples, deliver the quantity of Samples required in the associated Specifications. If quantity of Samples is not indicated in the associated Specifications section, deliver to Engineer not less than two identical Samples of each item for which Sample is required.
 - c. Samples will not be returned to Contractor. If Contractor requires Sample(s) for Contractor's use, so advise Engineer in writing and furnish additional copies of the Sample. Contractor is responsible for furnishing, shipping, and transporting additional Samples.
4. Locations for Delivery of Reasonably Portable Samples for Review:
- a. Deliver one physical Sample to Engineer's field office at the Site.
 - b. Deliver balance of required physical Samples to Engineer at address indicated in this Article for receipt of Submittals, unless otherwise directed by Engineer.
- D. Closeout Submittals - Transmittal and Delivery:
- 1. Furnish the following Closeout Submittals in accordance with general requirements for transmitting and delivering Submittals, indicated above in this Article: Maintenance contracts; warranty bonds (when required) and other bonds required for specific materials, equipment, or systems; warranty documentation; and sustainable design closeout documentation (when required). On documents such as maintenance contracts and bonds, include on each document furnished original ("wet") signature of entity issuing said document. When original "wet" signatures are required, furnish such Submittals to Engineer both on original paper and as Electronic Documents, and to other entities furnish as indicated above in this Article for general requirements for Submittals.
 - 2. Operations and Maintenance Manuals: Submit in accordance with Specification Section 01 78 23 - Operation and Maintenance Data.
 - 3. Record Documents: Submit in accordance with Specification Section 01 78 39 - Project Record Documents.
 - 4. Software: In addition to software installed on Owner's computer system, furnish number of copies of software required in the Specifications Section where the software is specified. Preferred means of transmittal is via secure file transfer directly to Owner (or facility manager, if other than Owner) via secure file transfer method mutually acceptable to software developer and the receiving entity. When secure file transfer is used, submit to Engineer documentation signed or electronically acknowledged by Owner that the files were received. Where such software is available only on the software developer's portable media, furnish such software on software developer's original, portable media, sealed in software developer's original, unopened, clearly labeled packaging.
- E. Maintenance Materials Submittals - Delivery:
- 1. Deliver physical maintenance materials required by the Contract Documents in accordance with applicable provisions of the Contract, including Specification Section 01 78 43 - Spare Parts and Extra Materials.
 - 2. Submit documentation of delivery of (Maintenance Materials Submittals) in accordance with general requirements for Submittals as indicated in this Specification Section.

1.9 ENGINEER'S REVIEW OF SUBMITTALS

- A. This Article applies to review of all Submittals by Engineer or other entity to whom the Contract Documents require such Submittal be furnished.
- B. Timing:
 - 1. Timing of Engineer's review will be in accordance with the Schedule of Submittals accepted by Engineer.
 - 2. When Submittal is delivered to Engineer on a date other than that indicated in the Schedule of Submittals accepted by Engineer, duration of Engineer's review may differ from that indicated in the Schedule of Submittals, based on Engineer's availability and resources. Engineer will make good-faith effort to furnish responses to Submittals in a timely manner.
 - 3. Contractor is responsible for communicating to Engineer when a Submittal is on the Project's critical path.

C. Engineer's Review:

1. Markings:
 - a. Comments or responses marked directly on Submittal by Engineer (or other entity reviewing Submittal) will be colored red.
 - b. Engineer may also present narrative comments on a comment sheet inserted by Engineer into the Submittal or included on Engineer's transmittal form for the Submittal. Such comments will be in red text. When a separate comment sheet is included by Engineer, such sheet will be clearly identified as Engineer's comments.
2. Engineer's review and disposition assigned to Submittal are subject to the following:
 - a. Submittal disposition is subject to: Engineer's comments on the Submittal; disclaimer language on Engineer's Submittal transmittal form; Engineer's Submittal review stamp (when used) or equivalent (when used); and this provision.
 - b. Engineer's review is only for general compatibility with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents, and for general compliance with the information given in the Contract Documents.
 - c. Contractor shall be solely responsible for complying with the Contract Documents, as well as with Supplier instructions consistent with the Contract Documents, Owner's directions, and Laws and Regulations. Contractor is solely responsible for obtaining, correlating, confirming, and correcting dimensions at the Site; quantities; information and choices pertaining to fabrication processes; means, methods, sequences, procedures, and techniques of construction; safety precautions and programs incident thereto; and for coordinating the work of all trades.
 - d. Engineer is not responsible for resubmittals not yet furnished by Contractor or tracking Contractor's progress on resubmittals.
3. Documents not required by the Contract Documents but nonetheless furnished by Contractor as submittals will not be reviewed by Engineer.

D. Meaning of Submittal disposition Assigned by Engineer:

1. Action Submittals:
 - a. "Approved" (Action Code A): Upon return of Submittal marked "Approved", order, ship, or fabricate materials and equipment included in the Submittal (pending Engineer's approval or acceptance, as applicable, of production-related qualifications statements and certifications, and required source quality control Submittals) or otherwise proceed with the Work in accordance with the Submittal and the Contract Documents.
 - b. "Approved as Noted" (Action Code B): Upon return of Submittal marked "Approved as Noted", order, ship, or fabricate materials and equipment included in the Submittal (pending Engineer's approval or acceptance, as applicable, of production-related qualifications statements and certifications, and required source quality control Submittals) or otherwise proceed with the Work in accordance with the Submittal and the Contract Documents, and in accordance with Engineer's comments and notes indicated in Engineer's Submittal response.
 - c. "Revise and Resubmit" (Action Code C): Upon return of Submittal marked "Revise and Resubmit", make the revisions necessary and indicated and resubmit to Engineer for approval.
 - d. "Not Approved" (Action Code D): This disposition indicates material or equipment that cannot be approved. "Not Approved" disposition may also be applied to Submittals that are incomplete. Upon return of Submittal marked "Not Approved", repeat initial submittal procedure utilizing approvable material or equipment, with a complete Submittal clearly indicating all information required.
2. Informational, Closeout, and Maintenance Materials Submittals:
 - a. "Accepted" (Action Code F): Information included in Submittal complies with the applicable requirements of the Contract Documents and is acceptable. No further action by Contractor is required relative to such Submittal, and the Work covered by the Submittal may proceed. Materials and equipment with Submittals with this disposition may be shipped or operated, as applicable. Submittals assigned "Accepted"

by Engineer (or other reviewing entity) does not indicate Engineer's acceptance of the associated Work, which is indicated only as set forth in the Contract Documents and Specification Section 01 77 19 – Closeout Requirements.

- b. "Not Acceptable" (Action Code G): Submittal, or part thereof, does not indicate full compliance with applicable requirements of the Contract Documents and is not acceptable. Provide labor, materials, equipment, services, and incidentals necessary to properly and accurately revise Submittal and resubmit to indicate acceptability and compliance with the Contract Documents.
 3. Operation and Maintenance Manual Submittals:
 - a. See Specification Section 01 78 23 - Operation and Maintenance Manuals.
 4. Other:
 - a. "Submittal Not Reviewed" (Action Code E): Documents so marked by Engineer are not required by the Contract Documents. Submittals may also be marked with this disposition when information in the document was previously reviewed and approved or accepted by Engineer, as applicable.
- E. Distribution of Engineer's Responses:
1. Unless otherwise indicated in the Contract Documents, Engineer will distribute written responses (as Electronic Documents) to Submittals to the following:
 - a. Contractor.
 - b. Owner.
 - c. Engineer's file.
 2. Engineer's acceptance of Informational Submittals, Closeout Submittals, and Maintenance Materials Submittals will be recorded in Engineer's Submittal log. Engineer may distribute copy of Engineer's Submittals log as an Electronic Document or as handout at construction progress meetings.
 3. Paper copies of Engineer's Submittal responses will not be distributed unless otherwise required by the Contract Documents or otherwise agreed to by Engineer.
 4. Contractor is responsible for forwarding Engineer's Submittals responses to Subcontractors and Suppliers as appropriate, and for coordinating the Work of all trades.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The documents listed below, following this Specification Section's "End of Section" designation, are part of this Specification Section:
1. "Exhibit 01 33 00-A - Transmittal for Submittal No. _____ - ___" (one page).

END OF SECTION

Transmittal for Submittal No. _____ - _____

Project Name: WRF Clarifier Improvements Phase 2					Date Received:	
Project Owner: Des Moines Metropolitan Wastewater Reclamation Authority					Checked By:	
Contractor:			HDR Engineering, Inc.		Log Page:	
Address:			Address: 300 East Locust Street, Suite 210 Des Moines, IA 50309		HDR No.: 10229519	
					Spec Section:	
					Drawing/Detail No.:	
Attn (Contractor):			Attn (HDR):		Review Cycle	
Date Transmitted by Contractor:			Date of Engineer's Response Transmittal:			
Item No.	Submittal No.	Description (indicate number of copies where paper copies of physical Samples are returned)	Manufacturer	Supplier Dwg or Data No.	Engineer's Disposition (Action Code) *	
1						
2						
3						
4						
Contractor's Remarks <i>(insert text):</i>						
Engineer's Remarks <i>(insert text):</i>						
* Legend for Action Code indicated above, assigned by Engineer:						
Action Submittal: A – Approved B – Approved as Noted C – Revise and Resubmit D – Not Approved			Informational, Closeout, or Maintenance Materials Submittal: F – Accepted. G – Not Acceptable Other: E – Submittal Not Reviewed			
Engineer's Disclaimer (for Submittals that do <u>not</u> involve delegated design):						
a. Submittal action code is subject to: Engineer's comments on the Submittal, comment sheets (if any), and this transmittal form; disclaimer language on Engineer's Submittal review stamp or equivalent; and Specification Section 01 33 00 - Submittal Procedures.						
b. Engineer's review is only for general compatibility with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents, and for general compliance with the information given in the Contract Documents.						
c. Contractor shall be solely responsible for complying with the Contract Documents, as well as with Supplier instructions consistent with the Contract Documents, Owner's directions, and Laws and Regulations. Contractor is solely responsible for obtaining, correlating, confirming, and correcting dimensions at the Site; quantities; information and choices pertaining to fabrication processes; means, methods, sequences, procedures, and techniques of construction; safety precautions and programs incident thereto; and for coordinating the work of all trades.						
Reviewed for HDR by:					Date of Engineer's Review:	
Distribution:		Contractor	File	Field	Owner	Other

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SECTION 01 35 05
ENVIRONMENTAL PROTECTION AND SPECIAL CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Minimizing the pollution of air, water, or land; control of noise, the disposal of solid waste materials, and protection of deposits of historical or archaeological interest.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 – General Requirements.
 - 3. Section 01 04 00 - Special Provisions.

1.2 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Prior to the start of any construction activities submit:
 - a. A detailed proposal of all methods of control and preventive measures to be utilized for environmental protection.
 - b. A copy of the NPDES permit for storm water discharges from construction activities.
 - c. A copy of the approved pollution prevention plan.

PART 2 - PRODUCTS - (NOT APPLICABLE TO THIS SPECIFICATION SECTION)

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Employ and utilize environmental protection methods, obtain all necessary permits, and fully observe all local, state, and federal regulations.
- B. Land Protection:
 - 1. Except for any work or storage area and access routes specifically assigned for the use of the Contractor, the land areas outside the limits of construction shall be preserved in their present condition.
 - a. Confine construction activities to areas defined for work within the Contract Documents.
 - 2. Manage and control all borrow areas, work or storage areas, access routes and embankments to prevent sediment from entering nearby water or land adjacent to the work site.
 - 3. Restore all disturbed areas including borrow and haul areas and establish permanent type of locally adaptable vegetative cover.
 - 4. Unless earthwork is immediately paved or surfaced, protect all side slopes and backslopes immediately upon completion of final grading.
 - 5. Plan and execute earthwork in a manner to minimize duration of exposure of unprotected soils.
 - 6. Except for areas designated by the Contract Documents to be cleared and grubbed, do not deface, injure or destroy trees and vegetation, nor remove, cut, or disturb them without approval of the Engineer.
 - a. Any damage caused by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at no additional cost to the Owner.

C. Surface Water Protection:

1. Utilize, as necessary, erosion control methods to protect side and backslopes, minimize and the discharge of sediment to the surface water leaving the construction site as soon as rough grading is complete.
 - a. These controls shall be maintained until the site is ready for final grading and landscaping or until they are no longer warranted and concurrence is received from the Engineer.
 - b. Physically retard the rate and volume of run-on and runoff by:
 - 1) Implementing structural practices such as diversion swales, terraces, straw bales, silt fences, berms, storm drain inlet protection, rock outlet protection, sediment traps and temporary basins.
 - 2) Implementing vegetative practices such as temporary seeding, permanent seeding, mulching, sod stabilization, vegetative buffers, hydroseeding, anchored erosion control blankets, sodding, vegetated swales or a combination of these methods.
 - 3) Providing Construction sites with graveled or rock access entrance and exit drives and parking areas to reduce the tracking of sediment onto public or private roads.
2. Discharges from the construction site shall not contain pollutants at concentrations that produce objectionable films, colors, turbidity, deposits or noxious odors in the receiving stream or waterway.
3. Contractor shall take means to collect, control, and dispose of large volume water intensive operations to prevent discharge of water from the project work area in an uncontrolled manner.

D. Solid Waste Disposal:

1. Collect solid waste on a daily basis.
2. Provide disposal of degradable solid waste to an approved solid waste disposal site.
3. Provide disposal of non-degradable solid waste to an approved solid waste disposal site or in an alternate manner approved by Engineer and regulatory agencies.
4. No building materials wastes or unused building materials shall be buried, dumped, or disposed of on the site.

E. Fuel and Chemical Handling:

1. Store and dispose of chemical wastes in a manner approved by regulatory agencies.
2. Take special measures to prevent chemicals, fuels, oils, greases, herbicides, and insecticides from entering drainage ways.
3. Do not allow water used in onsite material processing, concrete curing, cleanup, and other waste waters to enter a drainage way(s) or stream.
4. Provide containment around fueling and chemical storage areas to ensure that spills in these areas do not reach waters of the state.

F. Control of Dust:

1. The control of dust shall mean that no construction activity shall take place without applying all such reasonable measures as may be required to prevent particulate matter from becoming airborne so that it remains visible beyond the limits of construction.
 - a. Reasonable measures may include paving, frequent road cleaning, planting vegetative groundcover, application of water or application of chemical dust suppressants.
 - b. The use of chemical agents such as calcium chloride must be approved by the State of Iowa DOT.
2. Utilize methods and practices of construction to eliminate dust in full observance of agency regulations.
3. The Engineer will determine the effectiveness of the dust control program and may request the Contractor to provide additional measures, at no additional cost to Owner.

G. Burning:

1. Do not burn material on the site.

2. If the Contractor elects to dispose of waste materials by burning, make arrangements for an off-site burning area and conform to all agency regulations.
- H. Control of Noise:
1. Control noise by fitting equipment with appropriate mufflers.
- I. Completion of Work:
1. Upon completion of work, leave area in a clean, natural looking condition.
 2. Ensure all signs of temporary construction and activities incidental to construction of required permanent work are removed.
 3. Grade, fill, and seed all disturbed areas.

END OF SECTION

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SECTION 01 42 13
STANDARD ABBREVIATIONS AND SYMBOLS

PART 1 - GENERAL

1.1 UNITS OF MEASUREMENT

A. Units of measurement abbreviations are defined on the Drawings.

1.2 TERMINOLOGY

A. Abbreviations associated with terminology are defined in the Drawings, with the following exceptions:

1. Typical equipment abbreviations are listed in Specification Section 01 61 03 - Equipment - Basic Requirements.

1.3 ORGANIZATIONS AND STANDARDS

A. Organizations associated with industry reference standards are defined in each Specification Section.

PART 2 - PRODUCTS – (NOT USED)

PART 3 - EXECUTION – (NOT USED)

END OF SECTION

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SECTION 01 45 33
SPECIAL INSPECTIONS AND TESTING PROGRAM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Contractor responsibilities for special inspection and testing.
 2. Special Inspection program and reporting requirements.
 3. Attachment A to this Specification Section includes the Submittal of Special Inspections.
 4. Attachment B to this Specification Section includes Special Inspector qualifications, reporting requirements, and material specific inspections and tests.
 - a. The information in Attachments A and B is for the Contractor reference only and is not part of the Contract Documents.
 - b. It is included to assist the Contractor in understanding the Owner-provided Services so that those services may be factored into the Contractor's pricing and schedule.
 - c. The Service Provider(s) responsible for the Owner-provided Services will be selected after Contract Award.
- B. Purpose:
1. This Document was developed to address the requirements of the 2018 International Building Code IBC, section 1704.1, including:
 - a. One or more special inspectors will be hired by the Owner or the Owner's Agent to provide inspections during constructions on the types of work listed under Section 1704.
 2. A Statement of Special Inspections will be submitted to the Building Code Official as a condition for permit issuance. This statement is included as Attachment A to this Specification. Attachment B includes a complete list of materials and work requiring special inspections, the inspections to be performed and a list of the minimum qualifications of the individuals, approved agencies, or firms intended to be retained for conducting such inspections.
- C. Related Specification Sections include but are not necessarily limited to:
1. SUDAS Division 1.
 2. Division 01 - General Requirements.
 3. Section 01 04 00 - Special Provisions.

1.2 DEFINITIONS

- A. Special Inspector: Representative of the Owner approved inspection agency designated for that portion of the work.
- B. Testing Agency: Approved agency, not affiliated or hired by the Contractor, which is responsible for the materials testing requirements of the project including but not limited to concrete cylinder breaks, soils testing, and masonry materials testing.
- C. Statement of Special Inspections: Document provided to the Building Code Official outlining special inspections and tests to be done on the project and frequency of required test.
- D. Soils Engineer or Geotechnical Engineer: For the purposes of Special Inspection "Soils Engineer," "Geotechnical Engineering," and "Special Inspector" shall be interchangeable as pertains to the Division 31 specifications.
- E. NICET: National Institute for Certification in Engineering Technologies.

1.3 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with testing agency personnel, special inspector, and agents of the Building Code Official and provide access to the work.
 - 1. Providing access to the work shall include all labor and facilities to perform inspections and tests as listed in the Specifications for the duration of the inspections or tests involved.
 - 2. Provide means to obtain and handle samples taken on site.
- B. Attend a pre-construction meeting to coordinate and clarify inspection and testing procedures, requirements.
- C. Notify special inspector and/or testing agency of work to be inspected/tested minimum of 24 HRS prior.
- D. Work for which special inspections are required shall remain accessible and exposed for the purposes of special inspections until completion of required special inspections.
- E. Any portion of work that is not in conformance shall be corrected and re-inspected. Such portions of the work shall not be covered or concealed until authorized by Owner's Representative.
- F. Work to be inspected should be complete at time of inspector's arrival on-site.
- G. Payment for Special Inspection services will be in accordance with the following:
 - 1. Payment described below is for the Testing Agency and Special Inspector costs and does not include the Contractor's costs listed in Paragraph 1.3.A.
 - 2. After Contractor notification, inspector arrives at site and performs inspection within the timeframe defined in Item 4 below.
 - a. Inspection reveals work is satisfactory.
 - b. Owner pays all costs associated with this inspection.
 - 3. After Contractor notification, inspector arrives at site and performs inspection within the timeframe defined in Item 4 below.
 - a. Inspection reveals work is deficient.
 - b. Contractor corrects deficiencies within timeframe defined in Item 4 below.
 - c. Work is re-inspected and work is satisfactory.
 - d. Owner pays all costs associated with this inspection.
 - 4. After Contractor notification, inspector arrives at site and work is not ready for inspection when inspector arrives.
 - a. Inspector will remain on-site for a maximum of 2 HRS awaiting the completion of the work.
 - b. If work is not ready for inspection at the end of this period, inspector will be dismissed until Contractor requests re-inspection.
 - c. All costs associated with this inspection trip will be charged to the Contractor.
 - 5. After Contractor notification, inspector arrives at site and performs inspection within the timeframe defined above.
 - a. Inspection reveals work is deficient.
 - b. Contractor attempts to correct deficiencies within 2 HR timeframe and calls for re-inspection.
 - c. Work is re-inspected and found to still be deficient.
 - d. Inspector will be dismissed.
 - e. All costs associated with this inspection trip will be charged to the Contractor.
 - 6. Owner will pay for "passing" soils on the Project. Costs of corrective actions and cost of failed test areas requiring retesting are the sole responsibility of the Contractor. For additional specific payment requirements for soils, see the respective Division 31 Section.
 - 7. Owner will pay for "passing" tests and/or inspections. Costs of corrective actions for failed tests and/or inspections and the cost for re-testing and/or inspection are the sole responsibility of the Contractor. Contractor is responsible for any cancellation or "stand-by" time charges incurred by the test/inspection agency. Contractor shall also be

responsible for overtime charges incurred by the test/inspection agency for working outside the specified project work hours unless explicit approval is provided by WRA.

- H. Special Inspection is intended to be an Independent Quality Assurance.
 - 1. Special Inspections shall not relieve the Contractor of any quality assurance, quality control, workmanship, or warranty responsibilities. Contractor's own personnel shall review all work to be inspected for conformance with Contract Documents prior to calling for inspection.

1.4 REPORTING DUTIES AND AUTHORITY

- A. A pre-construction meeting to coordinate and clarify inspection, testing, and procedural requirements will be held per Specification Section 01 31 19.
 - 1. The meeting is to be attended by:
 - a. Owner.
 - b. Engineer.
 - c. Building Code Official or designee.
 - d. Testing Agency and Special Inspectors.
 - e. General Contractor.
 - f. Appropriate Sub-contractor(s).
- B. Special Inspector shall report all deficient work to the Contractor as soon as possible.
 - 1. Deficient work that has been covered up or concealed prior to re-inspection shall be reported to the Engineer and the Building Code Official.
- C. Special Inspector does not have authority to stop work or modify the requirements of the Contract Documents.

PART 2 - PRODUCTS - (NOT APPLICABLE TO THIS SPECIFICATION SECTION)

PART 3 - EXECUTION - (NOT APPLICABLE TO THIS SPECIFICATION SECTION)

END OF SECTION

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ATTACHMENT A TO SECTION 01 45 33



City of Des Moines
SPECIAL INSPECTION AND TESTING AGREEMENT
 Permit and Development Center, 602 Robert D. Ray Dr., Des Moines, IA 50309-1868

Project Address 3000 Vandalia Road
Building Permit Number

A pre-construction meeting with the parties involved may be required to review the special inspection requirements and procedures.

STATEMENT OF SPECIAL INSPECTIONS

In accordance to Section 1704 of the International Building Code (IBC), the owner, or the registered design professional in responsible charge acting as the owner’s agent, is required to hire an independent testing/inspection agency to perform required special inspections.

The design professional shall complete the attached forms and submit them to the Permit and Development Center (PDC) at the time construction plans are submitted for plan review. The special inspectors assigned to any project within the jurisdiction shall be identified by the design professional, and certified for the disciplines assigned.

A. Owner Responsibilities

1. The owner or the design professional in responsible charge acting as the owner’s agent shall fund special inspection services. The owner is responsible for seeing that these requirements are met.

B. Registered Design Professional Responsibilities

1. The registered design professional in responsible charge (engineer, or architect), shall include special inspection requirements and specifications on the plans.
2. Provide structural observation Per IBC Section 1704.6 requirements and specifications on the plans.
3. Prepare the Statement of Special Inspections in accordance with IBC section 1704.2.3. The statement of special inspections shall identify items fabricated on the premises of an approved fabricator where special inspections are not required by section 1704.2.1.
4. Review the special inspection reports and provide corrective action for work that may not conform to the approved plans.

C. Contractor’s Responsibilities

1. Notify the agency. The contractor is responsible for notifying both the special inspector and the Building Official in sufficient time for scheduling personnel to perform required inspections.
2. Written statement of responsibility.
3. Provide access to city approved plans. The approved plans shall be readily accessible at the job site.
4. Provide access to work. The contractor shall provide reasonable access to all work requiring special inspection.
5. Retaining special inspection reports at the job site. The contractor is also responsible for retaining at the job site all special inspection records submitted by the special inspector, and providing these records for review by the Building Official upon request.
6. Notify the Building Official of special inspections prior to scheduled inspection time.
7. Provide a copy of special inspector’s credentials when requested by the Building Official.

D. Duties of the Special Inspector

1. Observe the work. The inspector shall observe the work for compliance with the jurisdiction approved plans, specifications, and applicable provisions of the IBC. The architect/engineer’s reviewed shop drawings, and/or placement drawings, may be used only as an aid to inspections.
 - **Continuous Special Inspection** – The full-time observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed.
 - **Periodic Special Inspection** – The part-time or intermittent observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed and at the completion of the work.

2. Report non-conforming items. The special inspector shall bring non-conforming items to the immediate attention of the contractor, and note all such items in the daily report. If any item is not resolved in a timely manner and is about to be incorporated in the work, the special inspector shall immediately notify the engineer or architect of record. Where an appropriate action is not taken by either the contractor or the engineer or architect of record to correct the non-conforming item(s), the special inspector shall immediately notify the Building Official.
3. Furnish daily reports. The special inspector shall complete a daily report for each day's inspections. The daily reports shall remain at the job site with the contractor for the Building Official. The reports shall include the following:
 - a. Name of special inspector.
 - b. Description of the inspections, with locations and tests performed.
 - c. Listing any non-conforming items.
 - d. Include how items were resolved or unresolved.
 - e. List any changes or corrections to non-conforming issues authorized by the engineer, architect, or Building Official.
4. Furnish weekly reports. The inspection agency shall furnish weekly reports of the tests and inspections performed directly to the Building Official, project engineer, architect, and/or others as designated.
5. Furnish final report. The inspection agency shall submit a final signed report to the Building Official stating that all items requiring special inspections and testing were fulfilled, all discrepancies were corrected or resolved, and all work requiring special inspections is in conformance with the approved design drawings and specifications. Any items unresolved or discrepancies in coverage (i.e., missed inspections, periodic inspections when continuous was required, etc.) shall be specifically itemized in this report.

E. Jurisdiction (Building Official)

The jurisdiction will review the implementation of Structural Tests and Special Inspection requirements.

1. Review special inspections. The Building Official shall review all special inspectors and special inspection requirements found in IBC Chapter 17.
2. Monitor special inspections. Work requiring special inspections, and the performance of special inspectors, may be monitored by the Building Official. The Building Official's approval must be obtained prior to placement of concrete or other similar activities in addition to that of the special inspector.
3. Issue Certificate of Occupancy. **The Building Official will only issue a Certificate of Occupancy after all special inspection reports and the final special inspection report, have been submitted and accepted.**

ACKNOWLEDGMENTS

I have read and understand my responsibilities regarding special inspections. (Electronic signatures are acceptable)

Registered Design Professional in Responsible Charge:

_____ By: _____ Date: _____

Owner:

Patrick Brown, Des Moines WRA

_____ By: _____ Date: _____

Contractor:

TBD

_____ By: _____ Date: _____

Special Inspector/ Special Inspection Agency:

TBD

_____ By: _____ Date: _____

Others as required by the Building Official:

_____ By: _____ Date: _____

ACCEPTED FOR THE BUILDING DEPARTMENT

By: _____ Date: _____

CITY OF DES MOINES - SCHEDULE OF SPECIAL INSPECTION SERVICES

Per IBC Section 1704 of the 2015 International Building Code the following items require Special Inspections. **Special inspectors must be employed by the Owner or registered design professional in responsible charge acting as the owner's agent.**

PROJECT ADDRESS	3000 Vandalia Road	PERMIT NO.	APPLICABLE TO THIS PROJECT	
			Y/N	EXTENT
MATERIAL / ACTIVITY	SERVICE			AGENT*
1704.2.5 Inspection of Fabricators		N/A		
Verify fabrication/quality control procedures	In-plant review	Y	Periodic	
1705.1.1 Special Cases (work unusual in nature, including but not limited to alternative materials and systems, unusual design applications, materials and systems with special manufacturer's requirements)	Submittal review and/or field inspection	N		
1705.2 Steel Construction				
1. Fabricator and erector documents (Verify reports and certificates as listed in AISC 360, chapter N, paragraph 3.2 for compliance with construction documents)	Submittal Review	Y	Each submittal	
2. Material verification of structural steel	Field inspection	Y	Periodic	
3. Embedments (Verify diameter, grade, type, length, embedment. See 1705.3 for anchors)	Field inspection	Y	Continuous	
4. Verify member locations, braces, stiffeners, and application of joint details at each connection comply with construction documents	Field inspection	Y	Periodic	
5. Structural steel welding:				
a. Inspection tasks Prior to Welding (Observe, or perform for each welded joint or member, the QA tasks listed in AISC 360, Table N5.4-1)	Field inspection	Y	Observe or Perform	
b. Inspection tasks During Welding (Observe, or perform for each welded joint or member, the QA tasks listed in AISC 360, Table N5.4 1)	Field inspection	Y	Observe	
c. Inspection tasks After Welding (Observe, or perform for each welded joint or member, the QA tasks listed in AISC 360, Table N5.4 3)	Field inspection	Y	Observe or Perform	
d. Nondestructive testing (NDT) of welded joints: <i>see Commentary</i>		N/A		
1) Complete penetration groove welds 5/16" or greater in risk category III or IV	Field ultrasonic testing - 100%	Y	Periodic	
2) Complete penetration groove welds 5/16" or greater in risk category II	Field ultrasonic testing - 10% of welds minimum	Y	Periodic	
3) Thermally cut surfaces of access holes when material t > 2"	Field magnetic Particle or Penetrant testing	N/A	Periodic	
4) Welded joints subject to fatigue when required by AISC 360, Appendix 3, Table A-3.1	Field radiographic or Ultrasonic testing	N	Periodic	
5) Fabricator's NDT reports when fabricator performs NDT	Verify reports	Y	Each submittal	
6. Structural steel bolting:	Field inspection			

SCHEDULE OF SPECIAL INSPECTION SERVICES

Per IBC Section 1704 of the 2015 International Building Code the following items require Special Inspections. **Special inspectors must be employed by the Owner or registered design professional in responsible charge acting as the owner's agent.**

PROJECT ADDRESS	3000 Vandalia Road		PERMIT NO.	
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT		
		Y/N	EXTENT	AGENT*
a. Inspection tasks Prior to Bolting (Observe, or perform tasks for each bolted connection, in accordance with QA tasks listed in AISC 360, Table N5.6-1)		Y	Observe or Perform	
b. Inspection tasks During Bolting (Observe the QA tasks listed in		Y	Observe	
1) Pre-tensioned and slip-critical joints		Y		
a) Turn-of-nut with matching markings		Y	Periodic	
b) Direct tension indicator		Y	Periodic	
c) Twist-off type tension control bolt		Y	Periodic	
d) Turn-of-nut without matching markings		Y	Continuous	
e) Calibrated wrench		Y	Continuous	
2) Snug-tight joints		Y	Periodic	
c. Inspection tasks After Bolting (Perform tasks for each bolted connection in accordance with QA tasks listed in AISC 360, Table N5.6-3)		Y	Perform	
7. Inspection of steel elements of composite construction prior to concrete placement in accordance with QA tasks listed in AISC 360, Table N6.1	Field inspection and testing	Y	Observe or Perform	
1705.2.2 Steel Construction Other Than Structural Steel				
1. Material verification of cold-formed steel deck:		N/A		
a. Identification markings	Field inspection	Y	Periodic	
b. Manufacturer's certified test reports	Submittal Review	Y	Each submittal	
2. Connection of cold-formed steel deck to supporting structure:	Field inspection	Y		
a. Welding		Y	Periodic	
b. Other fasteners (in accordance with AISC 360, Section N6)		N/A		
1) Verify fasteners are in conformance with approved submittal		N/A	Periodic	
2) Verify fastener installation is in conformance with approved submittal and manufacturer's recommendations		N/A	Periodic	
3. Reinforcing steel	Field inspection	N/A		
a. Verification of weldability of steel other than ASTM A706		N/A	Periodic	
b. Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames, boundary elements of special concrete structural walls and shear reinforcement		N/A	Continuous	
c. Shear reinforcement		N/A	Continuous	
d. Other reinforcing steel		N/A	Periodic	
4. Cold-formed steel trusses spanning 80 feet or greater		N/A		

SCHEDULE OF SPECIAL INSPECTION SERVICES

Per IBC Section 1704 of the 2015 International Building Code the following items require Special Inspections. **Special inspectors must be employed by the Owner or registered design professional in responsible charge acting as the owner's agent.**

PROJECT ADDRESS	3000 Vandalia Road	PERMIT NO.	
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT	
		Y/N	EXTENT
a. Verify temporary and permanent restraint/bracing are installed in accordance with the approved truss submittal package	Field inspection	N/A	Periodic
1705.3 Concrete Construction			
1. Inspection of reinforcing steel installation (see 1705.2.2 for welding)	Field inspection	Y	Periodic
2. Inspection of prestressing steel installation	Field inspection	N/A	Periodic
3. Inspection of anchors cast in concrete where allowable loads have been increased per section 1908.5 or where strength design is used	Field inspection	Y	Continuous
4. Inspection of anchors and reinforcing steel post-installed in hardened concrete: Per research reports including verification of anchor type, anchor dimensions, hole dimensions, hole cleaning procedures, anchor spacing, edge distances, concrete minimum thickness, anchor embedment and tightening torque	Field inspection	Y	Periodic or as required by the research report issued by an approved source
5. Verify use of approved design mix	Field inspection	Y	Periodic
6. Fresh concrete sampling, perform slump and air content tests and determine temperature of concrete	Field inspection	Y	Continuous
7. Inspection of concrete and shotcrete placement for proper application techniques	Field inspection	Y	Continuous
8. Inspection for maintenance of specified curing temperature and techniques	Field inspection	Y	Periodic
9. Inspection of prestressed concrete:	Field inspection	N/A	
a. Application of prestressing force		N/A	Continuous
b. Grouting of bonded prestressing tendons in the seismic-force-resisting system		N/A	Continuous
10. Erection of precast concrete members		N/A	
a. Inspect in accordance with construction documents	Field inspection	N/A	In accordance with construction documents
b. Perform inspections of welding and bolting in accordance with Section 1705.2	Field inspection	N/A	In accordance with Section 1705.2
11. Verification of in-situ concrete strength, prior to stressing of tendons in post tensioned concrete and prior to removal of shores and forms from beams and structural slabs	Review field testing and laboratory reports	Y	Periodic
12. Inspection of formwork for shape, lines, location and dimensions	Field inspection	Y	Periodic

SCHEDULE OF SPECIAL INSPECTION SERVICES

Per IBC Section 1704 of the 2015 International Building Code the following items require Special Inspections. **Special inspectors must be employed by the Owner or registered design professional in responsible charge acting as the owner's agent.**

PROJECT ADDRESS	3000 Vandalia Road	PERMIT NO.	
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT	
		Y/N	EXTENT
AGENT*			
13. Concrete strength testing and verification of compliance with construction documents	Field testing and review of laboratory reports	Y	Periodic
1705.4 Masonry Construction			
(A) Level A, B and C Quality Assurance:		N/A	
1. Verify compliance with approved submittals	Field Inspection	N/A	Periodic
(B) Level B Quality Assurance:			
1. Verification of f _m and f _{AAC} prior to construction	Testing by unit strength method or prism test method	N/A	Periodic
(C) Level C Quality Assurance:			
1. Verification of f _m and f _{AAC} prior to construction and for every 5,000 SF during construction	Testing by unit strength method or prism test method	N/A	Periodic
2. Verification of proportions of materials in premixed or preblended mortar, prestressing grout, and grout other than self-consolidating grout, as delivered to the project site	Field inspection	N/A	Continuous
3. Verify placement of masonry units	Field Inspection	N/A	Periodic
(D) Levels B and C Quality Assurance:			
1. Verification of Slump Flow and Visual Stability Index (VSI) of self-consolidating grout as delivered to the project	Field testing	N/A	Continuous
2. Verify compliance with approved submittals	Field inspection	N/A	Periodic
3. Verify proportions of site-mixed mortar, grout and prestressing grout for bonded tendons	Field Inspection	N/A	Periodic
4. Verify grade, type, and size of reinforcement and anchor bolts, and prestressing tendons and anchorages	Field Inspection	N/A	Periodic
5. Verify construction of mortar joints	Field Inspection	N/A	Periodic
6. Verify placement of reinforcement, connectors, and prestressing tendons and anchorages	Field Inspection	N/A	Level B - Periodic
		N/A	Level C - Continuous
7. Verify grout space prior to grouting	Field Inspection	N/A	Level B - Periodic
		N/A	Level C - Continuous
8. Verify placement of grout and prestressing grout for bonded tendons	Field Inspection	N/A	Continuous
9. Verify size and location of structural masonry elements	Field Inspection	N/A	Periodic
10. Verify type, size, and location of anchors, including details of anchorage of masonry to structural members, frames, or other construction.	Field inspection	N/A	Level B - Periodic
		N/A	Level C - Continuous

SCHEDULE OF SPECIAL INSPECTION SERVICES

Per IBC Section 1704 of the 2015 International Building Code the following items require Special Inspections. **Special inspectors must be employed by the Owner or registered design professional in responsible charge acting as the owner's agent.**

PROJECT ADDRESS	3000 Vandalia Road	PERMIT NO.		
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT		
		Y/N	EXTENT	AGENT*
11. Verify welding of reinforcement (see 1705.2.2)	Field inspection	N/A	Continuous	
12. Verify preparation, construction, and protection of masonry during cold weather (temperature below 40°F) or hot weather (temperature above 90°F)	Field inspection	N/A	Periodic	
13. Verify application and measurement of prestressing force	Field Inspection	N/A	Continuous	
14. Verify placement of AAC masonry units and construction of thin-bed mortar joints (first 5000 SF of AAC masonry)	Field inspection	N/A	Continuous	
15. Verify placement of AAC masonry units and construction of thin-bed mortar joints (after the first 5000 SF of AAC masonry)	Field inspection	N/A	Level B - Periodic	
		N/A	Level C - Continuous	
16. Verify properties of thin-bed mortar for AAC masonry (first 5000 SF of AAC masonry)	Field inspection	N/A	Continuous	
17. Verify properties of thin-bed mortar for AAC masonry (after the first 5000 SF of AAC masonry)	Field inspection	N/A	Level B - Periodic	
		N/A	Level C - Continuous	
18. Prepare grout and mortar specimens	Field testing	N/A	Level B - Periodic	
		N/A	Level C - Continuous	
19. Observe preparation of prisms	Field inspection	N/A	Level B - Periodic	
		N/A	Level C - Continuous	
1705.5 Wood Construction				
1. Inspection of the fabrication process of wood structural elements and assemblies in accordance with Section 1704.2.5	In-plant review	N/A	Periodic	
2. For high-load diaphragms, verify grade and thickness of structural panel sheathing agree with approved building plans	Field inspection	N/A	Periodic	
3. For high-load diaphragms, verify nominal size of framing members at adjoining panel edges, nail or staple diameter and length, number of fastener lines, and that spacing between fasteners in each line and at edge margins agree with approved building plans	Field inspection	N/A	Periodic	
4. Metal-plate-connected wood trusses spanning 60 feet or greater: verify temporary and permanent restraint/bracing are installed in accordance with the approved truss submittal package	Field inspection	N/A	Periodic	
1705.6 Soils				

SCHEDULE OF SPECIAL INSPECTION SERVICES

Per IBC Section 1704 of the 2015 International Building Code the following items require Special Inspections. **Special inspectors must be employed by the Owner or registered design professional in responsible charge acting as the owner's agent.**

PROJECT ADDRESS	3000 Vandalia Road		PERMIT NO.	
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT		
		Y/N	EXTENT	AGENT*
1. Verify materials below shallow foundations are adequate to achieve the design bearing capacity.	Field inspection	Y	Periodic	
2. Verify excavations are extended to proper depth and have reached proper material.	Field inspection	Y	Periodic	
3. Perform classification and testing of controlled fill materials.	Field inspection	Y	Periodic	
4. Verify use of proper materials, densities, and lift thicknesses during placement and compaction of controlled fill	Field inspection	Y	Continuous	
5. Prior to placement of controlled fill, observe subgrade and verify that site has been prepared properly	Field inspection	Y	Periodic	
1705.7 Driven Deep Foundations				
1. Verify element materials, sizes and lengths comply with requirements	Field inspection	N/A	Continuous	
2. Determine capacities of test elements and conduct additional load tests, as required	Field inspection	N/A	Continuous	
3. Observe driving operations and maintain complete and accurate records for each element	Field inspection	N/A	Continuous	
4. Verify placement locations and plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and document any damage to foundation element	Field inspection	N/A	Continuous	
5. For steel elements, perform additional inspections per Section 1705.2	See Section 1705.2	N/A	See Section 1705.2	
6. For concrete elements and concrete-filled elements, perform additional inspections per Section 1705.3	See Section 1705.3	N/A	See Section 1705.3	
7. For specialty elements, perform additional inspections as determined by the registered design professional in responsible charge	Field inspection	N/A	In accordance with construction documents	
8. Perform additional inspections and tests in accordance with the construction documents	Field Inspection and testing	N/A	In accordance with construction documents	
1705.8 Cast-in-Place Deep Foundations				
1. Observe drilling operations and maintain complete and accurate records for each element	Field inspection	Y	Continuous	

SCHEDULE OF SPECIAL INSPECTION SERVICES

Per IBC Section 1704 of the 2015 International Building Code the following items require Special Inspections. **Special inspectors must be employed by the Owner or registered design professional in responsible charge acting as the owner's agent.**

PROJECT ADDRESS	3000 Vandalia Road		PERMIT NO.	
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT		
		Y/N	EXTENT	AGENT*
2. Verify placement locations and plumbness, confirm element diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end-bearing strata capacity. Record concrete or grout volumes	Field inspection	Y	Continuous	
3. For concrete elements, perform additional inspections in accordance with Section 1705.3	See Section 1705.3	Y	See Section 1705.3	
4. Perform additional inspections and tests in accordance with the construction documents	Field Inspection and testing	Y	In accordance with construction documents	
1705.9 Helical Pile Foundations				
1. Verify installation equipment, pile dimensions, tip elevations, final depth, final installation torque and other data as required.	Field inspection	N/A	Continuous	
2. Perform additional inspections and tests in accordance with the construction documents	Field Inspection and testing	N/A	In accordance with construction documents	
1705.11.1 Structural Wood Special Inspections For Wind Resistance				
1. Inspection of field gluing operations of elements of the main windforce-resisting system	Field inspection	N/A	Continuous	
2. Inspection of nailing, bolting, anchoring and other fastening of components within the main windforce-resisting system	Field inspection	N/A	Periodic	
1705.10.2 Cold-formed Steel Special Inspections For Wind Resistance				
1. Inspection during welding operations of elements of the main windforce-resisting system	Field inspection	N/A	Periodic	
2. Inspections for screw attachment, bolting, anchoring and other fastening of components within the main windforce-resisting system	Field inspection	N/A	Periodic	
1705.11.3 Wind-resisting Components				
1. Roof cladding	Field inspection	N/A	Periodic	
2. Wall cladding	Field inspection	N/A	Periodic	
1705.14 Sprayed Fire-resistant Materials				
1. Verify surface condition preparation of structural members	Field inspection	N	Periodic	

SCHEDULE OF SPECIAL INSPECTION SERVICES				
Per IBC Section 1704 of the 2015 International Building Code the following items require Special Inspections. <u>Special inspectors must be employed by the Owner or registered design professional in responsible charge acting as the owner's agent.</u>				
PROJECT ADDRESS	3000 Vandalia Road	PERMIT NO.		
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT		
		Y/N	EXTENT	AGENT*
3. Verify average thickness of sprayed fire-resistant materials applied to structural members	Field inspection	N		
4. Verify density of the sprayed fire-resistant material complies with approved fire-resistant design	Field inspection and testing	N	Per IBC Section 1705.13.5	
5. Verify the cohesive/adhesive bond strength of the cured sprayed fire-resistant material	Field inspection and testing	N	Per IBC Section 1705.13.6	
1705.15 Mastic and Intumescent Fire-Resistant Coatings				
Inspect mastic and intumescent fire-resistant coatings applied to structural elements and decks	Field inspection	N	Periodic	
1705.16 Exterior Insulation and Finish Systems (EIFS)				
1. Verify materials, details and installations are per the approved construction documents	Field inspection	N	Periodic	
2. Inspection of water-resistive barrier over sheathing substrate	Field inspection	N	Periodic	
1705.17 Fire-Resistant Penetrations and Joints				
1. Inspect penetration firestop systems	Field testing	N	Per ASTM E2174	
2. Inspect fire-resistant joint systems	Field testing	N	Per ASTM E2393	
1705.18 Smoke Control Systems				
1. Leakage testing and recording of device locations prior to concealment	Field testing	N	Periodic	
2. Prior to occupancy and after sufficient completion, pressure difference testing, flow measurements, and detection and control verification	Field testing	N	Periodic	
Special Inspection Procedures				
Special inspection reports are to be kept on the job for Building Inspector verification. Send reports bi-weekly to specialinspections@dmagov.org **Please include the address of the project in the subject line of the email**				
All discrepancies must be brought to the immediate attention of the contractor for correction. If not corrected discrepancies must be brought to the immediate attention of the building official, and design professional in responsible charge before completion of that stage of work.				
A final special inspection report, from the special inspector(s), documenting the required special inspections were performed, correction of discrepancies, and compliance with construction documents shall be submitted before a Certificate of Occupancy is issued.				
* INSPECTION AGENTS				
FIRM		ADDRESS		
1.				
2.				
3.				
4.				

END OF ATTACHMENT A

ATTACHMENT B TO SECTION 01 45 33
SPECIAL INSPECTIONS, INSPECTOR QUALIFICATIONS AND REPORTING
REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Related Specification Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 03 09 00 - Concrete.
 - 5. Section 05 50 00 - Metal Fabrications.
 - 6. Section 31 23 00 - Earthwork.

1.2 QUALIFICATIONS

- A. Qualifications stated here are the minimum recommended by the Engineer. If the Building Code Official has more stringent qualifications, the more stringent qualifications will take precedence.
- B. All Special Inspections and Testing to be done under the direction of a Professional Engineer or Registered Architect registered in the State of Iowa herein referred to as Registered Professional for Special Inspections (RPSI).
- C. Soil, concrete, masonry, mortar, grout, steel, and aluminum related testing.
 - 1. The Testing Agency shall have a minimum of 10 years experience in the testing of these materials.
 - 2. The Testing Agency's technician(s) conducting this testing:
 - a. Shall have a minimum of five years experience in the testing of soil, concrete, mortar, grout, steel and aluminum as appropriate.
 - 3. Concrete related work:
 - a. International Code Council certification for Reinforced Concrete and American Concrete Institute Concrete Field Testing Technician – Grade 1.
- D. Special Structural Inspections:
 - 1. Professional Engineers or Architects, licensed in the State of Iowa, may perform special inspections in accordance with their license qualifications.
 - 2. Other individuals, working under the direct supervision of a licensed engineer and meeting the following qualifications, may perform special inspections.
 - 3. Soils related work:
 - a. NICET Level II Certification in geotechnical engineering technology/construction; or
 - b. Registered Geologist; or
 - c. Engineer Intern under the direct supervision of a Licensed Professional Engineer.
 - 4. Concrete related work:
 - a. International Code Council certification for Reinforced Concrete Special Inspector or American Concrete Institute Concrete Construction Special Inspector.
 - b. Alternatively, may be an Engineer Intern under the direct supervision of a Licensed Professional Engineer.
 - 5. Masonry related work:
 - a. Shall be certified by the International Code Council or American Concrete Institute for structural masonry and one year of related experience.
 - b. Alternatively, may be an Engineer Intern with a minimum of two years appropriate training.
 - 6. Steel and aluminum related work:
 - a. Frame and material verification: ICC Structural Steel and Bolting Special Inspector S1 or approved equal.
 - b. Welding:

- 1) American Welding Society as a Certified Welding Inspector; or
- 2) International Code Council Structural Steel and Welding Certification and American Welding Society Qualified and one year of related experience; or
- 3) NDT Level II or II Certificate (for non-destructive testing only).
- c. High strength bolting:
 - 1) International Code Council Structural Steel and Welding Certification and one year related experience.
 - 2) Alternatively, may be an Engineer Intern with appropriate training.
7. Other equivalent certifications will not be acceptable unless approved by the Engineer.

1.3 REPORTING DUTIES AND AUTHORITY

- A. Reporting requirements for special inspector per IBC 2015 for Building System Related Work.
 1. Comply with requirements of IBC Section 1704.2.4.
 2. Provide written documentation of all inspections and testing.
 - a. Include exact location of work.
 - b. If testing of specimens is included, include detailed information on storage and curing of specimens prior to testing.
 3. Furnish inspection and test reports to the Contractor, the Engineer's Project Manager and the Owner's on-site representative.
 - a. Indicate that work inspected was done in conformance with approved construction documents.
 - b. Immediately report any discrepancies to the Contractor for correction.
 - c. If the discrepancies are not corrected in a timely fashion, notify the Engineer's Project Manager and Owner's on-site representative.
 4. Issue an electronic report summarizing all inspections, corrective action notifications, and resolution of discrepancies and non-conforming work every two weeks (14 calendar days).
 - a. Copy will be available to:
 - 1) Engineer's Project Manager.
 - 2) Owner.
 - 3) The Building Code Official.
 - 4) General Contractor.
 5. At the end of the Project, the RPSI shall compile all test reports for each inspected material and for each Special Inspector and summarize into a single PDF and submit to the Engineer and Building Code Official.
 - a. Final summary report to be signed and sealed by a Registered Professional for Special Inspections stating:
 - 1) The required Special Inspections have been performed.
 - 2) All discrepancies have been resolved except as specifically stated in the summary report.
- B. Special Inspector shall report all deficient work to the Contractor as soon as possible.
 1. Deficient work that has been covered up or concealed prior to re-inspection shall be reported to the Engineer and the Building Code Official.
- C. Special Inspector does not have authority to stop work or modify the requirements of the Contract Documents.

1.4 MATERIAL SPECIFIC SPECIAL INSPECTIONS AND TESTS

- A. Material specific requirements for special inspection and testing are listed in the technical specifications listed below. Special inspection and testing requirements will be located in each appropriate technical specification under "SOURCE QUALITY CONTROL", "FIELD QUALITY CONTROL" and/or "QUALITY ASSURANCE" as appropriate for each material.

1.5 SOILS

- A. Special Inspection/testing will be provided per IBC Section 1705.6 and Table 1705.6 as required to determine that the site has been prepared in accordance with the approved soils report, and to

verify the allowable soil bearing pressure, materials, compaction densities, trenching and backfill, and conformance to the project Specifications.

- B. Inspection/testing requirements are listed separately in Specification Division 31 and are indicated as the work to be done by the Geotechnical Engineer, Testing Agency, or Special Inspections and Testing Provider.

1.6 CONCRETE

- A. Special Inspection and testing will be provided per IBC Table 1705.3. Inspection is required for material verification, reinforcing steel, embedded bolts, mechanical splices, concrete tests, welding of reinforcing, concrete placement and curing, and waterstop placement.
- B. Inspection and testing requirements are listed separately in Specification Section 03 09 00 and Specification Section 32 13 13 and are indicated as the work to be done by the Special Inspector or Testing Agency.

1.7 STEEL, STAINLESS STEEL, AND ALUMINUM

- A. Special Inspection will be provided for structural steel and aluminum per IBC Section 1705.2 and AISC 360. Inspection is required for material verification, high-strength bolting, welding, and other work noted on the Contract Documents.
- B. Inspection/testing requirements are listed separately in Section 05 50 00 and are indicated as the work to be done by the Special Inspector. Inspection requirements listed are applicable to aluminum, stainless steel, and structural steel.

PART 2 - PRODUCTS - (NOT APPLICABLE TO THIS ATTACHMENT)

PART 3 - EXECUTION - (NOT APPLICABLE TO THIS ATTACHMENT)

END OF ATTACHMENT B

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SECTION 01 45 50
INTERNAL INSPECTION OF PIPELINES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. This Specification defines the requirements for internal inspection of the existing 48 IN Final Clarifier Influent piping (48-ML) and 24 IN Final Clarifier Return Sludge (24-RSL) piping for the existing 12 Final Clarifiers (Nos. 1 through 12) to assess condition using closed-circuit television (CCTV) inspection.
 - 2. Piping shall be hydro-jet cleaned and inspected after demolition of the existing Final Clarifier equipment but prior to the installation of the new Final Clarifier equipment.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 01 14 16 - Coordination with Owner's Operations.

1.2 QUALITY ASSURANCE

- A. Reference Standards: NASSCO PACP Coding Manual.
- B. Quality Control Submittals.
 - 1. Qualification References: Contact names and telephone numbers.
 - 2. List of staff and equipment.
 - 3. NASSCO PACP certifications.
 - 4. Look-ahead inspection schedules, one week in advance of Work.

1.3 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Shop Drawings:
 - 1. Catalog and manufacturer's data sheets for inspection equipment and field data acquisition system.
 - 2. Completed internal pipe inspection records.

1.4 USE OF INSPECTION RECORDS

- A. Internal inspection data will be used by the Owner to confirm the integrity and condition of existing piping and to identify necessary repairs, if any.

1.5 CONTRACTOR QUALIFICATIONS

- A. The Contractor shall be qualified or shall have a qualified independent company specializing in internal inspections to inspect the piping interior using a color camera and providing required documentation.
- B. The Contractor shall be responsible for properly inspecting the pipe, or providing approval of the finished inspection video.
- C. The Contractor shall have performed work successfully for at least three other projects, within the last five years, with pipe lengths and pipe diameters similar to this Work.
- D. The Crew Chief designated by the Contractor shall have worked on other projects similar to this Work and shall be experienced using the equipment proposed for this Work.

- E. Field operator(s) must have current National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) Certification.

PART 2 - PRODUCTS

2.1 INSPECTION EQUIPMENT

- A. Equipment to operate inside the pipe including, but not limited to, cables, power source, lights, and camera shall be operative in 100% humidity conditions.
- B. Support equipment including, but not limited to, monitor, footage counter, winches, rewinders, and computer, recording instruments located above-ground suitable to inspection work.
- C. Camera:
 - 1. Camera shall be nationally-recognized testing laboratory (NRTL) certified for a normal sewer environment when gas meter readings of the manhole airspace indicate an LEL less than 10 PCT and shall be explosion proof certified for hazardous environment when gas meter readings of the manhole environment indicate an LEL greater than 10%.
 - 2. Resolution: 350 lines per inch, minimum, color image.
 - 3. Pan and tilt unit, with adjustable supports specifically designed and constructed for operation in connection with pipe inspection.
 - 4. 65 DEG viewing angle, minimum and automatic or remote focus and iris controls.
 - 5. Skid mounts, sized for each pipe diameter, or self-propelled.
 - 6. Equipped with tag line suitable for pulling camera backwards.
 - 7. Automatic or remote-controlled tint and brightness balance adjustments.
- D. Camera Lighting:
 - 1. Minimize reflection.
 - 2. Sufficient for diameters from 24 to 48 IN.
 - 3. Provide clear view of entire inside periphery of pipe.
 - 4. Adjustable through range from 4 IN to infinity.
- E. Remote Reading Footage Counter.
 - 1. Calibration: Each day prior to start of work using walking meter, roll-a-tape, or other suitable device.
 - 2. Accurate to plus or minus 2/10ths of a foot over 1,000 FT of pipe inspected.

2.2 RECORDING MEDIUM

- A. The inspection shall be recorded, stored, and submitted electronically via a file sharing site and on a flash drive. The audio portion of the composite disc shall be sufficiently free from electrical interference and background noise to provide complete intelligibility of the oral report.

PART 3 - EXECUTION

3.1 INSPECTION - GENERAL

- A. Defect Coding: National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) coding system, latest version, shall be used to document all defects visible on the image recordings.
- B. Line segments shall be televised complete from beginning to end in a continuous run. Image stream must clearly show the camera starting and ending at the upstream and downstream locations, unless a defect(s) does not allow it. Do not record partial televising of a segment and then record another partial run on another flash drive.
- C. Pipe defects shall be recorded, in addition to any location determined not to be clean, part of a proper liner installation, or liner defects (including, but not limited to, bumps, folds, tears, dimples, etc.).

3.2 FIELD QUALITY CONTROL

- A. Inspection Rate
 - 1. Maximum rate of travel shall be 30 FT per minute when recording. The camera shall be stopped for a minimum of 5 SEC at each pipe defect.
- B. Required Field in Header File
 - 1. Opening Screen Fields: according to PACP format standards and valid codes and as amended below:
 - a. Operator's Name.
 - b. PACP Certificate No.
 - c. Date, Time.
 - d. City Name (Des Moines Wastewater Reclamation Facility).
 - e. Line inspected (e.g., Final Clarifier No. 1 Influent, Final Clarifier No. 1 Return Sludge).
 - f. Insertion Point.
 - g. Size 1 (diameter of round pipe, or wide of other shape).
 - h. Shape.
 - i. Material.
 - j. Media number (unique number for every flash drive on the project e.g. date - # or 022719-1 or 022719-2).
 - k. Total Length Surveyed (from inspection edge of upstream manhole to edge of downstream manhole).
 - l. Purpose of Survey (Condition Assessment).
 - m. Additional Information (complete for "other" code used in previous fields).
- C. Recording
 - 1. Set the camera so that axis is as close to centerline of pipe as possible.
 - 2. Provide a 360 DEG view of the pipe interior when moving forward.
 - 3. Keep camera lens clean and clear. If material or debris obscures image and reduces visibility, clean or replace lens prior to proceeding with inspection.
 - 4. Camera lens may submerge only while passing through clearly-identifiable line sags (or vertical misalignments).
 - 5. Lighting intensity shall be remote controlled and shall be adjusted to minimize reflective glare. Lighting and camera quality shall provide a clear, in-focus image of the inside periphery of the sewer.
 - 6. The system of cabling employed to transport the camera and transmit its signal shall not obstruct the camera's view.
 - 7. Pipe defects according to NASSCO PACP standards shall be recorded, in addition to any location determined not to be clean, part of a proper liner installation, or liner defects (including, but not limited to, bumps, folds, tears, dimples, etc.).
 - 8. Record inside view of each defect.
 - 9. Loss of color or severe red or green color will be cause for rejection of inspection.
 - 10. Record in English units.
 - 11. Continuous Footage Readings:
 - a. Visible on image at all times.
 - b. Record defect locations to the nearest one-half foot (e.g., 2.5 FT).
 - c. Line segment recording will be rejected if continuous footage meter is inaccurate, not visible, or leave doubt as to the total length of pipe inspected.
 - 12. Loss of vertical hold will constitute a cause for rejection.
 - 13. Do not include defect codes on image at any time.

3.3 INSPECTION RECORDS

- A. An electronic report and written summary shall be provided for each line section for later reference by the Owner.

- B. Electronic Inspection Report.
 - 1. Electronic Format: Electronic files shall be consecutively numbered and labeled and submitted to the Owner and Engineer. If the Engineer determines that the flash drive is defective or not of adequate quality, the Contractor shall inspect again at no additional cost to the Owner.
 - 2. Complete one inspection record for each section of pipe.
 - 3. Contractor shall maintain a copy of all inspection documentation (electronic files and databases) for the duration of the work and warranty period.
- C. Electronic Data Labeling.
 - 1. Provide typed label on flash drive that indicates the following:
 - a. Name OWNER: Des Moines Wastewater Reclamation Facility.
 - b. Project Title: Final Clarifier Piping Inspection.
 - c. Date of Inspection: Month/Day/Year.
 - d. Inspection company.
 - e. Flash Drive Number: Do not duplicate numbers at any time during the inspection work.
- D. Still Image:
 - 1. Provide whenever defect is encountered that interrupts completion of inspection (i.e., collapsed pipe, deformed pipe, severe offset joints, heavy debris or roots).
 - 2. Provide typed label on front of photograph with upstream and downstream identification numbers, footage (if not visible on photograph), and defect type.
- E. Written Inspection Summary:
 - 1. Prepare one page summary for each submittal with electronic submittal and include:
 - a. Summary of flash drives clearly indicating which pipe segments are on each flash drive and include:
 - 1) Date, Time.
 - 2) City Name (Des Moines Wastewater Reclamation Facility).
 - 3) Line inspected (e.g., Final Clarifier No. 1 Influent, Final Clarifier No. 1 Return Sludge).
 - 4) Insertion Point.
 - 5) Pipe Size (diameter of round pipe).
 - 6) Pipe Length (FT).
 - 7) Inspected Length (FT).
 - b. Summary of still images:
 - 1) Provide for beginning and end points plus all defects noted.
 - 2) Identify footage where image was taken, description of what image is showing.

3.4 QUALITY ASSURANCE

- A. The Engineer will review inspection data to ensure compliance with the requirements listed of the Contract Documents. If, in the opinion of the Engineer, the inspection is not acceptable, re-inspection will be completed by the Contractor at no additional cost to the Owner.
- B. The Contractor shall be responsible for modifications to his equipment and/or inspection procedures to achieve report material of acceptable quality. No work shall commence prior to approval of the material by the Engineer. Once accepted, the report material shall serve as a standard for the remaining work.

3.5 PIPELINE CLEANING AND INSPECTION

- A. Extents of Hydro-Jet Cleaning and CCTV Inspection:
 - 1. Each Final Clarifier Influent pipe (48-ML) on the 12 Final Clarifiers shall be hydro-jet cleaned and inspected via CCTV from center well to the final clarifier influent sluice gate north of return sludge pump station (50, 51, 52).

2. Each Final Clarifier Return Sludge pipe (24-RSL) on the 12 Final Clarifiers shall be hydro-jet cleaned and inspected via CCTV from center well to RSL wet well in return sludge pump station (50, 51, 52).
- B. Sequencing:
1. Comply with Specification Section 01 14 16 - Coordination with Owner's Operations.
 2. Each pipe must be hydro-jet cleaned prior to CCTV inspection.
- C. Schedule:
1. Table 01 45 50-A is a schedule of the estimated pipeline lengths for the Final Clarifier Influent and Return Sludge pipes to be hydro-jet cleaned and inspected.

Table 01 45 50-A

Final Clarifier No.	Estimated Pipeline Length, ft	
	Influent (48-ML)	Return Sludge (24-RSL)
1	172	172
2	172	172
3	168	143
4	168	143
5	172	172
6	172	172
7	168	143
8	168	143
9	172	172
10	172	172
11	168	143
12	168	143

END OF SECTION

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SECTION 01 51 05
TEMPORARY UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Temporary electricity.
 - 2. Temporary lighting.
 - 3. Temporary communications.
 - 4. Temporary heating, cooling, ventilating, and temporary enclosures.
 - 5. Temporary water supply.
 - 6. Temporary sanitary facilities.

- B. Scope:
 - 1. Contractor shall provide all temporary utilities and temporary facilities required for the Project, including those indicated in this Specifications Section.
 - 2. Make all arrangements with utility owners for temporary utilities and with others as appropriate for temporary facilities. Obtain required permits and approvals for temporary utilities and temporary facilities.
 - 3. Pay all service costs for utilities and facilities indicated in this Specifications Section as Contractor's responsibility, including cost of fuel and other utility services and temporary facilities required for the Work.
 - 4. Continuously maintain adequate temporary utilities and temporary facilities for all purposes for the Project, until removal of temporary utilities and temporary facilities. At minimum, provide and maintain temporary utilities and temporary facilities through Substantial Completion and removal of temporary field offices and sheds unless otherwise approved in writing by Engineer.
 - 5. Maintain, including cleaning, temporary utilities and temporary facilities, and continuously provide consumables as necessary.
 - 6. Temporary utilities and temporary facilities shall be adequate for personnel using the Site and the needs of the Project.
 - 7. Provide temporary utilities and temporary facilities in compliance with Laws and Regulations and requirements of authorities having jurisdiction and, when applicable, requirements of utility owners.

- C. Related Requirements:
 - 1. Include, but are not necessarily limited to:
 - a. SUDAS Division 1.
 - b. Division 01 - General Requirements.
 - c. Section 01 04 00 - Special Provisions.

1.2 REQUIREMENTS FOR TEMPORARY UTILITIES AND TEMPORARY FACILITIES

- A. Temporary Electricity:
 - 1. Provide temporary electric service necessary for the Work, including continuous power for temporary field offices and sheds. Provide temporary outlets with circuit breaker protection and ground fault protection. Owner will pay for temporary electricity necessary for the Work.

- B. Temporary Lighting:
 - 1. Provide temporary lighting at the Site of not less than the greater of (1) Laws and Regulations, and (2) five foot-candles for open areas.
 - 2. Do not work in areas with insufficient lighting. Where lighting is insufficient for the work activities to be performed, provide additional temporary lighting.

3. Provide temporary lighting sufficient for observation of the Work by Engineer and inspection by Contractor, entities performing code-required tests and special inspections, and Authorities Having Jurisdiction. Where required by Engineer, provide additional temporary lighting.
- C. Temporary Communications:
1. Provide temporary telephone service and communications necessary for Contractor's operations at the Site and for summoning emergency medical assistance and other first-responders as necessary.
- D. Temporary Heating, Cooling, Ventilating, and Enclosures:
1. Provide sufficient temporary heating, cooling, and ventilating and temporary enclosures to ensure safe working conditions and prevent damage to existing property and the Work.
 2. Required temperature range for storage areas and certain elements of the Work, including preparation of materials and surfaces, installation or application, and curing as applicable, shall be in accordance with the Contract Documents for the associated Work and the Supplier's recommended temperature and humidity ranges for storage, application, or installation, as appropriate.
 3. Temporary Enclosures:
 - a. Provide temporary enclosures and partitions required to maintain required temperature and humidity.
 - b. Temporary enclosures shall be sufficiently sturdy and durable for the intended use and duration. Maintain and repair temporary enclosures as necessary.
- E. Temporary Water:
1. General:
 - a. Provide temporary water service and facilities including piping, valves, meters if not provided by owner of existing waterline, backflow preventers, pressure regulators, and other appurtenances. Provide freeze-protection as necessary to prevent freezing of temporary services.
 - b. Continuously maintain adequate water flow and pressure for all purposes during the Project, until removal of temporary water systems.
 - c. Owner will pay for temporary water necessary for the Work.
 2. Water for Construction Purposes:
 - a. Provide water for Site maintenance and cleaning and, water necessary for construction activities, and water for disinfecting and testing of systems.
 - b. Contractor may use existing hose bibs for short-term wash-downs and intermittent use of water for work areas in existing building and existing structures. Obtain consent of Engineer and Owner if connections to existing hose bibs and similar existing connections will be used for more than one day at a time.
 3. Water for Human Consumption and Sanitation:
 - a. Provide potable water in accordance with Laws and Regulations for consumption by personnel at the Site, for field offices, and for sanitary facilities.
 - b. When necessary, provide bottled, potable water for use and consumption by personnel at the Site, including Contractor, Engineer, and visitors to the Site.
- F. Temporary Sanitary Facilities:
1. Provide suitably-enclosed chemical or self-contained toilets for Contractor's employees, Subcontractors, Suppliers, Engineer, and visitors to the Site. Location of temporary toilets shall be acceptable to Owner and Engineer.
 2. Refer to Paragraph 1.2.E of this Specification Section for requirements for temporary water service intended for human consumption during construction.
 3. Do not use existing toilet facilities in occupied areas or new toilet facilities in construction area without Owner's written consent.
 4. Provide facilities complying with local, State and Federal sanitary laws and regulations.
 5. Follow facility provider's minimum maintenance frequency or service more frequently to keep in clean and sanitary condition.

6. Provide adequate supplies of toilet paper, cleaning supplies, and other required items.

1.3 USE OF OWNER'S SYSTEM

- A. Existing Utility Systems: Do not use systems in existing buildings or structures for temporary utilities without Owner's written permission.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment for temporary utilities and temporary facilities:
 1. may be new or used but, if used, shall be in good condition;
 2. shall be adequate for purposes intended;
 3. shall not create unsafe or unsanitary conditions; and
 4. shall comply with Laws and Regulations.
- B. Provide required materials, equipment, and facilities, including piping, cabling, supports, controls, and appurtenances.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install temporary utilities and temporary facilities in neat, orderly, manner, and make structurally, mechanically, and electrically sound throughout.
- B. Location of Temporary Utilities and Temporary Facilities:
 1. Coordinate locations with Owner.
 2. Locate temporary systems for proper function and service.
 3. Temporary systems shall not interfere with or provide hazards or nuisances to: The Work under this and other contracts, movement of personnel, traffic areas, materials handling, hoisting systems, storage areas, finishes, and work of utility owners and Others.
 4. Do not install temporary utilities on the ground, with the exception of temporary extension cords, hoses, and similar systems in place for short durations.
- C. Modify and extend temporary systems as required by progress of the Work.

3.2 USE

- A. Maintain temporary systems to provide safe, continuous service as necessary and as required.
- B. Properly supervise operation of temporary systems:
 1. Enforce compliance with Laws and Regulations.
 2. Enforce safe practices.
 3. Prevent abuse of services.
 4. Prevent nuisances and hazards caused by temporary systems and their use.
 5. Prevent damage to finishes.
 6. Ensure that temporary systems and equipment do not interrupt continuous progress of construction.
- C. At end of each workday, check temporary systems and verify that sufficient consumables are available to maintain operation until work is resumed at the Site. Provide additional consumables if the supply on hand is insufficient for continuous operation.

3.3 REMOVAL

- A. Completely remove temporary utilities, temporary facilities, equipment, and materials when no longer required. Repair damage caused by temporary systems and their removal and restore the Site to condition required by the Contract Documents; if restoration of damaged areas is not otherwise specified, restore to preconstruction condition.

- B. Where temporary utilities are disconnected from existing utility, provide suitable, watertight or gastight (as applicable) cap or blind flange, as applicable, on service line, in accordance with requirements of utility owner. If utility owner will perform such work, coordinate with and pay utility owner for such work.
- C. Where permanent utilities and systems were used for temporary utilities, upon Substantial Completion replace all consumables such as filters and light bulbs and parts used during the Work.

END OF SECTION

SECTION 01 52 11
ENGINEER'S FIELD OFFICE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Requirements for Engineer's field office at the Site, provided by Contractor, including:
 - a. Physical requirements for field office and related site improvements.
 - b. Utilities, environmental controls, and similar services for field office.
 - c. Furniture and furnishings for field office.
 - d. Equipment for field office.
 - e. Maintenance, cleaning, and supplies.
 - f. Removal of field office and associated restoration.
- B. Scope:
1. Contractor shall provide temporary field office, with furniture, furnishings, equipment, services, consumables, and other requirements of this Section, for Engineer's sole use during the Project's construction.
 2. Engineer's field office shall be complete and fully functional within 30 days of the date the Contract Times start to run.
 3. Obtain and pay for required permits and utilities.
- C. Related Sections include, but are not necessarily limited to:
1. SUDAS Division 1.
 2. Division 01 - General Requirements.
 3. Section 01 04 00 - Special Provisions.
 4. Section 01 51 05 - Temporary Utilities.
 5. Section 01 71 33 - Protection of the Work and Property.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
1. Coordinate with Owner, facility manager (if other than Owner), other contractors, and others using the Site, location of Engineer's field office and related temporary facilities.
 2. Location of Engineer's field office is addressed in this Section's Article 3.1 ("Installation").

1.3 SUBMITTALS

- A. Action Submittals: Obtain Engineer's approval of the following prior to installing Engineer's field office at the Site and prior to obtaining furniture, furnishings, and equipment required by this Section:
1. Field Office Submittal: Submit all of the following as one Submittal which shall include:
 - a. Site plan indicating proposed location of Engineer's field office, parking for Engineer's field office, facilities related to Engineer's field office, and material of both field office parking and sidewalk or walkway to Engineer's field office.
 - b. Layout and Physical Attributes Shop Drawings of Engineer's Field Office:
 - 1) Information on proposed field office size, construction, exterior appearance, interior finishes, and field office security measures.
 - 2) Proposed layout of interior of Engineer's field office, showing location of offices, common areas, restroom, closet, other areas required (if any), with dimensions indicated for each. Show locations of interior partition walls, doors (including direction of opening), and windows.
 - c. Exterior Sign Shop Drawing:
 - 1) Indication of size, material, and thickness of exterior sign for Engineer's field office.

- 2) Proposed layout of field office exterior sign, showing all text, font, character sizes, colors, and graphics (if any).
- d. Utilities:
 - 1) Proposed type of internet service; name of proposed internet service provider; and product data and technical information on equipment required for internet service.
- e. Furniture and Furnishings: Product data and technical information for:
 - 1) Desks.
 - 2) Chairs (desk chairs, office chairs, folding chairs).
 - 3) Tables.
 - 4) File cabinets and storage cabinet.
 - 5) Racks.
 - 6) Field office safety items and equipment required in this Section.
- f. Equipment: Product data and technical information for:
 - 1) Copier-printer-scanner.
 - 2) Speaker phone for conference area.
 - 3) Coffee maker.
 - 4) Other equipment required in this Section.

PART 2 - PRODUCTS

2.1 FIELD OFFICE CONSTRUCTION AND SITE REQUIREMENTS

- A. Site Requirements at Field Office:
 - 1. Vehicle Parking:
 - a. Allocate total of three reserved parking spaces for use by Engineer and Owner in close proximity to Engineer's field office.
 - b. Vehicle parking spaces shall be not less than nine FT wide.
 - c. Parking area shall be paved with crushed stone, asphalt concrete, concrete, or other material approved by Engineer. Provide reasonably smooth surface for vehicles.
 - d. Provide parking area with safe layout, suitable for vehicle entry to temporary or permanent travelled ways, as applicable, with sufficient space for reasonable vehicle maneuvering.
 - e. Parking area shall be properly drained and free of standing water during wet weather.
 - 2. Walkway or Sidewalk to Field Office Entrance:
 - a. Provide sidewalk or walkway, not less than four feet wide, of crushed stone, asphalt concrete, concrete, or other material approved by Engineer.
 - b. Provide sidewalk or walkway for full distance between parking area and entrance to Engineer's field office.
- B. Minimum Construction for Engineer's Field Office: Provide Engineer's field office in accordance with the following:
 - 1. Structurally sound foundation and superstructure.
 - 2. Size: Floor area of not less than 430 SF, and not less than 10 FT wide, with clear vertical distance of 8 FT between interior floor and ceiling.
 - 3. Two separate lockable offices and one common meeting room.
 - 4. Completely weathertight and insulated, with not less than R-19 insulation.
 - 5. Exterior finish approved by Engineer.
 - 6. Interior finishes shall be new or in like-new condition, approved by Engineer, including wood paneling (or other acceptable finishing) on walls and resilient flooring in first-class condition.
 - 7. Field Office Ingress and Egress:
 - a. Provide two doors for ingress and egress for each field office unit, each with landing, stairs, and railing complying with applicable building code and other Laws and Regulations in effect at the Site.
 - b. Landing and stairs shall have slip-resistant walking surfaces, and be metal, pressure-treated lumber, fiberglass, or concrete.

- c. Railing shall be metal, pressure-treated lumber, or fiberglass.
- 8. Physical Security:
 - a. Doors shall be secure and lockable with cylinder-type locks. Padlocks are unacceptable.
- 9. Windows:
 - a. Window area equal to not less than 10% of floor area.
 - b. Provide each window with insect screen (unless other type of screen is required) and operable sash.
 - c. Provide each window with lock approved by Engineer, in addition to other physical security features required, if any.
- 10. One lockable closet for storage.
- 11. Keys:
 - a. Furnish to Engineer two identical sets of keys suitable for operating all keyed locks, including ingress/egress door locks, security bars (when required) for doors and windows, window locks, closet(s), and lockable drawers on office furniture.
 - b. Permanently and legibly label each key to indicate its associated lock.
- 12. Restroom:
 - a. Provide private restroom in Engineer's field office, including one lavatory, one toilet, medicine cabinet with mirror, soap dispenser, and paper towel holder.
 - b. Provide each restroom with appropriate electric ventilation fan with positive discharge to location outside the field office.
- 13. Exterior Sign for Engineer's Field Office:
 - a. Provide exterior sign for Engineer's field office, approved by Engineer. Sign shall be durable, weatherproof, suitable for long-term exposure to sunlight, precipitation, wind, windborne grit, and other local atmospheric elements.
 - b. Exterior sign shall be not less than 3 FT high by 4 FT wide, installed at location determined by Engineer at the Site.
 - c. Sign shall be in color, as presented in the layout below.
 - d. Sign layout and general proportions shall be as presented below. Text of first line and last line shall be Arial font. Text size and size of graphic shall be proportionate to the layout below. Engineer will furnish to Contractor Electronic Documents file(s) of Engineer's "third party logo package" for use in preparing the sign, together with Engineer's standard, published instructions on use of Engineer's logo. Contractor shall comply with Engineer's written instructions for using Engineer's logo.



- C. Optional Construction for Engineer's Field Office:
 - 1. In lieu of providing Engineer's field office in a fixed structure, provide mobile office trailer(s), either new or used (if used, in good condition), approved by Engineer. Mobile field office trailer(s) shall be, specifically designed for use as construction site field office and complying with requirements of this Section.
 - 2. Provide skirting (between bottom of trailer to ground) around perimeter of each mobile field office trailer.
 - 3. Supplier: Subject to compliance with the Contract Documents, provide Engineer's field office by one of the following:
 - a. Pac-Van division of United Rentals.

- b. WillScot Modular Space Solutions.
- c. Or approved equal.

2.2 UTILITIES AND ENVIRONMENTAL CONTROLS FOR FIELD OFFICE

- A. Utilities for Engineer's Field Office – General:
 - 1. Comply with Section 01 51 05 - Temporary Utilities.
 - 2. Should actions of utility owner(s) delay completion of Engineer's field office, Contractor shall provide temporary electricity, heat, water, sanitary facilities, and communications service as necessary at no additional cost to Owner.
- B. Provide the Following for Engineer's Field Office:
 - 1. Electrical System and Lighting:
 - a. Electric service as required, including paying all costs. Provide electrical submeter if electric service is obtained from Owner's system.
 - b. Electrical systems shall comply with Laws and Regulations.
 - c. System suitable for 120/240 volt AC, single phase, 60 Hertz service. Provide 120-volt AC, single-phase, 60 Hertz power to convenience receptacles in Engineer's field office. Provide transformers and other materials and equipment as necessary.
 - d. Electrical system components, including circuit breakers, cabling, convenience receptacles, switches, and lighting fixtures and luminaires, shall be Underwriters Laboratories, Inc. (UL) approved.
 - e. Electric circuits shall be protected by circuit breakers. Fuses are unacceptable. Provide circuit breaker on incoming electric service to Engineer's field office.
 - f. Not less than 13 wall-mounted, duplex convenience receptacles on interior of each structure comprising Engineer's field office. Provide four per room plus one in restroom.
 - g. Appropriate strike plate for each wall switch and convenience receptacle.
 - h. Interior lighting of not less than 100 foot-candles at desktop height.
 - i. Exterior, wall-mounted lighting at each entrance to field office, not less than 250 watts (equivalent) each.
 - j. Exterior security lighting for Engineer's field office's parking area. Provide one, 1,000-watt (equivalent), pole-mounted fixture with photocell control.
 - 2. Heating, Ventilating, and Air Conditioning:
 - a. Provide automatic heating to maintain indoor temperature in field office of not less than 70 DEGF in cold weather. Provide fuel and pay utility costs.
 - b. Automatic cooling to maintain indoor temperature in field office of not greater than 75 DEGF in warm weather.
 - c. Provide wall-mounted thermostat for controlling heating and air conditioning.
 - d. Functioning ventilation system for field office with number of air changes in accordance with Laws and Regulations.
 - 3. Water and Sewerage:
 - a. Provide potable water service for each plumbing fixture associated with field office.
 - b. Provide sanitary sewerage for each lavatory/sink and toilet in field office.
 - c. Utility Connections – General:
 - 1) Comply with Laws and Regulations, including plumbing and sewer codes, and requirements of authorities having jurisdiction, including water and wastewater utility owners and operators.
 - 2) Protect plumbing from freezing.
 - d. Potable Water Service: Provide the following:
 - 1) Appropriate copper waterline from potable water main to each plumbing fixture.
 - 2) Reduced pressure zone (RPZ)-type backflow preventer in accordance with Laws and Regulations and requirements of Authorities Having Jurisdiction.
 - 3) Provide 15 GAL electric hot water tank or tankless hot water heater, and hot water piping to serve each lavatory/sink in field office.

- 4) Not less than one exterior hose bib, with not less than 50 FT of hose, located adjacent to field office sidewalk or walkway, near field office ingress/egress doors. Provide wall-mounted hose reel or hose caddy.
- 5) Before placing potable water system into service, disinfect piping and appurtenances in accordance with Laws and Regulations, and requirements of Authorities Having Jurisdiction.
- e. Sanitary Sewerage:
 - 1) Provide PVC or other appropriate piping, arranged in accordance with Laws and Regulations, to convey wastewater from field office to sanitary sewer location coordinated with Owner.
4. Telephone Service:
5. Internet Access:
 - a. Obtain and pay for internet service until removal of Engineer's field office, with unlimited (untimed, unrestricted by data use) internet access, for Engineer's sole use.
 - b. Set up system and appurtenances required and verify functionality in the field office. Engineer will establish router password and information technology security measures for Engineer's field office.
 - c. Regardless of type of internet service provided, provide the following:
 - 1) Modem appropriate for internet service provided.
 - 2) Ethernet cabling between modem and router.
 - 3) Wireless Router: Product and Manufacturer: NETGEAR Orbi 6 Wifi Router; or Linksys Dual-Band Mesh WiFi 6 Router (MR9600); or equal.
 - 4) Modem, router, and cabling will remain Contractor's property upon removal of Engineer's field office.
 - d. Internet service shall be one of the following, listed in order of preference, with most desirable type of service indicated first. Provide a lower type of service only when the next-preferred type of service is unavailable:
 - 1) Cable or Fiber-optic Service:
 - a) Provide service via communication service provider via either cable or fiber-optic service at download speed of not less than 100 megabits per second (Mbps) and upload speed of not less than 25 Mbps.
 - 2) Mobile Wireless Broadband Service:
 - a) Provide mobile broadband wireless 5G network by AT&T, Verizon, T-Mobile, or equal, with download speed of not less than 75 Mbps and upload speed of not less than 25 Mbps.
 - b) When 5G service is not available at the Site, provide mobile broadband wireless 4G network by AT&T, Verizon, T-Mobile, or equal, with download speed of not less than 37 Mbps and upload speed of not less than 17 Mbps.
 - 3) DSL Service:
 - a) Provide service via symmetrical digital subscriber line (DSL) with download speed of not less than 1.5 Mbps and upload speed of not less than 384 kilobits per second (Kbps).
 - b) Provide dedicated telephone line for internet access.
 - c) Provide DSL filters on each non-DSL outlet in Engineer's field office landline telephone system.
 - 4) Satellite:
 - a) Provide 5G network service with download speed of not less than 50 Mbps.
 - b) Provide required equipment, including outdoor unit (dish) and cabling between dish and satellite modem.
 - c) Provide telephone modem for each of Engineer's personnel assigned to Engineer's field office, together with one telephone line and service, for file uploading.

2.3 FURNITURE AND FURNISHINGS FOR FIELD OFFICE

- A. Furniture: Provide
- B. in Engineer's field office at the Site the following furniture:
 - 1. Desks: Two 5-drawer desks, each with desktop surface 5 FT long by 2.5 FT wide, with not less than one file drawer per desk, suitable for storing 8.5 by 11 IN documents. When Engineer's field office is mobile trailer-type structure, built-in desks are acceptable when required drawers are provided.
 - 2. Chairs:
 - a. Desk Chairs: Two new or used (in good condition) five-point, high backed, cushioned swivel chairs with seat-height adjustment. Chairs without wheels or with torn or holed cushions, backs, or arms are unacceptable.
 - b. Side Chairs: Four side chairs with arm rests and padded seats and backs.
 - c. Folding Chairs: 12 sturdy metal folding chairs without arm rests.
 - 3. Tables:
 - a. Two new or used (in good condition) folding tables, each eight feet long by 2.5 FT wide.
 - b. Four new or used (in good condition) folding tables, each four feet long by 2.5 FT wide.
 - 4. Drawing Racks: One drawing rack(s), each capable of holding not less than three full-sized paper sets of the Drawings.
 - 5. File Cabinets: Two 4-drawer file cabinets.
 - 6. Storage Cabinet: One 2-door storage cabinet.
 - 7. Shelving or Bookcase: Provide not less than 12 FT of shelf length, not less than 12 IN deep.
- C. Furnishings: Provide in Engineer's field office at the Site the following furnishings:
 - 1. Ingress/Egress Furnishings: Provide the following at each ingress/egress to and from Engineer's field office:
 - a. Door mats of suitable size and texture.
 - b. Boot scraper.
 - 2. Window Coverings: Operable blinds sized for each window in Engineer's field office.
 - 3. Office Waste Receptacles:
 - a. Four polyethylene waste baskets, each with capacity of not less than 7 GAL.
 - 4. Clock: One electric, wall-mounted clock, not less than 10 IN DIA.
 - 5. Wall-Mounted Furnishings: Installed by Contractor at locations indicated by Engineer's field office personnel:
 - a. Two cork tack-boards, each approximately 2.5 by 3 FT, with thumbtacks.
 - b. One white board for use with dry markers (four colors), approximately 6 by 3 FT, with marker holding tray. Furnish supply of colored markers and eraser for white board.
 - 6. Safety Equipment for Field Office:
 - a. Provide for each separate structure comprising Engineer's field office the following, in accordance with Laws and Regulations and manufacturer's published instructions:
 - 1) One wall-mounted, 10 LB ABC dry powder fire extinguisher, upright and fully charged, in an easily accessible location, with signage.
 - 2) Ceiling-mounted smoke detectors with supply of batteries for each.
 - 3) Carbon monoxide detector with power supply.
 - b. Provide the following for Engineer's field office, regardless of the quantity of structures comprising field office:
 - 1) One ANSI/ISEA Z308.1, Class B first aid kit, Type III or Type IV, in weatherproof case, for Engineer's sole use.
 - 2) One OSHA, "Employee Right to Know" Poster, prominently displayed.
 - 3) One weather radio.

- 4) One automatic external defibrillator (AED) kit, rescue-ready, in appropriate, wall-mounted cabinet (installed by Contractor at location approved by Engineer) with “AED” signage. Product and Manufacturer: Zoll AED Plus, or equal. Upon removal of Engineer’s field office from the Site, defibrillator and accessories shall remain Contractor’s property.
7. Personal Protective Equipment for Visitors: Furnish the following:
 - a. Hard Hats: Four, each with full brim, of fiberglass or thermoplastic; each with ratchet suspension; white in color.
 - b. Safety Glasses: Four, each with clear lenses, polycarbonate, anti-fog and anti-scratch coating, suitable to fit over personal eyewear.
 - c. Reflective Safety Vest: Four, each of polyester mesh or other material acceptable to Engineer, color to be high-visibility orange, with one-inch-wide reflective tape, one-size-fits-all design.
 - d. Earplugs: Supply of foam, disposable earplugs. Promptly resupply when stock is depleted.
8. Miscellaneous Office Items: Furnish the following for Engineer’s use:
 - a. One three-hole punch, Master Products Series 25, or equal.
 - b. One stapler, Swingline 113, or equal.
 - c. One stapler(s), Acco 20, or equal.
 - d. One Scotch tape dispenser(s).
 - e. Two wire “in”/“out” baskets.
 - f. Three two-hole punch, Wilson-Jones Model 202B.
 - g. One date stamp, Eagle Zepher 84, or equal.
 - h. One electric pencil sharpener, Panasonic Model KP-77, or equal.
 - i. Upon removal of Engineer’s field office from the Site, miscellaneous office items shall become Owner’s property.

2.4 EQUIPMENT FOR FIELD OFFICE

- A. Provide the following equipment for Engineer’s field office:
 1. Copier-Printer-Scanner (Inkjet, Basic):
 - a. Description: Furnish one inkjet copier-printer-scanner with color printing capability.
 - b. Manufacturer and Product: Furnish from among the following:
 - 1) Brother MFC-J4535DW INKvestment Tank All-in-One Color Inkjet Printer with NFC, Duplex and Wireless Printing.
 - 2) Canon PIXMA TS Series All-in-One Color Wireless Bluetooth Inkjet Printer.
 - 3) Or approved equal.
 - c. Sheet Size: Capable of printing 8.5 11 IN, 8.5 by 14 IN, and 11 by 17 IN sheets.
 - d. Printing Speed: 20 pages per minute (black and white), 18 pages per minute (color).
 - e. Scanning: Capable of scanning to PDF and JPG files, selectable by the user.
 - f. Ink Cartridges: Provide all cartridges required for full-color printing, and promptly replace cartridges as needed until removal of Engineer’s field office from the Site.
 - g. Upon removal of Engineer’s field office from the Site, copier-printer-scanner will remain Contractor’s property.
 2. Speaker Phone for Conference Area:
 - a. Description: Furnish speaker phone for conference area in Engineer’s field office. Speaker phone shall be suitable for use with computer conferencing platforms such as Zoom, Microsoft Teams, Cisco WebEx, and Google Meetings, without connecting to telephone landline.
 - b. Manufacturer and Product: Jounvo JV801 USB Speakerphone; or equal.
 - c. Equipment:
 - 1) Intelligent noise cancelation.
 - 2) Microphone: 15 FT pickup radius.
 - 3) Speaker: Adjustable volume control.
 - 4) Connection: USB or Bluetooth connection to computer.

- d. Accessories:
 - 1) Provide with cables necessary for operation.
- e. Upon removal of Engineer's field office from the Site, conference area speaker phone shall remain Contractor's property.
- 3. Temperature and Humidity Monitor:
 - a. Provide temperature and humidity monitor for Engineer's field office, with sensor installed outdoors in shade and approximately 5 FT above ground, and display installed inside Engineer's field office.
 - b. Manufacturer and Product: Provide Fisher Scientific "Traceable Remote Alarm RH/Temperature Monitor" (Catalog No. 14-649-84); or equal.
 - c. Unit shall display daily minimum and maximum temperature and current temperature and be capable of displaying daily minimum and maximum relative humidity and current relative humidity and have audible alarm and adjustable alarm setpoints.
- 4. Water Cooler and Potable Water Supply:
 - a. Provide 5 GAL bottled water with electric cooler dispenser.
 - b. Provide supply of potable, bottled water suitable for dispenser for duration of Project, together with supply of disposable cups.
- 5. Coffee Maker:
 - a. One electric coffee maker, with ten-cup capacity or larger.
 - b. For duration of Project, furnish coffee supplies, including coffee (ground), filters, sugar and alternative sweetener, creamer, stir sticks, and disposable cups.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Location:
 - 1. Locate Engineer's field office in accordance with relevant provisions of the Contract Documents, and decisions made during site mobilization discussions at the preconstruction conference.
 - 2. Provide Engineer's field office nearby Contractor's field office.
 - 3. Provide field office with convenient, nearby parking for Engineer.
 - 4. Location of Engineer's field office shall be acceptable to Engineer and Owner.
- B. Preparation:
 - 1. Prepare the site where Engineer's field office will be installed as necessary and required by the Contract Documents. Minimize extent of site disturbance for Engineer's field office. Where site preparation for Engineer's field office results in disturbance of existing ground cover, comply with Laws and Regulations, required permits, and requirements of the Contract Documents regarding soil disturbances and temporary erosion and sediment controls.
 - 2. Provide firm, compacted subgrade for Engineer's temporary field office.
 - 3. Provide temporary utilities in accordance with Section 01 51 05 - Temporary Utilities, and requirements of utility owner.
- C. Installation:
 - 1. Install Engineer's temporary field office and related facilities in accordance with Laws and Regulations. Install Engineer's field office level and in structurally sound manner.
 - 2. Install materials and equipment, including prefabricated structures, in accordance with manufacturer's instructions.
 - 3. Verify operation of all systems, including electrical power supply to lighting and convenience receptacles in field office; proper operation of field office's heating, ventilating, and air conditioning system; proper plumbing with freeze protection (where necessary); and proper operation of all other equipment provided by Contractor for Engineer's field office.
 - 4. Install in Engineer's field office furniture, furnishings, equipment, and appurtenances required in this Section. Install at locations directed by or otherwise acceptable to Engineer.

5. Remove from Engineer's field office packing materials and boxes for furniture, furnishings, and equipment.
6. Where furniture, furnishings, and equipment provided by Contractor will become Owner's property, temporarily store original packaging and boxes for such items and deliver such items to Owner in such boxes and packaging, where appropriate.

3.2 MAINTENANCE, CLEANING, AND SUPPLIES

- A. Maintenance Services: Provide the following maintenance services for Engineer's field office, from establishment of field office until its removal:
 1. Maintenance and Repairs:
 - a. Immediately and properly remedy malfunctioning, damaged, leaking, or defective field office structure, site improvements, systems, and equipment.
 - b. Provide supplies for Engineer's field office electronic equipment. Arrange and pay for maintenance on Contractor-furnished electronic equipment, including copier.
 - c. Promptly provide snow and ice removal for Engineer's field office, including vehicle parking area, walkways, and stairs and landings.
 2. Cleaning:
 - a. Provide continuous maintenance of and janitorial service for Engineer's field office and sanitary facilities.
 - b. Clean only when Engineer's employee or representative is present in Engineer's field office.
 - c. Clean Engineer's field office not less than once per week. During weekly cleaning, clean windows of Engineer's field office inside and out and vacuum clean window blinds. Sweep or vacuum-clean (while minimizing airborne dust) Engineer's field office's floors not less than each weekday, or more frequently when site conditions are such that dirt or mud is frequently tracked into Engineer's field office.
 - d. Clean and wax (as appropriate) flooring every six months.
 3. Waste Disposal:
 - a. Properly dispose of trash and waste as needed, not less than twice per week.
 - b. Properly handle and dispose of recyclables. Do not dispose of recyclables as trash.
 - c. Dispose of other waste, if any, as necessary and required, to avoid creation of nuisances and adverse environmental effects. Properly dispose of electronic waste, when necessary, at proper waste receiving facility.
 - d. Dispose of waste from Engineer's field office in accordance with Laws and Regulations.
- B. Consumables: Provide the following consumables as needed:
 1. Toner and ink cartridges for copiers and printers, as required.
 2. Paper supplies for copiers and printers. Always maintain in Engineer's field office not less than one ream of each size of paper for which copiers and printers are capable.
 3. Dry markers in four colors, and white board eraser set. Replace markers when exhausted or misplaced.
 4. Paper towels, anti-bacterial liquid soap, toilet tissue, and cleaning supplies for field office restroom.
 5. Bottled water suitable for water cooler. and disposable cups.
 6. Coffee supplies, including coffee, filters, cups, sugar, alternative sweetener(s), creamer, and stir-sticks.
 7. Batteries for smoke detectors and other battery-powered items furnished by Contractor.
 8. Replace fire extinguishers upon expiration.
 9. Supply of disposable ear plugs for visitors.
 10. Not less-often than monthly, inspect first-aid kit and inventory items consumed or used and remove items at or near their expiration date. Promptly replace and restock consumed and expired items.

3.3 REMOVAL AND RESTORATION

A. Removal:

1. Do not remove Engineer's field office until after Substantial Completion of the entire Work, unless otherwise approved by Engineer.
2. On date acceptable to Engineer, fully remove Engineer's field office and restore areas prior to final inspection.
3. When required by the Contract Documents to deliver to Owner or facility manager certain equipment provided for Engineer's field office, carefully remove such items, return to original boxes, and deliver to Owner or facility manager (as applicable) at location indicated by Owner or facility manager. Deliver such items complete with all accessories and manufacturer's operation and maintenance instructions.

B. Restoration:

1. Restore areas occupied by Engineer's field office and related facilities. Restore areas damaged or disturbed during installation, maintenance, and removal of Engineer's field office and related facilities.
2. Restore to condition in accordance with the Contract Documents. If not expressly required otherwise, restore to preconstruction condition.
3. Restore subject to approval of the owner of affected property. Remedy damage in accordance with Section 01 71 33 - Protection of the Work and Property, and other provisions of the Contract Documents.

END OF SECTION

SECTION 01 52 13
CONTRACTOR'S FIELD OFFICE AND SHEDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. General requirements for:
 - a. Contractor's field office at the Site.
 - b. Contractor's storage and work sheds.
 - c. Maintenance and removal of Contractor's field offices and sheds and associated restoration.
- B. Scope:
 - 1. Contractor shall provide temporary field office for Contractor's use during the Work.
 - 2. Provide required temporary storage and work sheds.
 - 3. Obtain and pay for required permits and utilities.
- C. Related Sections include, but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 01 11 00 - Summary of Work.
 - 5. Section 01 51 05 - Temporary Utilities.
 - 6. Section 01 66 00 - Product Storage and Handling Requirements.
 - 7. Section 01 71 33 - Protection of the Work and Property.
 - 8. Section 01 78 39 - Project Record Documents.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate with Owner, facility manager (if other than Owner), other Contractors, and others using the Site, location of field offices and sheds, including contracts and projects indicated in Section 01 11 00 – Summary of Work.
- B. Staffing:
 - 1. Not less than one Contractor staff member shall be reasonably present at, or in reasonable proximity to, Contractor's field office during normal working hours when work is in progress.
 - 2. When Contractor's staff are absent from, and not within reasonable proximity to, Contractor's field office, provide clearly legible sign, each entrance to Contractor's field office, indicating specific location onsite of Contractor's site superintendent, together with (a) valid mobile phone number of Contractor's site superintendent, and (b) Contractor's 24-HR emergency contact telephone number.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S FIELD OFFICE

- A. Structure:
 - 1. Provide for Contractor's field office structurally sound, weathertight, temporary structures in good condition, complying with Laws and Regulations, and suitable for the intended purpose and environment.
 - 2. Where field office and sheds will be occupied, whether regularly or on an interim basis, comply with Laws and Regulations governing accessibility, egress, fire detection and prevention, and other Laws and Regulations related to health and safety.

3. Size and layout of Contractor's temporary field office and sheds to be determined by Contractor and appropriate for Contractor's purposes.
- B. Temporary Utilities and Related Items – Materials and Equipment:
1. Provide materials and equipment for temporary utilities, temporary lighting, temporary control of temperature and ventilation, temporary fire protection, temporary sanitary facilities, and temporary first-aid facilities, in accordance with Section 01 51 05 – Temporary Utilities.
- C. Furnishings and Equipment:
1. Sign for Field Office:
 - a. Provide on exterior of Contractor's field office, at location plainly visible for visitors, an identification sign displaying Contractor's company name.
 - b. Maximum size of sign shall be 4 by 3 FT.
 - c. Provide highly-visible, plainly legible, text on contrasting background color.
 - d. Sign shall be suitable for outdoor use for the duration of the Project.
 2. Conference Facilities:
 - a. Provide in Contractor's field office conference area with conference table and chairs sufficient for 12 people, unless Contractor requires greater space and furniture for Contractor's purposes.
 3. Provide other furnishings and equipment deemed necessary and appropriate by Contractor.
 4. Personal Protective Equipment for Use by Visitors:
 - a. Furnish and maintain at Contractor's field office 10 protective helmets ("hard hats" and other, appropriate personal protective equipment deemed necessary by Contractor, for use by visitors to the Site.

2.2 CONTRACTOR'S STORAGE SHEDS AND WORK SHEDS

- A. Storage and Work Sheds – General:
1. Provide storage and work sheds sized, furnished, and equipped to accommodate personnel, materials, and equipment used in the Work, including temporary utility services and facilities necessary for environment and sufficient for personnel, materials, and equipment.
 2. Provide in accordance with Laws and Regulations.
 3. Storage sheds used for storing materials and equipment to be incorporated into the Work shall comply with Section 01 66 00 – Product Storage and Handling Requirements, and other requirements of the Contract Documents.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Location:
1. Locate Contractor's field office and sheds in accordance with Section 01 14 19 – Use of Site, other relevant provisions of the Contract Documents, and decisions made during site mobilization discussions at the preconstruction conference.
- B. Installation:
1. Install Contractor's temporary field office, sheds, and related facilities in accordance with Laws and Regulations.
 2. Install materials and equipment, including prefabricated structures, in accordance with manufacturer's instructions.
 3. Provide temporary utilities in accordance with Section 01 51 05 – Temporary Utilities, and requirements of utility owner.

- C. Provide the following in Contractor's field office at the Site:
1. Not less than one complete set of the Contract Documents, Submittals approved or accepted (as applicable) by Engineer, Engineer's interpretations and clarifications, copies of Contractor's daily field reports, all necessary and required safety data sheets, copies of documents comprising Contractor's safety program, and copies of applicable permits issued for the Work by authorities having jurisdiction, for ready reference by interested persons.
 2. In addition to the reference set of Contract Documents, comply with Section 01 78 39 – Project Record Documents and provisions of the General Conditions, as may be modified by the Supplementary Conditions, regarding Project Record Documents.

3.2 MAINTENANCE

- A. Clean and maintain field offices and sheds as necessary.
- B. Provide consumables as necessary.

3.3 REMOVAL AND RESTORATION

- A. Removal:
 1. Do not remove temporary field offices and sheds until after Substantial Completion of the entire Work, unless otherwise approved by Engineer.
 2. Fully remove field offices and sheds and restore areas prior to final inspection.
- B. Restoration:
 1. Restore to preconstruction conditions areas damaged by Contractor while installing and using temporary field offices and sheds, subject to approval of the owner of affected property. Remedy damage in accordance with Section 01 71 33 - Protection of the Work and Property, and other provisions of the Contract Documents.

END OF SECTION

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SECTION 01 61 03
EQUIPMENT - BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Requirements of this Specification Section apply to all equipment provided on the Project including those found in other Divisions even if not specifically referenced in individual "Equipment" Articles of those Specification Sections.
- B. Related Sections include, but are not necessarily limited to:
1. SUDAS Division 1.
 2. Division 01 - General Requirements.
 3. Section 01 04 00 - Special Provisions.
 4. Section 03 15 19 - Anchorage to Concrete.
 5. Section 03 09 00 - Concrete.
 6. Section 05 50 00 - Metal Fabrications.
 7. Section 07 92 00 - Joint Sealants.
 8. Section 09 96 00 - High Performance Industrial Coatings.
 9. Section 10 14 00 - Identification Devices.
 10. Section 40 61 13 - Process Control System General Requirements.
 11. Section 40 67 00 - Control System Equipment Panels and Racks.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. American Bearing Manufacturers Association (ABMA).
 2. American Gear Manufacturers Association (AGMA).
 3. ASTM International (ASTM):
 - a. E1934, Standard Guide for Examining Electrical and Mechanical Equipment with Infrared Thermography.
 - b. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 4. Hydraulic Institute (HI):
 - a. 9.6.4, Rotodynamic Pumps for Vibration Measurements and Allowable Values.
 5. International Electrotechnical Commission (IEC).
 6. Institute of Electrical and Electronics Engineers, Inc. (IEEE).
 7. International Organization for Standardization (ISO):
 - a. 1940, Mechanical Vibration - Balance Quality Requirements for Rotors in a Constant (Rigid) State - Part 1: Specification and Verification of Balance Tolerances.
 - b. 21940-11, Mechanical Vibration - Rotor Balancing - Part 11: Procedures and Tolerances for Rotors with Rigid Behavior.
 8. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. ICS 6, Enclosures for Industrial Control and System.
 - c. MG 1, Motors and Generators.
 9. InterNational Electrical Testing Association (NETA):
 - a. ATS, Acceptance Testing Specification for Electrical Power Distribution Equipment and Systems.
 10. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC):
 11. National Institute for Certification in Engineering Technologies (NICET).
 12. National Institute of Standards and Technology (NIST).

13. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.
 14. Underwriters Laboratories, Inc. (UL).
 - a. 508, Standard for Safety Industrial Control Equipment.
 - b. 508A, Standard for Safety Industrial Control Panels.
 - c. 698A, Standard for Industrial Control Panels Relating to Hazardous (Classified) Locations.
- B. Electrical Equipment and Connections Testing Program:
1. Testing firm:
 - a. An independent firm performing, as the sole or principal part of its business for a minimum of 10 years, the inspection, testing, calibration, and adjusting of systems.
 - b. Must have an established monitoring and testing equipment calibration program with accuracy traceable in an unbroken chain, according to NIST.
 2. Field personnel:
 - a. Minimum of one year field experience covering all phases of electrical equipment inspection, testing, and calibration.
 - b. Relay test technician having previous experience with testing and calibration of relays of the same manufacturer and type used on project and proficient in setting and testing the types of protection elements used.
 - c. Supervisor certified by NETA or NICET.
 3. Analysis personnel:
 - a. Minimum three years combined field testing and data analysis experience.
 - b. Supervisor certified by NETA or NICET.
- C. Miscellaneous:
1. A single manufacturer of a "product" shall be selected and utilized uniformly throughout Project even if:
 - a. More than one manufacturer is listed for a given "product" in Specifications.
 - b. No manufacturer is listed.
 2. Equipment, electrical assemblies, related electrical wiring, instrumentation, controls, and system components shall fully comply with specific NEC requirements related to area classification and to NEMA 250 and NEMA ICS 6 designations shown on Electrical Power Drawings and defined in the Electrical specifications.

1.3 DEFINITIONS

- A. Product: Manufactured materials and equipment.
- B. Major Equipment Supports - Supports for Equipment:
1. Located on slab-on-grade or earth with supported equipment weighing 5000 LBS or more.
- C. Equipment:
1. One or more assemblies capable of performing a complete function.
 2. Mechanical, electrical, instrumentation or other devices requiring an electrical, pneumatic, electronic or hydraulic connection.
 3. Not limited to items specifically referenced in "Equipment" articles within individual Specifications.
- D. Installer or Applicator:
1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 2. Installer and applicator are synonymous.

1.4 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

B. Shop Drawings:

1. General for all equipment:
 - a. Data sheets that include manufacturer's name and complete product model number.
 - 1) Clearly identify all optional accessories that are included.
 - b. Acknowledgement that products submitted comply with the requirements of the standards referenced.
 - c. Manufacturer's delivery, storage, handling, and installation instructions.
 - d. Equipment identification utilizing numbering system and name utilized in Drawings.
 - e. Equipment installation details:
 - 1) Location of anchorage.
 - 2) Type, size, and materials of construction of anchorage.
 - 3) Anchorage setting templates.
 - 4) Manufacturer's installation instructions.
 - f. Equipment area classification rating.
 - g. Shipping and operating weight.
 - h. Equipment physical characteristics:
 - 1) Dimensions (both horizontal and vertical).
 - 2) Materials of construction and construction details.
 - i. Equipment factory primer and paint data.
 - j. Manufacturer's recommended spare parts list.
 - k. Equipment lining and coatings.
 - l. Equipment utility requirements include air, natural gas, electricity, and water.
2. Mechanical and process equipment:
 - a. Operating characteristics:
 - 1) Technical information including applicable performance curves showing specified equipment capacity, rangeability, and efficiencies.
 - 2) Brake horsepower requirements.
 - 3) Copies of equipment data plates.
 - b. Equipment bearing life certification.
3. Electric motor:
 - a. Motor manufacturer and model number.
 - b. Complete motor nameplate data.
 - c. Weight.
 - d. NEMA design type.
 - e. Enclosure type.
 - f. Frame size.
 - g. Winding insulation class and temperature rise.
 - h. Starts per hour.
 - i. Performance data:
 - 1) Guaranteed minimum efficiencies at 100%, 75%, and 50% of full load.
 - 2) Guaranteed minimum power factor at 100%, 75%, and 50% of full load.
 - 3) Locked rotor and full load current at rated terminal voltage and minimum permissible or specified terminal voltage.
 - 4) Starting, full load, and breakdown torque at rated terminal voltage and minimum permissible or specified terminal voltage.
 - j. Bearing data and lubrication system.
 - k. Fabrication and/or Layout Drawings:
 - 1) Dimensioned Outlined Drawing.
 - 2) Connection diagrams including accessories (strip heaters, thermal protection, etc.).
 - l. Certifications:
 - 1) When utilized with a reduced voltage starter, certify that motor and driven equipment are compatible.

- 2) When utilized with a variable frequency controller, certify motor is inverter duty and the controller and motor are compatible.
 - a) Include minimum speed at which the motor may be operated for the driven machinery.
- m. Electrical gear:
 - 1) Unless specified in a narrow-scope Specification Section, provide the following:
 - a) Equipment ratings: Voltage, continuous current, kVa, watts, short circuit with stand, etc., as applicable.
 - 2) Control panels:
 - a) Panel construction.
 - b) Point-to-point ladder diagrams.
 - c) Scaled panel face and subpanel layout.
 - d) Technical product data on panel components.
 - e) Panel and subpanel dimensions and weights.
 - f) Panel access openings.
 - g) Nameplate schedule.
 - h) Panel anchorage.
 - i) Short Circuit Current Rating (SCCR) nameplate marking per NFPA 70. Include any required calculations.
4. Systems schematics and data:
 - a. Provide system schematics where required in system specifications.
 - 1) Acknowledge all system components being supplied as part of the system.
 - 2) Utilize equipment, instrument and valving tag numbers defined in the Contract Documents for all components.
 - 3) Provide technical data for each system component showing compliance with the Contract Document requirements.
 - 4) For piping components, identify all utility connections, vents and drains which will be included as part of the system.
5. For factory painted equipment, provide paint submittals in accordance with Section 09 96 00.
6. Qualifications for:
 - a. Electrical equipment and connections testing firm and personnel.
7. Equipment Monitoring and Testing plans, in accordance with PART 3 of this Specification Section:
 - a. Electrical equipment and connection testing.
- C. Factory Test Reports:
 1. Motor, equipment, and final assembled equipment including motor.
 2. Equipment performance tests.
 - a. As listed in individual equipment specifications.
- D. Contract Closeout Information:
 1. Operation and Maintenance Data:
 - a. See Specification Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
- E. Informational Submittals:
 1. Sample form letter for equipment field certification.
 2. Certification from equipment manufacturer that all manufacturer-supplied control panels that interface in any way with other controls or panels have been submitted to and coordinated with the supplier/installer of those interfacing systems.
 3. Submit sample Manufacturer's Field Service Report (MFSR). Report shall use manufacturer's standard report or use the form in the Exhibits and have at least the following information:
 - a. Certification that equipment has been installed properly, has been initially started up, has been calibrated and/or adjusted as required, and is ready for operation.

- b. Certification for major equipment supports that equipment foundation design loads shown on the Drawings or specified have been compared to actual loads exhibited by equipment provided for this Project and that said design loadings are equal to or greater than the loads produced by the equipment provided.
 - c. Motor test reports.
 - d. Preliminary field quality control testing format to be used as a basis for final field quality control reporting.
 - e. Provide three bound final written reports documenting testing for specified equipment.
 - 1) Include the acceptance criteria of all equipment tested.
 - 2) Provide individual tabbed sections for information associated with each piece of tested equipment.
 - f. Certification prior to Project closeout that Electrical Panel Drawings for manufacturer-supplied control panels truly represent panel wiring including any field-made modifications.
 - g. Testing and monitoring reports in accordance with PART 3 of this Specification Section.
4. Submit completed Manufacturer's Field Service Report (MFSR) for each piece of equipment supplied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
- 1. Motors:
 - a. Baldor.
 - b. General Electric.
 - c. Hyundai Heavy Industries.
 - d. Marathon Electric.
 - e. Rockwell - Reliance.
 - f. Siemens.
 - g. TECO-Westinghouse.
 - h. Toshiba U.S.
 - i. U.S. Motors, Nidec Motor Corporation.
 - j. WEG.

2.2 MANUFACTURED UNITS

- A. Electric Motors:
- 1. Where used in conjunction with adjustable speed AC or DC drives, provide motors that are fully compatible with the speed controllers.
 - 2. Design for frequent starting duty equivalent to duty service required by driven equipment.
 - 3. Design for full voltage starting.
 - 4. Design bearing life based upon actual operating load conditions imposed by driven equipment.
 - 5. Size for altitude of Project.
 - 6. Furnish with stainless steel nameplates which include all data required by NEC Article 430.
 - 7. Use of manufacturer's standard motor will be permitted on integrally constructed motor driven equipment specified by model number in which a redesign of the complete unit would be required in order to provide a motor with features specified.
 - 8. AC electric motors less than 1/3 HP:
 - a. Single phase, 60 Hz, designed for the supply voltage shown on the Drawings.
 - b. Permanently lubricated sealed bearings conforming to ABMA standards.
 - c. Built-in manual reset thermal protector or integrally mounted manual motor starter with thermal overload element with stainless steel enclosure.

9. AC electric motors 1/3 to 1 HP:
 - a. Single or 3 PH, 60 Hz, designed for the supply voltage shown on the Drawings.
 - b. Permanently lubricated sealed bearings conforming to ABMA standards.
 - 1) For single phase motors, provide built-in manual reset thermal protector or integrally mounted manual motor starter with thermal overload element.
 10. AC electric motors 1-1/2 to 10 HP:
 - a. Single or 3 PH, 60 Hz, designed for the supply voltage shown on the Drawings.
 - b. Permanently lubricated sealed bearings conforming to ABMA standards.
 - c. For vertical motors provide 15 year, average-life thrust bearings conforming to ABMA standards.
- B. NEMA Design Squirrel Cage Induction Motors:
1. Provide motors designed and applied in compliance with NEMA and IEEE for the specific duty imposed by the driven equipment.
 2. Motors to meet NEMA MG 1 (NEMA Premium) efficiencies.
 3. Do not provide motors having a locked rotor kVA per HP exceeding the NEMA standard for the assigned NEMA code letter.
 4. For use on variable frequency type adjustable speed drives, provide:
 - a. Induction motors that are in compliance with NEMA MG 1, Part 31.
 - b. Nameplate identification meeting NEMA MG 1 Part 31 requirements.
 - c. Insulated drive end bearing on all motors.
 - d. Insulated non-drive end bearings, at a minimum, on all motors with horizontal shaft 100 HP and larger.
 - e. An insulated bearing carrier on the non-drive end for vertical shaft motors 100 HP and larger.
 - f. Shaft grounding ring on all motors:
 - 1) Factory installed, maintenance free, circumferential, bearing protection ring with conductive microfiber shaft contacting material.
 - 2) Electro Static Technology AEGIS SGR Bearing Protection Ring or approved equal.
 - g. Have the following minimum turndown ratio without the use of additional cooling, such as a blower, to provide continuous supply of cooling air over the motor.
 - 1) Variable torque: 10:1.
 - 2) Constant torque: 6:1.
 5. Design motor insulation in accordance with NEMA standards for Class F insulation with Class B temperature rise above a 40 DEGC ambient.
 6. Design motors for continuous duty.
 7. Size motors having a 1.0 service factor so that nameplate HP is a minimum of 15% greater than the maximum HP requirements of the driven equipment over its entire operating range.
 - a. As an alternative, furnish motors with a 1.15 service factor and size so that nameplate HP is at least equal to the maximum HP requirements of the driven equipment over its entire operating range.
 8. Motor enclosure and winding insulation application:
 - a. The following shall apply unless modified by specific Specification Sections:

MOTOR LOCATION	MOTOR ENCLOSURE / WINDING INSULATION
Wet outdoor Areas	TEFC, Extra Dip and Bake for Moisture, WP-II (for vertical motors)
Class I or Class II, Division 2 Areas	Explosion Proof, Approved for Division 1 Locations or TEFC with maximum external frame temperature compatible with the gas or dust in the area, Extra Dip and Bake for moisture

NOTE: Provide TENV motors in the smaller horsepower ratings where TEFC is not available.

9. Provide oversize conduit box complete with clamp type grounding terminals inside the conduit box.

10. Balance motors to ISO G2.5 level.
 - a. Submit prior to shipping to equipment manufacturer or job site.

2.3 COMPONENTS

- A. Gear Drives and Drive Components:
 1. Size drive equipment capable of supporting full load including losses in speed reducers and power transmission.
 2. Provide nominal input horsepower rating of each gear or speed reducer at least equal to nameplate horsepower of drive motor.
 3. Design drive units for 24 HR continuous service, constructed so oil leakage around shafts is precluded.
 4. Utilize gears, gear lubrication systems, gear drives, speed reducers, speed increasers and flexible couplings meeting applicable standards of AGMA.
 5. Gear reducers:
 - a. Provide gear reducer totally enclosed and oil lubricated.
 - b. Utilize antifriction bearings throughout.
 - c. Provide worm gear reducers having a service factor of at least 1.20.
 - d. Furnish other helical, spiral bevel, and combination bevel-helical gear reducers with a service factor of at least 1.50.

2.4 ACCESSORIES

- A. Guards:
 1. Provide each piece of equipment having exposed moving parts with full length, easily removable guards, meeting OSHA requirements.
 2. Interior applications:
 - a. Construct from expanded galvanized steel rolled to conform to shaft or coupling surface.
 - b. Utilize non-flattened type 16 GA galvanized steel with nominal 1/2 IN spacing.
 - c. Connect to equipment frame with hot-dip galvanized bolts and wing nuts.
 3. Exterior applications:
 - a. Construct from 16 GA stainless steel or aluminum.
 - b. Construct to preclude entrance of rain, snow, or moisture.
 - c. Roll to conform to shaft or coupling surface.
 - d. Connect to equipment frame with stainless steel bolts and wing nuts.
- B. Anchorage:
 1. Cast-in-place anchorage:
 - a. Provide ASTM F593, Type 316 stainless steel anchorage for all equipment.
 - b. Configuration and number of anchor bolts shall be per manufacturer's recommendations.
 - c. Provide two nuts for each bolt.
 2. Drilled anchorage:
 - a. Adhesive anchors per Specification Section 03 15 19.
 - b. Epoxy grout per Specification Section 03 09 00.
 - c. Threaded rods same as cast-in-place.
- C. Data Plate:
 1. Attach a stainless steel data plate to each piece of rotary or reciprocating equipment.
 2. Permanently stamp information on data plate including manufacturer's name, equipment operating parameters, serial number and speed.
- D. Lifting Eye Bolts or Lugs:
 1. Provide on all equipment 50 LBS or greater.
 2. Provide on other equipment or products as specified in the narrow-scope Specification Sections.

- E. Platforms and Ladders:
 - 1. Design and fabricate in accordance with OSHA Standards.
 - 2. Fabricate components from aluminum.
 - 3. Provide platform surface: Serrated grating, unless specified in narrow-scope Specification Sections.

2.5 FABRICATION

- A. Design, fabricate, and assemble equipment in accordance with modern engineering and shop practices.
- B. Manufacture individual parts to standard sizes and gages so that repair parts, furnished at any time, can be installed in field.
- C. Furnish like parts of duplicate units to be interchangeable.
- D. Ensure that equipment has not been in service at any time prior to delivery, except as required by tests.
- E. Furnish equipment which requires periodic internal inspection or adjustment with access panels which will not require disassembly of guards, dismantling of piping or equipment or similar major efforts.
 - 1. Quick opening but sound, securable access ports or windows shall be provided for inspection of chains, belts, or similar items.
- F. Provide common, lipped base plate mounting for equipment and equipment motor where said mounting is a manufacturer's standard option.
 - 1. Provide drain connection for 3/4 IN PVC tubing.
- G. Machine the mounting feet of rotating equipment.
- H. Fabricate equipment which will be subject to Corrosive Environment in such a way as to avoid back to back placement of surfaces that cannot be properly prepared and painted.
 - 1. When such back to back fabrication cannot be avoided, provide continuous welds to seal such surfaces from contact with corrosive environment.
 - 2. Where continuous welds are not practical, after painting seal the back to back surfaces from the environment in accordance with Section 07 92 00.
- I. Control Panels Engineered and Provided with the Equipment by the Manufacturer:
 - 1. Manufacturer's standard design for components and control logic unless specific requirements are specified in the specific equipment Specification Section.
 - 2. NEMA or IEC rated components are acceptable, whichever is used in the manufacturer's standard engineered design, unless specific requirements are required in the specific equipment Specification Section.
 - 3. Affix entire assembly with a UL 508A or UL 698A label "Listed Enclosed Industrial Control Panel" prior to delivery.
 - a. Control panels without an affixed UL 508A or UL 698A label shall be rejected.
 - 4. Provide equipment or control panels with Short Circuit Current Rating (SCCR) labeling as required by NFPA 70 and other applicable codes.
 - a. Determine the SCCR rating by one of the following methods:
 - 1) Method 1: SCCR rating meets or exceeds the available fault current of the source equipment when indicated on the Drawings.
 - 2) Method 2: SCCR rating meets or exceeds the source equipment's Amp Interrupting Current (AIC) rating as indicated on the Drawings.
 - 3) Method 3: SCCR rating meets or exceeds the calculated available short circuit current at the control panel.
 - b. The source equipment is the switchboard, panelboard, motor control center or similar equipment where the control panel circuit originates.
 - c. For Method 3, provide calculations justifying the SCCR rating. Utilize source equipment available fault current or AIC rating as indicated on the Drawings.

2.6 SHOP OR FACTORY PAINT FINISHES

- A. Electrical Equipment:
 - 1. Provide factory-applied paint coating system(s) for all electrical equipment components except those specified in Specification Section 09 96 00 to receive field painting.
 - a. Field painted equipment: See Specification Section 09 96 00 for factory applied primer/field paint compatibility requirements.
- B. Field paint other equipment in accordance with Specification Section 09 96 00.
 - 1. See Specification Section 09 96 00 for factory applied primer/field paint compatibility requirements.

2.7 SOURCE QUALITY CONTROL

- A. Motor Tests:
 - 1. Test motors in accordance with NEMA and IEEE standards.
 - 2. Provide routine test for all motors.
 - 3. The Owner reserves the right to select and have tested, either routine or complete, any motor included in the project.
 - a. The Owner will pay all costs, including shipping and handling, for all motors successfully passing the tests.
 - b. Pay all costs, including shipping and handling, for all motors failing the tests.
 - c. If two successive motors of the same manufacturer fail testing, the Owner has the right to reject all motors from that manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install equipment as shown on the Drawings and other Contract Documents, in accordance with manufacturer's written instructions, and in accordance with Laws and Regulations. Where the Contract Documents, manufacturer's written instructions, or Laws and Regulations conflict, obtain interpretation or clarification from Engineer before proceeding.
- B. Utilize appropriate templates for anchorage placement for equipment installed on concrete.
- C. Coordination of Equipment Supports and Bases with Structures:
 - 1. Do not construct foundations until major equipment supports are approved by Engineer.
- D. Equipment Lubrication Points:
 - 1. Extend all non-accessible or difficult-to-access lubrication fittings to reasonably accessible locations to facility operation and maintenance personnel without use of ladders or elevating devices, by providing stainless steel tubing (of appropriate wall thickness for the service and application) to a location which allows easy access of fittings from closest operating floor level.
- E. Equipment Bases:
 - 1. Install level in both directions, with acceptable vertical tolerance of 1/4 IN.
 - 2. At anchorage locations, install bases flat and level.
- F. Machine Bases:
 - 1. Grease anchorages and jack screws to inhibit grout from adhering to bolts and other anchors.
 - 2. Install machine base of rotating equipment on equipment base.
 - 3. Level in both directions using jack screws, with a machinist level, according to machined surfaces on base. Base shall be level within vertical tolerance of the lesser of (a) 0.004 IN, or (b) equipment manufacturer's written instructions.
 - 4. Level machine base on equipment base and align couplings between driver and driven equipment.

5. After all leveling and alignment is complete, provide non-shrink grout for base, in accordance with the Contract Documents. Grouting requirements are provided below in this Article.
- G. Couplings for Rotating Equipment:
1. Align in annular and parallel positions.
 - a. For equipment rotating at 1200 RPM or less, align both annular and parallel within 0.001 IN tolerance for couplings 4 IN size and smaller.
 - b. Couplings larger than 4 IN size: Increase tolerance 0.0005 IN per inch of coupling diameter above 4 IN; for example: For 6 IN coupling, tolerance is 0.002 IN. For 10 IN coupling, required tolerance is 0.004 IN.
 - c. For equipment rotating at speeds greater than 1200 RPM, tolerance for both annular and parallel positions shall be rate of 0.00025 IN (or less) per inch of coupling diameter.
 2. If equipment is furnished by manufacturer as mounted unit, verify factory alignment after installation at the Site. Realign if as necessary, in accordance with equipment manufacturers' written instructions, to provide required factory tolerance.
 3. Inspect surfaces for runout before attempting to trim or align units.
- H. Grouting:
1. Level onto equipment base with jack screws in accordance with the Contract Documents, provide a dam or formwork around base to contain grout between equipment base and equipment support pad.
 2. Preparation:
 - a. Extend dam or formwork to cover leveling shims and blocks.
 - b. If anchor sleeves were used, fill voids in anchor sleeves with foam to keep grout from filling sleeves.
 - c. Do not use nuts below the machine base to level the unit.
 - d. Saturate top of roughened concrete surface with water before grouting.
 3. Grout Installation:
 - a. Install grout until entire space under machine base is completely filled to underside of base. Voids are unacceptable.
 - b. Puddle grout by working a stiff wire through the grout and vent holes, to ensure grout is installed properly and to release air entrained in grout or base cavity.
 4. After Grout Installation:
 - a. When grout is sufficiently hardened, remove dam or formwork and finish exposed grout surface to fine, smooth surface.
 - b. Completely cover exposed grout surfaces with wet burlap and keep covering sufficiently wet to prevent too-rapid evaporation of water from grout.
 - c. When grout is fully hardened (after not less than seven days), remove jack screws, and tighten nuts on anchor bolts and similar anchors to required torque.
 - d. Inspect and verify levelness of machine base and, if not in accordance with requirements, remedy by removing base and reinstalling in accordance with the Contract Documents.
 - e. Inspect driver-driven equipment for proper alignment. When not in accordance with requirements, remedy so that the Work is not defective.

3.2 INSTALLATION CHECKS

- A. For all equipment specifically required in detailed specifications, secure services of experienced, competent, and authorized representative(s) of equipment manufacturer to visit site of work and inspect, check, adjust and approve equipment installation.
 1. In each case, representative(s) shall be present during placement and start-up of equipment and as often as necessary to resolve any operational issues which may arise.
- B. Secure from equipment manufacturer's representative(s) a written report certifying that equipment:
 1. Has been properly installed and lubricated.
 2. Is in accurate alignment.

3. Is free from any undue stress imposed by connecting piping or anchor bolts.
4. Has been operated under full load conditions and that it operated satisfactorily.
 - a. Secure and deliver a field written report to Owner immediately prior to leaving jobsite.
- C. No separate payment shall be made for installation checks.
 1. All or any time expended during installation check does not qualify as Operation and Maintenance training or instruction time when specified.

3.3 IDENTIFICATION OF EQUIPMENT AND HAZARD WARNING SIGNS

- A. Identify equipment and install hazard warning signs in accordance with Specification Section 10 14 00.

3.4 FIELD PAINTING AND PROTECTIVE COATINGS

- A. For required field painting and protective coatings, comply with Specification Section 09 96 00, High Performance Industrial Coatings.

3.5 WIRING CONNECTIONS AND TERMINATION

- A. Clean wires before installing lugs and connectors.
- B. Coat connection with oxidation eliminating compound for aluminum wire.
- C. Terminate motor circuit conductors with copper lugs bolted to motor leads.
- D. Tape stripped ends of conductors and associated connectors with electrical tape.
 1. Wrapping thickness shall be 150% of the conductor insulation thickness.
- E. Connections to carry full ampacity of conductors without temperature rise.
- F. Terminate spare conductors with electrical tape.

3.6 FIELD QUALITY CONTROL

- A. General:
 1. Furnish equipment manufacturer's field quality control services and testing as specified in the individual equipment Specification Sections.
 2. Execute pre-demonstration requirements in accordance with Section 01 75 00.
 3. Perform and report on all tests required by the equipment manufacturer's Operation and Maintenance Manual.
 4. Provide testing of electrical equipment and connections in accordance with the Electrical Specifications.
 5. Equip testing and analysis personnel with all appropriate project related reference material required to perform tests, analyze results, and provide documentation including, but not limited to:
 - a. Contract Drawings and Specifications.
 - b. Related construction change documentation.
 - c. Approved Shop Drawings.
 - d. Approved Operation and Maintenance Manuals.
 - e. Other pertinent information as required.
- B. Equipment Monitoring and Testing Plans:
 1. Approved in accordance with Shop Drawing submittal schedule.
 2. Included as a minimum:
 - a. Qualifications of firm, field personnel, and analysis personnel doing the Work.
 - b. List and description of testing and analysis equipment to be utilized.
 - c. List of all equipment to be testing, including:
 - 1) Name and tag numbers identified in the Contract Documents.
 - 2) Manufacturer's serial numbers.
 - 3) Other pertinent manufacturer identification,

- C. Instruments Used in Equipment and Connections Quality Control Testing:
 - 1. Minimum calibration frequency:
 - a. Field analog instruments: Not more than 6 months.
 - b. Field digital instruments: Not more than 12 months.
 - c. Laboratory instruments: Not more than 12 months.
 - d. If instrument manufacturer's calibration requirements are more stringent, those requirements shall govern.
 - 2. Carry current calibration status and labels on all testing instruments.
 - 3. See individual testing programs for additional instrumentation compliance requirements.
- D. Testing and Monitoring Program Documentation:
 - 1. Provide reports with tabbed sections for each piece of equipment tested.
 - 2. Include all testing results associated with each piece of equipment under that equipment's tabbed section.
 - a. Include legible copies of all forms used to record field test information.
 - 3. Prior to start of testing, submit one copy of preliminary report format for Engineer review and comment.
 - a. Include data gathering and sample test report forms that will be utilized.
 - 4. In the final report, include as a minimum, the following information for all equipment tested:
 - a. Equipment identification, including:
 - 1) Name and tag numbers identified in the Contract Documents.
 - 2) Manufacturer's serial numbers.
 - 3) Other pertinent manufacturer identification,
 - b. Date and time of each test.
 - c. Ambient conditions including temperature, humidity, and precipitation.
 - d. Visual inspection report.
 - e. Description of test and referenced standards, if any, followed while conducting tests.
 - f. Results of initial and all retesting.
 - g. Acceptance criteria.
 - h. "As found" and "as left" conditions.
 - i. Corrective action, if required, taken to meet acceptance.
 - j. Verification of corrective action signed by the Contractor, equipment supplier, and Owner's representative.
 - k. Instrument calibration dates of all instruments used in testing.
 - 5. Provide three bound final reports prior to Project final completion.
- E. Electrical Equipment and Connections Testing Program:
 - 1. Perform testing on Electrical equipment and connections in accordance with the Electrical specification requirements.
 - 2. Testing of motors:
 - a. Ensure motor has been lubricated.
 - b. Bump motor to check for correct rotation.
 - 3. Repair or replace equipment shown to be out of range of the acceptable tolerance until the equipment meets or exceeds acceptability standards.
- F. Other Testing:
 - 1. Perform tests and inspections not specifically listed but required to assure equipment is safe to energize and operate.

3.7 DEMONSTRATION

- A. Demonstrate equipment in accordance with Specification Section 01 75 00.

3.8 ABBREVIATION TABLE

- A. As indicated on the Drawings.

END OF SECTION

EXHIBIT A
MANUFACTURER FIELD SERVICE REPORT

This field service report is generic in nature. An electronic copy of this form will be furnished upon request from the Engineer. This report is to reflect that all requirements of the Operations and Maintenance Manual and the individual equipment specification requirements have been performed for the installation and operation and also to provide a baseline for amperage draw for each phase, vibration readings, rotation, alignment and all other applicable tests required to ensure that the equipment has been installed properly. A MFSR will be required for each individual piece of equipment requiring a MFSR.

Definitions of Reports:

Initial service report: Required for construction preparations. Equipment delivered to site is in good condition and conforms to specification requirements. Anchor bolts, hardware and ancillary items (piping, flanges, conduits, fuel/power supply) are compatible with equipment.

Interim service report: Required for equipment installation onto base or foundation. Piping connections, electrical and control connections or structural attachment are complete. For equipment stored on site over four weeks, interim service report will document that manufacturer's long-term storage procedures have been incorporated and equipment has not been damaged, nor coatings deteriorated.

Final service report is to be completed when equipment can be started, electrical amperage and voltage draw measured, cold and hot alignments performed, vibration testing and monitoring performed and the equipment is found to be in compliance with Manufacturer's operating parameters and the requirements of the individual equipment specifications.

PROJECT: _____

Report Status:

Initial Service Report completed and submitted on _____

Interim Service Report completed and submitted on _____

Final Service Report completed and submitted on _____

Commencement of Warranty _____

I Description

A. Equipment Name and Identification: _____

B. Serial Number: _____

C. Specification Section Number: _____

D. Manufacturer: _____

E. Representative: _____

F. Type of Service: Initial ____ Interim ____ Final ____

II General Review

A. The above referenced equipment/material/supplies have been inspected, checked, and adjusted. Yes ____ No ____

Summary: _____

B. The above referenced equipment/material/supplies were placed upon properly prepared or suitable substrate. N/A ____ Yes ____ No ____

Summary: _____

C. The above referenced equipment/material/supplies are free from any undue stress imposed by any connected piping, anchor bolts or any other load. N/A ____ Yes ____ No ____

Summary: _____

D. The above referenced equipment/material/supplies have operated under design conditions.
 N/A _____ Yes _____ No _____

Summary: _____

E. The above referenced equipment/material/supplies have been installed in accordance with the manufacturer's recommendations and the Procurement Documents, require no corrective work, and are hereby approved. Yes _____ No _____

Summary: _____

F. The above referenced equipment/material/supplies are acceptable to the manufacturer as installed providing the following corrective action(s) are performed:

1. _____
2. _____
3. _____
4. _____
5. _____

III Inspection Checklist

Item	Acceptable (Yes/No)	Readings/Comments
Bearings (1)		
Belts (tension reading)		
Lubrication Levels		
Vibration (1) (2) (MILS/SEC)		
Infrared Thermography (1) (2)		
Starting AMPS		
Full Load AMPS		
Volts		
Rotation		
Jacket Temperature (DEGF)		
Seal Water Flow Rate (GPH or GPM)		
Seal Water Pressure (PSI)		
O-rings/Packing		
Alignment (1)		
Anchor Bolts		
Grout		

Item	Acceptable (Yes/No)	Readings/Comments
Substrate Approval		
Sound level (4 FT from unit) (1) (dB)		
Other		

(1) Inspection or testing reports must be attached.

(2) Provide vibration testing and monitoring procedures for Engineer's review and approval prior to testing.

IV O&M Manuals

- A. The O&M manual as presented contains all information required for proper operation, maintenance, and instruction of this system. N/A _____ Yes _____ No _____

Summary: _____

V Preventive Maintenance

- A. The preventive maintenance summary outlined in the O&M manual is acceptable for operation of the system throughout the warranty period. N/A _____ Yes _____ No _____

Summary: _____

VI Operator Training/Classroom Instruction

- A. Training and instruction have been performed in accordance with the requirements of the Procurement Documents. N/A _____ Yes _____ No _____

B. Final Training/Classroom Instruction Completed on: _____

Summary: _____

VII Remarks

VIII Certification

I hereby certify, that I, _____, am a duly authorized representative of the manufacturer, that I am empowered by the manufacturer to inspect, approve, and operate his equipment, and that I am authorized to make recommendations required to assure that the equipment furnished by the manufacturer is complete and operational, except as modified herein. I also certify that all information contained herein is true and accurate.

By: _____
(Authorized Representative)

For: _____

Date: _____

IX Acknowledgments

By: _____

For: _____
(Contractor)

Date: _____

By: _____

For: _____
(Engineer)

Date: _____

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SECTION 01 65 00
PRODUCT DELIVERY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. General requirements for:
 - a. Coordination of deliveries.
 - b. Preparing materials and equipment for shipping from the production or fabrication facility, including packaging.
 - c. Shipment.
 - d. Delivery of materials and equipment to the Site.
 - e. Inspection upon delivery and remedy of damaged, deteriorated, or otherwise defective items, and remedy of missing or lost items.
- B. Scope:
1. Contractor shall make all arrangements for packaging, shipping, delivering, inspecting upon delivery, and unloading upon delivery materials and equipment necessary and required for the Work.
 2. Contractor shall provide all labor, materials, equipment, tools, incidentals, and services necessary to have materials and equipment properly packaged, shipped, and delivered to the Site, and all related Work required by the Contract Documents.
- C. Related Sections include, but are not necessarily limited to:
1. SUDAS Division 1.
 2. Division 01 - General Requirements.
 3. Section 01 04 00 - Special Provisions.
 4. Section 01 29 76 - Progress Payment Procedures.
 5. Section 01 66 00 - Product Storage and Handling Requirements.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
1. To extent practicable, coordinate shipping and delivery of materials and equipment with anticipated shipping requirements, such as allowing sufficient time for customs inspections on international shipments, availability of shipping services and facilities, and seasonal concerns (such as shipments that may be influenced by major tropical storms and predictable, typical weather).
 2. Coordinate shipping and delivery of materials and equipment to the Site and other locations where such items may be stored prior to delivery to the Site. Coordinate such shipments and deliveries with the progress of the Work and status of adequate facilities, whether temporary storage or permanent installation locations, necessary to properly store and safeguard materials and equipment to be incorporated into the Work.
 3. Where possible, deliver to the Site materials and equipment as close as possible to when such items will be incorporated into appropriately protected, permanent installation location.

1.3 PREPARATION FOR SHIPMENT

- A. Factory Assembly:
1. When practical, factory-assemble materials and equipment. Mark or tag separate parts and assemblies to facilitate field assembly.
- B. Temporary Protection:
1. Appropriately cover, with strippable, protective coating or other material, machined parts and unpainted, uncoated, or unprotected surfaces subject to damage or deterioration caused by weather elements or environment.

2. To extent practical, strippable, removable, disposable protective materials shall be recyclable.
 3. To extent practical, avoid strippable, removable, and disposable protective items shall be type resulting in minimum waste and cleanup upon removal.
 4. Protection of Electrical Equipment, Instrumentation and Controls, Items with Computer Chips, Solid-State Devices, and Other Electronics:
 - a. Provide appropriate temporary protection of electrical equipment, microprocessors, and other electronics from humidity, moisture, and corrosion by appropriate packaging, protection, desiccants, and volatile corrosion inhibitor (VCI) blocks.
 - b. Immediately prior to shipment, provide new, fresh desiccants and ensure integrity of other protective materials.
- C. Packaging:
1. Package materials and equipment to facilitate handling, and protect materials and equipment from damage during shipping, handling, and storage.
 2. Mark, label, or tag, on outside of each package, crate, and container, to indicate associated:
 - a. Purchase order number.
 - b. Bill of lading number.
 - c. Delivery address (including facility name, where applicable).
 - d. Owner's contract designation or Project name.
 - e. Contractor name.
 - f. Purchasing Subcontractor's name (as applicable).
 - g. Contents by name and designation within the Work (for example, "Influent Pump No. 1.>").
 - h. Approximate weight of container, crate, package, including packaging.
 - i. Special instructions for handling and protection during shipment and unloading.
 3. The Site may be listed as the "ship to" or "delivery" address; but Owner shall not be listed as recipient of shipment unless otherwise directed in writing by Engineer.
 4. Truthfully and accurately mark, label, or tag items for shipment and delivery.
 5. Include complete packing lists and bills of materials with each shipment.
 6. Protect materials and equipment with appropriate, temporary packaging or protection when such items may rotate or move during shipment.
 7. Protect materials and equipment from exposure to weather elements, adverse environments, and keep thoroughly dry and dust-free. Protect painted surfaces against impact, abrasion, discoloration, and other damage and deterioration.
 8. Lubricate bearings and other items requiring lubrication, in accordance with manufacturer's written instructions.

1.4 SHIPPING

- A. Notification of Shipments:
1. Keep Engineer, Owner, and RPR informed of delivery of all materials and equipment to be incorporated into the Work.
- B. Do Not Ship Materials and Equipment Until:
1. Related Shop Drawings, product data, Samples, shop testing plan Submittals, and other Submittals required by the Contract Documents are approved by Engineer, including, but not necessarily limited to, all Action Submittals associated with the materials and equipment being delivered.
 2. Manufacturer's written instructions for handling, storing, and installing the associated materials and equipment have been submitted to and accepted by Engineer, in accordance with the Specifications.
 3. Results of source quality control activities (factory testing and inspections), when required by the Contract Documents for the subject materials or equipment, have been submitted to and accepted by Engineer.

4. Facilities required for handling materials and equipment, in accordance with the Contract Documents and manufacturer's instructions, are in place and available at the delivery location.
 5. Required storage facilities and protection measures have been provided.
- C. Loss or Damage During Shipment:
1. Unless otherwise indicated in the Contract Documents (whether expressly or in provisions regarding builder's risk insurance), Contractor is responsible for all loss, damage, and deterioration to materials and equipment incurred during shipment and delivery.
 2. Contractor is not eligible for additional Contract Times or increase in the Contract Price due to delays or costs incurred due to loss, damage, or deterioration during shipment, unless Owner was responsible for shipping the subject materials or equipment to the Site.

1.5 DELIVERY

- A. Scheduling and Timing of Deliveries:
1. Arrange deliveries of materials and equipment in accordance with the Progress Schedule accepted by Engineer and in ample time to facilitate inspection and observation prior to installation.
 2. Schedule deliveries to minimize space required for, and duration of, storage of materials and equipment at the Site or other delivery location, as applicable.
 3. Coordinate deliveries to avoid conflicting with the Work and conditions at the Site, and to accommodate the following:
 - a. Work of other contractors at or adjacent to the Site, Owner, and others.
 - b. Storage space limitations.
 - c. Availability of appropriate construction equipment and machinery, tools, and qualified personnel for inspecting, unloading, and handling materials and equipment.
 - d. Owner's use of premises.
 4. Deliver materials and equipment to the Site during regular working hours.
 5. Deliver materials and equipment to avoid delaying the Work and the Project.
- B. Deliveries:
1. Provide Contractor's telephone number to shipper; do not provide Owner's telephone number to shipper or carrier.
 2. Arrange for deliveries while Contractor's personnel are at the Site. Contractor shall receive and coordinate shipments upon delivery. Shipments delivered to the Site when Contractor is not present will be refused by Owner, and Contractor shall be responsible for the associated delays and costs, including demurrage.
- C. Containers and Marking:
1. Have materials and equipment delivered in manufacturer's original, unopened, labeled containers.
 2. Clearly mark partial deliveries of component parts of materials and equipment to identify materials and equipment, to allow easy accumulation of parts, and to facilitate assembly.
- D. Inspection of Materials and Equipment Upon Delivery:
1. Immediately upon delivery, visually but critically inspect shipment to verify that:
 - a. Materials and equipment comply with the Contract Documents and approved or accepted (as applicable) Submittals.
 - b. Quantities are correct.
 - c. Materials and equipment are undamaged and of required quality.
 - d. Containers and packages are intact and labels are complete and legible.
 2. Eligibility for Payment:
 - a. Materials and equipment are not eligible for payment until duly inspected and determined to be in accordance with the Contract Documents and Engineer-approved Submittals, without damage or deterioration.
 - b. No payment can be made for damaged, deteriorated, or otherwise defective items.
 - c. No payment can be made for missing or lost items.

- d. Other provisions of the Contract Documents may establish other preconditions for payment for delivered material and equipment, including Specification Section 01 29 76 – Progress Payment Procedures.
- 3. Damaged, Deteriorated, and Otherwise Defective Items:
 - a. Promptly remove from the Site damaged, deteriorated, or defective materials and equipment and expedite delivery of new, undamaged materials and equipment.
 - b. Promptly remedy incomplete or lost materials and equipment.
 - c. Furnish materials and equipment in accordance with the Contract Documents, to avoid delaying progress of the Work.
 - d. Promptly advise Engineer in writing: (1) when damaged, deteriorated, incomplete, or otherwise defective materials and equipment are delivered, and (2) associated impact on the Progress Schedule.
- E. Handling of Materials and Equipment Upon Delivery:
 - 1. Provide construction equipment and machinery, tools, and qualified personnel necessary to unload and handle materials and equipment by methods that prevent damaging, defacing, and soiling materials and equipment and packaging.
 - 2. Comply with Specification Section 01 66 00 - Product Storage and Handling Requirements and manufacturer's written instructions.
 - 3. Provide additional protection during unloading and handling as necessary to prevent scraping, marring, and otherwise damaging materials and equipment and adjacent surfaces.
 - 4. Unload and handle materials and equipment by methods that prevent bending, warping, and overstressing.
 - 5. Lift heavy components only at designated lifting points.
 - 6. Unload and handle materials and equipment in safe manner and as recommended by manufacturer to prevent damage. Do not drop, roll, or skid materials and equipment off delivery vehicles or at other times during unloading and handling.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 66 00
PRODUCT STORAGE AND HANDLING REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. General requirements for:
 - a. Payment considerations for stored materials and equipment.
 - b. Handling of materials and equipment.
 - c. Storage of materials and equipment, including:
 - 1) General provisions for storage.
 - 2) Storage locations.
 - 3) Protection of stored items.
 - 4) Storage of items containing Constituents of Concern.
 - 5) Outdoor, uncovered storage.
 - 6) Outdoor, covered storage.
 - 7) Fully-protected storage.
 - 8) Removal of temporary storage facilities and restoration of storage areas.
 - d. Maintenance of storage.
- B. Scope:
 - 1. Contractor shall provide all labor, materials, equipment, tools, services, lands, and incidentals necessary and required to store and handle materials and equipment to be incorporated into the Work, and other materials and equipment at the Site, adjacent areas, and offsite storage areas.
 - 2. Comply with Specification Section 01 71 33 - Protection of the Work and Property, relative to handling and storing materials and equipment.
- C. Related Sections include, but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 01 29 76 - Progress Payment Procedures.
 - 5. Section 01 65 00 - Product Delivery Requirements.
 - 6. Section 01 71 33 - Protection of the Work and Property.

1.2 PRICE AND PAYMENT PROCEDURES

- A. Measurement and Payment:
 - 1. Materials and equipment delivered but not suitably stored and protected will not be eligible for payment.
 - 2. Engineer may recommend reduction in payment, and Owner may reduce payments to Contractor (“set-offs”) by an appropriate amount when stored items are subsequently revealed to be improperly stored or protected.
 - 3. Payment for Suitably Stored Items:
 - a. Requirements for payment for materials and equipment delivered and suitably stored, but not yet incorporated into the Work, are in the Contract Documents and Specification Section 01 29 76 - Progress Payment Procedures.

- b. Materials and equipment delivered and suitably stored, but not yet incorporated into the Work, will not be eligible for payment until the inspection upon delivery, required in Specification Section 01 65 00 - Product Delivery Requirements, is completed and Engineer concurs that such items generally appear to be in good condition, in accordance with the Contract Documents, and are of the required quality and quantity.
- c. Materials and equipment stored off-site will not be eligible for payment.

1.3 SUBMITTALS

- A. Informational Submittals: Submit the following:
 - 1. Affidavits of Inspection and Maintenance Performed on Mechanical and Electrical Equipment in Long-Term Storage:
 - a. Submit in accordance with requirements of Article 3.1 of this Specification Section.
 - 2. Other Records of Inspection and Maintenance of Stored Materials and Equipment:
 - a. Establish and maintain such records as required by this Specification Section.
 - b. Submit to Engineer or Owner (as applicable) within three days of Contractor's receipt of such request.

1.4 HANDLING

- A. Handling of Materials and Equipment - General:
 - 1. Handle materials and equipment to be incorporated into the Work in accordance with the Contract Documents and manufacturer's written instructions.
 - 2. During handling and assembling materials and equipment:
 - a. Maintain validity of manufacturers' warranties.
 - b. Comply with:
 - 1) Specification Section 01 65 00 - Product Delivery Requirements.
 - 2) Specification Section 01 71 33 - Protection of the Work and Property.
 - c. Do not drop, drag (without appropriate rollers or skids), or scrape materials and equipment.
 - d. Use proper construction equipment and machinery, and tools, operated by sufficient number of qualified personnel.
 - e. Maintain materials and equipment in neutral position.
 - f. Do not exert undue stress on materials and equipment.
 - g. Do not deform, bend, or damage materials and equipment.
 - h. Do not deform or mar shafts, bearings, or other parts.
- B. Additional Requirements for Hoisting and Lifting:
 - 1. When lifting or hoisting, support materials and equipment from appropriate lifting points using proper hooks and suitable nylon lifting straps, chains, and cables. Do not mar or scrape surfaces of materials and equipment during handling.
 - 2. Do not support rigging from building or structure without written approval of Engineer.
 - 3. Contractor is responsible for and shall remedy damage to building, structure, and existing hoisting equipment and elevators, resulting from Contractor's operations.

1.5 STORAGE

- A. Storage - General:
 - 1. Contractor shall make all arrangements and provide all measures necessary and required for, and pay all costs associated with, storing materials and equipment.
 - 2. Store materials and equipment in accordance with the Contract Documents and manufacturer's written instructions. In event of conflict between the Contract Documents and manufacturer's written instructions regarding storage and protection, comply with the more-stringent, more-protective requirements.
 - 3. Comply with Specification Section 01 71 33 - Protection of the Work and Property.

4. Records:
 - a. Establish and maintain up-to-date account of materials and equipment in storage, to facilitate preparation of progress payment requests, if the Contract Documents provide for payment for materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing.
 - b. Submit affidavits of inspection and maintenance of mechanical and electrical equipment in long-term storage in accordance with this Specification Section's Article 3.1 ("Maintenance of Storage").
 5. Arrange stored materials and equipment to allow easy access for observation or inspection by Owner, Engineer, Resident Project Representative (RPR), Owner-hired testing and inspection entities, and Authorities Having Jurisdiction.
 6. Inspect and maintain stored materials and equipment in accordance with this Specification Section's Article 3.1 ("Maintenance of Storage").
- B. Storage Location:
1. Area(s) available at the Site for storing materials and equipment shall be coordinated with the Owner.
 2. When onsite storage is insufficient, Contractor shall provide additional lands for storage facilities as necessary and required for the Work.
 3. Restrictions on Storage Locations:
 - a. Do not store materials or equipment in structures being constructed unless approved by Engineer in writing.
 - b. Do not use lawns, landscaped areas, or private property for storage without written permission of the Owner.
 - c. Comply with Specification Section 01 71 33 - Protection of the Work and Property.
- C. Protection of Stored Items - General:
1. Store materials and equipment indicated below to ensure preservation of quality and fitness for intended uses in the Work, including proper protection against damage and deterioration resulting from: water (including precipitation, flood, and other), moisture, humidity, wind, dust, freezing, and outdoor ambient air high temperature as high as 120 DEGF. Temperature and humidity inside crates, containers, storage structures, and packaging may be significantly higher than outdoor ambient air temperature.
 2. Store in indoor, climate-controlled storage all materials and equipment subject to damage or deterioration by water, moisture, humidity, heat, cold, and other elements, unless otherwise acceptable to Owner and Engineer.
 3. Do not open manufacturer's crates, containers, and packaging until time of installation, unless recommended by the manufacturer or otherwise required in the Contract Documents.
 4. Store all materials and equipment off the ground (or floor) on raised supports such as skids or pallets.
 5. Electrical Equipment, Instrumentation and Controls, Items Containing Computer Chips, Solid-State Devices, and Other Electronics:
 - a. Contractor shall obtain, coordinate, and comply with specific temperature, humidity, and environmental limitations on materials and equipment, because temperature inside cabinets and components stored in warm temperatures can approach 200 DEGF.
 - b. Protect from water, moisture, humidity, dust, heat, cold, and other potentially harmful elements and environments. Space heaters provided in equipment shall be connected and operating at all times until equipment is connected to active, permanent, electrical power.
 - c. Provide inside each electrical panel, control panel, and other enclosures with electronic device(s) each of the following: (1) desiccant, (2) volatile corrosion inhibitor (VCI) blocks, (3) moisture indicator, and (4) maximum- and minimum-indicating thermometer.
 - d. Check panels and equipment not less than once per month. Replace desiccant, VCI, and moisture indicator the earlier of: (1) as often as necessary, or (2) every six months.

- e. Establish and maintain certified record of daily maximum and minimum temperature and humidity in storage facility. Such records shall be available for Engineer's and Owner's inspection upon request. Certified record of monthly inspection, noting maximum and minimum temperature for month, condition of desiccant, VCI, and moisture indicator, shall be available to Engineer and Owner upon request.
 - 6. Finished Surfaces:
 - a. Protect finished surfaces against impact, abrasion, discoloration, and other damage.
 - b. Remedy, in accordance with requirements of item manufacturer and finishing system manufacturer damaged, marred, or deteriorated finishes, to Engineer's satisfaction.
 - 7. Contractor is fully responsible for loss, damage, and deterioration, including theft and vandalism, to stored materials and equipment.
- D. Storage of Materials or Equipment Containing Constituents of Concern:
- 1. Prevent contamination of personnel, storage areas, the Site, and adjacent areas.
 - 2. Comply with Laws and Regulations and other provisions of the Contract Documents relative to Constituents of Concern and Hazardous Environmental Conditions.
- E. Uncovered Storage:
- 1. The following materials may be stored outdoors without cover on supports, so there is no contact with the ground:
 - a. Reinforcing steel.
 - b. Precast concrete materials.
 - c. Structural steel.
 - d. Metal stairs.
 - e. Handrails and railings.
 - f. Grating.
 - g. Checker plate.
 - h. Metal access hatches, such as floor doors, roof hatches, and the like.
 - i. Castings.
 - j. Fiberglass items.
 - k. Rigid electrical conduit, except PVC-coated conduit.
 - l. Fencing intended for permanent, outdoor installation.
 - m. Piping, except PVC or chlorinated PVC (CPVC) pipe.
- F. Covered Storage:
- 1. The following materials and equipment may be stored outdoors on supports and completely covered with covering impervious to water:
 - a. Grout and mortar materials.
 - b. Masonry units.
 - c. Metal decking.
 - d. Rough lumber.
 - e. Soil materials and granular materials such as aggregate.
 - f. PVC and CPVC pipe.
 - g. PVC-coated electrical conduit.
 - h. Filter media.
 - 2. Properly and fully secure covers against coming loose in strong winds.
 - 3. Install coverings properly sloped to prevent accumulation of water.
 - 4. Loose Soil Material and Loose Granular Material:
 - a. Store such materials in well-drained areas.
 - b. Prevent mixing of such materials with foreign matter. Provide underlying separation layer or store on solid, impervious surface, where appropriate.
 - c. Provide temporary erosion and sediment controls for stockpiled soil materials in accordance with Contract Documents.

G. Fully-Protected Storage:

1. Store all materials and equipment not indicated in the provisions above regarding uncovered storage and covered storage on supports, in buildings, trailers, or other suitable temporary storage facility with concrete or wood flooring, solid and impervious roof, and fully closed walls on all sides.
2. Covering with visqueen plastic sheeting or similar material in storage space without floor, roof, and walls is unacceptable.
3. Provide heated storage for materials and equipment that could be damaged or deteriorate by low temperatures or freezing.
4. Provide air-conditioned storage for materials and equipment that could be damaged or deteriorate by high temperature or humidity.
5. Protect mechanical and electrical equipment from being contaminated by dust, dirt, and moisture.
6. Maintain temperature and humidity at levels recommended by materials and equipment manufacturers.
7. Prevent infestation of stored items by pests and rodents. Promptly and properly remedy such infestation when apparent.

H. Removal of Temporary Storage Facilities and Restoration of Storage Areas:

1. Completely remove temporary storage facilities when no longer necessary for the Work.
2. Restore areas used for storage and areas occupied by temporary storage facilities, in accordance with the Contract Documents, including Specification Section 01 71 33 - Protection of the Work and Property.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 MAINTENANCE OF STORAGE

- A. On a scheduled basis, periodically inspect stored materials and equipment to ensure that:
1. Condition and status of storage facilities is adequate to provide required storage conditions.
 2. Required environmental conditions are maintained on continuing basis.
 3. Materials and equipment exposed to weather elements or other environment are not adversely affected.
- B. Mechanical and Electrical Equipment in Long-Term Storage:
1. Meaning of the term “long-term storage” is as established in written instructions of manufacturer of associated materials or equipment.
 2. Mechanical and electrical equipment requiring long-term storage shall have complete manufacturer’s written instructions for servicing each item, with notice of enclosed instructions shown on exterior of crate, container, or packaging.
 3. Frequency of inspections and maintenance of stored items shall be in accordance with manufacturer’s written instructions.
 4. For mechanical equipment with bearings and shafts, manually rotate shaft during inspection and maintenance, as recommended by equipment manufacturer.
 5. Space heaters that are part of electrical equipment shall be connected and operated continuously until equipment is connected to permanent electrical power supply.
 6. Other requirements for maintenance during storage of electrical equipment, instrumentation and controls, items with computer chips, solid-state devices, and other electronics are in this Section’s provision on general protection during storage.
- C. Affidavits:
1. Submit to Engineer affidavit for each time maintenance and inspection was performed on materials and equipment in long-term storage. Affidavit shall be signed by Contractor and entity performing the inspection and maintenance on the stored items.

2. Indicate on affidavit:
 - a. Date of inspection.
 - b. Personnel involved and employer of each.
 - c. Condition of storage environment.
 - d. Specific stored items inspected, equipment condition, problems observed, problems corrected, maintenance tasks performed, and other relevant information.
 - e. Signature of Contractor's person responsible for the inspection and maintenance.
 - f. Signed by items' manufacturer indicating whether storage conditions and tasks performed are suitable for continued compliance with manufacturer's warranties.
3. Submit each affidavit, complete, not later than seven days after performing associated inspection and maintenance.

END OF SECTION

SECTION 01 71 14
MOBILIZATION AND DEMOBILIZATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Project mobilization and demobilization.
- B. Related Sections include, but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 01 29 73 - Schedule of Values.

1.2 GENERAL

- A. Mobilization work shall consist of preparatory work and operations necessary to be ready to perform the Work required under the Contract, and for other work and operations which must be performed, or costs incurred prior to the beginning of the Work.
- B. Demobilization work shall consist of all activities and costs for transportation of personnel, equipment, and supplies necessary to demobilize the contractor from the site.
- C. Mobilization and Demobilization shall not include mobilization or demobilization for specific items of work for which payment is provided elsewhere in the Contract.
- D. When the Contract or proposed Schedule of Values includes a separate item for mobilization or demobilization, payment will include full compensation for the furnishings of all labor, materials, tools, equipment, administrative costs, and incidentals to mobilization or demobilization.
- E. If additional mobilization and demobilization activities and costs are required during the performance of the Contract as a result of the changed, deleted, or added items of work for which the Contractor is entitled to an adjustment in Contract price, compensation for such costs shall be included in the price adjustment for the item of Work changed or added.

1.3 ITEMS INCLUDED

- A. Mobilization costs shall be limited to the following items:
 - 1. Obtaining bonds and insurance.
 - 2. Obtaining required permits and licenses.
 - 3. Developing Project Work Schedule.
 - 4. Attending Preconstruction Conference.
 - 5. Processing Permits.
 - 6. Furnishing and installing signs.
 - 7. Any work that is necessary to provide access to the site, including, but not limited to, grading and clearing.
 - 8. Installing temporary construction power wiring.
 - 9. Necessary assembly and testing required prior to start of the Work.
 - 10. Establishment of all and other facilities necessary for the Work, including utilities and specified field offices.
 - 11. Providing for and establishing Contractor's work and storage yard.
 - 12. Movement of personnel, major equipment, supplies, and incidentals to the site.
 - 13. Cost incurred prior to the start of the Work which must be performed, such as a down payment on a long lead item.

- B. Demobilization costs shall be limited to the following items:
 - 1. Disassembly, removal and site cleanup/repair of offices, buildings, and other facilities assembled on the site for the Contract.
 - 2. Costs for final site cleanup, packaging of miscellaneous items for return to the yard and other project closeout related expenses.
 - 3. Cost for final payment documents, and provision of Acknowledgement Certification Request, Bond, and Certificate of Completion.

- C. The Owner will pay all costs for the Mobilization and Demobilization of all of the Contractor's personnel, equipment, supplies, and incidentals at the contract lump sum price as follows:
 - 1. The Owner will pay no greater than 5% of the original Contract Amount as a separate pay item for mobilization.
 - 2. The Owner will pay no greater than 0.5% of the original Contract Amount as a separate pay item for demobilization.
 - 3. In accordance with SUDAS Division 11 Section 11,020 - Mobilization, Owner will pay 25% of the Mobilization lump sum price when 5% of the original Contract Amount is earned.
 - 4. In accordance with SUDAS Division 11 Section 11,020 - Mobilization, Owner will pay 50% of the Mobilization lump sum price when 10% of the original Contract Amount is earned.
 - 5. In accordance with SUDAS Division 11 Section 11,020 - Mobilization, Owner will pay the 100% of the Mobilization lump sum price when 50% of the original Contract Amount is earned.
 - 6. Owner will pay 100% of the Demobilization lump sum price when all closeout activities and documents are completed.
 - 7. Furnish cost data and documentation to justify this portion of the bid if Owner believes that the percentages in this paragraph do not bear a reasonable relation to the cost of the work in this Contract.
 - 8. This schedule of mobilization progress payments will not limit or preclude progress payments otherwise provided by the Contract.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

SECTION 01 71 33
PROTECTION OF THE WORK AND PROPERTY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. General requirements for protecting the Work and property, including:
 - a. Accessing or entering property.
 - b. Temporary barricades and temporary warning lights and signs.
 - c. Responsibility to remedy damaged property.
 - d. Protecting natural habitats, including trees, plants, lawns and meadows, and wildlife.
 - e. Protecting Underground Facilities.
 - f. Protecting existing surface structures.
 - g. Protecting floors, walls, and roofs.
 - h. Protecting other installed items and landscaping.
- B. Scope:
1. This Specification Section expands on the requirements of the Contract Documents regarding protection of the Work and property, including Underground Facilities.
 2. Contractor shall provide all labor, materials, equipment, tools, services, and incidentals necessary and required for protecting the Work and property in accordance with the Contract Documents.
- C. Related Sections include, but are not necessarily limited to:
1. SUDAS Division 1.
 2. Division 01 - General Requirements.
 3. Section 01 04 00 - Special Provisions.
 4. Section 01 14 16 - Coordination with Owner's Operations.
 5. Section 01 65 00 - Product Delivery Requirements.
 6. Section 01 66 00 - Product Storage and Handling Requirements.
 7. Section 01 74 00 - Cleaning.

1.2 PROTECTION - GENERAL

- A. Contractor shall provide all precautions and programs and perform all actions necessary to protect personnel health and safety, and to protect the Work and all public and private property and facilities from damage, in accordance with the Contract Documents, Laws and Regulations, and other applicable requirements.
- B. To prevent damage, injury, and loss, Contractor's actions shall include the following:
1. Providing measures for safety of all personnel at and adjacent to the Site, whether engaged in performing the Work, operating or maintaining the facility, or performing other functions for Owner or others.
 2. Storing construction equipment, machinery, tools, and similar items, materials and equipment to be incorporated into the Work, supplies, and other items in an orderly, safe manner that does not unduly interfere with progress of the Work or work of others, including Owner.
 3. Suitably storing materials and equipment to be incorporated into the Work, in accordance with the Contract Documents, including Specification Section 01 66 00 - Product Storage and Handling Requirements.
 4. Placing upon the Work or any part thereof only loads consistent with the safety and integrity of that portion of the Work and existing construction and facilities.
 5. Frequently removing and disposing of rubbish, scrap materials, and debris, in accordance with the Contract Documents, including Section Specification 01 74 00 - Cleaning, resulting from Contractor's operations.

6. Providing temporary controls, including controlling pests and rodents, in accordance with the Contract Documents.

PART 2 - PRODUCTS

2.1 TEMPORARY BARRICADES

- A. Materials and Construction:
 1. Temporary barricades shall be of materials that are either new or of good quality and sufficient for the intended purpose, exposure, and duration of use.
 2. Provide temporary barricades of sturdy materials of grade, thickness, and durability sufficient for the probable loads to which they will be subject. Temporary barricades intended for fall prevention, such as railings and handrails on temporary stairs and temporary walkways and at openings, shall be in accordance with Laws and Regulations, including the applicable building and safety codes.
 3. Color: Use appropriately colored and reflective barricades, or paint barricades accordingly, to be visible at night and during periods of low visibility.
 4. Where Authority Having Jurisdiction requires compliance with standards more stringent than the Contract Documents, comply with both the Contract Documents and requirements of the Authorities Having Jurisdiction.

PART 3 - EXECUTION

3.1 ACCESSING OR ENTERING PROPERTY

- A. Accessing or Entering Property - General:
 1. Use and occupy only areas identified on the Drawings, unless appropriate consent from the Owner is obtained by Contractor.
 2. The foregoing applies to personnel, construction equipment and machinery, tools, vehicles, materials or equipment to be incorporated into the Work, supplies, temporary facilities, and other items or obstructions.

3.2 BARRICADES

- A. Temporary Barricades and Temporary Warning Lights and Signs - General:
 1. All Work Areas:
 - a. Provide temporary barricades, warning lights, and warning signs for both indoor and outdoor Work, in accordance with Laws and Regulations and requirements of Contract Documents.
 - b. Warning Lights and Signage: From 30 minutes before terrestrial sunset to 30 minutes after terrestrial sunrise, provide and maintain not less than one temporary flashing light at each vehicle barricade and at other barriers and barricades as necessary.
 - c. Promptly replace temporary barricades that are damaged or are otherwise no longer capable of serving their intended function.
 2. Where the Work is performed on or adjacent to roadway, access road, other area travelled by motor vehicles:
 - a. Provide temporary barricades, temporary fences, temporary guard rails, temporary lights and warning signs, temporary danger signals, and other precautions for protecting persons, property, vehicles, and the Work.
 - b. Provide sufficient temporary barricades to keep vehicles from being driven on or into excavations and the Work under construction.
 3. Temporary Barriers for Areas Not Subject to Vehicular Traffic:
 - a. Provide temporary barriers around:
 - 1) Openings.
 - 2) Scaffolding.
 - 3) Temporary stairs and ramps.
 - 4) Around excavations.

- 5) Around elevated walkways, slabs, and platforms.
- 6) Other areas that may present a fall-hazard or hazard to persons and property.
- b. Provide appropriate temporary barriers, warning signs and, where necessary, warning lights, at ground level and other low elevations, and at higher elevations. Protect persons and property from fall-hazards and protect persons and property at lower elevations from falling objects.
- 4. Duration of Temporary Barriers, Barricades, Signs, and Warning Lights:
 - a. Contractor's responsibility for maintaining temporary barriers, barricades, signs, warning lights shall continue until the associated Work is substantially complete in accordance with the Contract Documents, unless other provision for protection are agreed to by the parties.
 - b. After Substantial Completion, protect Work and property during periods when Contractor is onsite: Completing the remaining Work, performing correction period work, and performing warranty work.

3.3 RESPONSIBILITY TO REMEDY DAMAGED PROPERTY

- A. Contractor to Remedy Damage:
 - 1. Contractor has full responsibility for preserving Owner's property and facilities on and adjacent to the Site.
 - 2. Direct or indirect damage done by, or on account of, any act, omission, neglect (including inadvertent acts), or misconduct by Contractor (including any person or entity for whom contractor is responsible) in performing the Work, shall be promptly remedied by Contractor, at Contractor's expense, in accordance with the Contract Documents.
 - 3. If the Contract Documents do not show or indicate the required restoration, or remedy, restore or remedy the damage to condition equal or better than that existing before damage was done.
- B. Owner May Remedy:
 - 1. Should Contractor fail to protect and safeguard property and the Work after requests from Engineer or Owner, Owner reserves the right to implement measures to protect property and the Work.
 - 2. Cost of such Owner-implemented measures shall be paid by Contractor. Owner may deduct from payments due Contractor such amounts as set-offs in accordance with the Contract Documents.
 - 3. Such right, however, does not obligate Owner or Engineer to continuously monitor or have responsibility for protection of property and the Work, which responsibility is exclusively Contractor's.
 - 4. In exercising its rights under this provision, Owner will endeavor to give Contractor sufficient notice to allow Contractor to remedy the damage or defect within a reasonable time. However, if Owner or Engineer deems that the situation requires prompt remedy, Owner may act as quickly as Owner deems appropriate, without infringing on or mitigating Owner's rights under this provision and elsewhere in the Contract Documents.

3.4 PROTECTION OF NATURAL HABITATS

- A. Tree and Plant Protection - General:
 - 1. Protect existing trees, shrubs, and plants on or adjacent to the Site, against unnecessary cutting, breaking, damage, and skinning of trunk, branches, bark, and roots.
 - 2. Protect irrigation servicing existing trees, shrubs, and plants on or adjacent to the Site that remain in place.
 - 3. Do not store materials or equipment or park construction equipment, machinery, or vehicles within foliage drip lines.
 - 4. In areas subject to traffic, provide temporary fencing or temporary barricades to protect trees and plants.
 - 5. Burning is not allowed at or adjacent to the Site, including burning, in open fires or otherwise, trees, plants, debris, or other combustible materials.

6. Within the limits of the Work, water trees and plants that are to remain, to maintain their health during construction operations.
 7. Cover exposed roots with burlap and keep such burlap continuously wet. Cover exposed roots with earth as soon as possible. Protect root systems from mechanical damage and damage by storm water runoff, erosion, flooding, and noxious materials in solution.
- B. Remedy of Damaged Trees:
1. If branches are damaged, prune branches immediately and protect as indicated below.
 2. If bark on trunk or major branches is scraped or damaged, using a sharp knife or other suitable cutting implement, clean the edge of the wound, leaving the bark smooth and tight against the wood. Avoid exposing more live tissue and do not remove too much healthy bark. Apply material indicated below.
 3. After pruning and cutting back damaged wood and bark, protect cut or damaged wood by applying emulsified asphaltic sealant specifically manufactured for sealing pruned and damaged trees. Apply sealant in accordance with sealant manufacturer's instructions, in manner acceptable to Engineer and tree owner.
 4. When directed by Engineer, remove and dispose of (at location away from the Site) damaged trees and plants (and parts thereof) that die or suffer permanent injury, and replace each such damaged tree and plant with new tree or plant of equal or better species and quality per City of Des Moines tree replacement requirements.
- C. Protection of Lawns:
1. Protect lawns from unnecessary damage during performance of the Work.
 2. To extent practicable, do not drive vehicles, construction equipment, machinery, or wheeled items such as carts and wheelbarrows, across lawns.
 3. When existing lawn areas are disturbed, promptly stabilize exposed soil in accordance with Contract Documents.
 4. Remedy damaged lawns and meadows in accordance with the Contract Documents. If not otherwise addressed in the Contract Documents, restore to preconstruction condition or better with the same or substantively similar species.
- D. Protection of Wildlife:
1. To extent practicable, avoid harming wildlife and damaging or destroying wildlife habitats, except for areas where the Work is to be located.
 2. In the event a threatened or endangered species is discovered at the Site for which provisions was not otherwise provided, stop work in the vicinity and immediately orally advise Engineer by telephone or in-person, promptly followed by written notice in accordance with the Contract's provisions for notice for differing Site conditions. If species is not threatened or endangered, promptly resume work; no change in Contract Price or Contract Times is due for misidentification of threatened or endangered species.
 3. Contractor is not responsible for wholesale inventorying or Site-wide evaluation of wildlife at the Site, except as indicated in the paragraph immediately above this paragraph.

3.5 PROTECTION OF UNDERGROUND FACILITIES

- A. Underground Facilities - General:
1. Underground Facilities known to Owner and Engineer, except laterals or services to individual structures or properties, such as water, wastewater, storm water, gas and fuel, hydronic, steam, electric, and communications laterals or services, are shown on the Drawings. Information shown for Underground Facilities is the best available to Engineer but, in accordance with Contract Documents is not guaranteed to be correct or complete.
 2. Comply with Laws and Regulations regarding notification of utility owners prior to performing the Work, including necessary "call before you dig" notifications.

3. Contractor shall explore ahead of trenching and excavating Work and shall sufficiently uncover Underground Facilities that will or may interfere with the Work to determine their location, to prevent damage to Underground Facilities, and to prevent service interruption to structures and properties served by Underground Facilities.
 4. If Contractor damages an Underground Facility, Contractor shall promptly restore the damaged Underground Facility in accordance with requirements of the Owner of the damaged facility and the Contract Documents. If the Contract Documents do not address repair or remedy of the damaged facility, restore to not less than preconstruction condition.
 5. Necessary changes in the location of the Work may be directed by Engineer to avoid Underground Facilities not shown or indicated on the Contract Documents.
 6. If permanent relocation of an existing Underground Facility is required and is not otherwise shown or indicated in the Contract Documents, Contractor may be directed in writing to perform the required work. When such relocation Work results in a change in the Contract Price, Contract Times, or both, the associated Contract modification procedures and payment for such Work shall be in accordance with the Contract Documents.
- B. Protection of Underground Facilities under Roads and Parking Areas:
1. Provide temporary, heavy-duty steel roadway plates to protect existing manholes, handholes, valve boxes, vaults, and other Underground Facilities near to, or visible at, the ground surface.
 2. Avoid imparting heavy loads, especially transitory loading (such as heavy truck traffic), vibration forces, and impact loads on Underground Facilities that are close to the ground surface and below-grade work areas. Provide temporary bridging or other appropriate protection where traffic must pass over Underground Facilities in close proximity to the ground surface.
- C. Temporary Support of Underground Facilities:
1. Where Contractor exposes or excavates around or under one or more existing Underground Facilities, provide appropriate and adequate temporary supports for the associated Underground Facilities.
 2. Do not allow Underground Facilities exposed by Contractor's operations to remain exposed without temporary support necessary to properly protect the Underground Facility. Where joint of Underground Facility is exposed by excavation, provide temporary support for each exposed joint and other temporary support as necessary.
 3. Design of Temporary Supports:
 - a. Where necessary or where expressly required by the Contract Documents, retain services of Professional Engineer, to design the temporary supports. Such Professional Engineer shall be experienced with the type and size of subject Underground Facility, structural engineering, and geotechnical engineering sufficient for the foundations of the temporary supports.
 - b. Temporary supports are not delegation of professional design responsibility unless expressly so indicated in the Contract Documents.
 - c. Responsibilities of Contractor's Professional Engineer shall include, but are not necessarily limited to, the following:
 - 1) Advising Contractor on investigations necessary to obtain information for design of temporary supports. Reviewing and considering results of such investigations in the design of temporary supports.
 - 2) Visiting the Site to make personal observations as needed.
 - 3) Identify appropriate design criteria for temporary supports.
 - 4) Preparing necessary calculations, Design Drawings, and Design Specifications (sealed and signed when required by Contract or Laws or Regulations), appropriately based on the associated soil conditions and subsurface conditions, considering the consequences of failure of the temporary supports and associated potential for damage or failure of the existing subject Underground Facility.
 - 5) Design temporary supports with a safety factor of not less than 2.0.

- 6) Review and approve or take other appropriate action on submittals of Shop Drawings and product data for the temporary supports and related materials.
 - 7) Make periodic visits to the Site during erection of the temporary supports and at appropriate intervals thereafter to inspect the temporary supports during performance of other, adjacent Work.
 - 8) Issue to Contractor written recommendations for repairs and improvements necessary for the proper protection of the associated Underground Facility.
 - 9) Submit to Contractor detailed, written recommendations for backfilling the excavation underneath and adjacent to the Underground Facility and for removing the temporary supports.
- d. Contractor shall comply with the Professional Engineer's design of the temporary supports.
 - e. Owner may require and, in such event, Contractor shall submit, design documents, Shop Drawings, product data, and reports by Contractor-hired Professional Engineer. Do not submit such documents to Engineer. When such documents are furnished to Owner, the Owner has no obligation to perform any review of such documents and Owner's possession of such documents does not impart on Owner or Engineer any responsibility for or professional liability associated with design of such temporary supports and consequences of implementing such designs. Owner and Engineer are not obligated in any way to implement recommendations of Contractor's Professional Engineer.

3.6 PROTECTION OF EXISTING SURFACE STRUCTURES

A. Surface Structures - General:

1. Surface structures are existing buildings, structures, and other facilities at or extending above ground surface, including their foundations and any extension below ground surface. Surface structures include, but are not limited to, buildings, tanks, walls, bridges, roads, dams, channels, open drainage routes, exposed piping and utilities, poles, exposed wires and cabling, posts, signs, markers, curbs, walks, fencing, and other facilities visible at or above ground surface.
2. Protect surface structures as necessary and promptly remedy damage and defects resulting or arising from Contractor's operations. Unless expressly shown or indicated otherwise in the Contract Documents, protect such items regardless of whether shown or indicated on the Drawings or elsewhere in the Contract Documents.
3. Protection of Overhead Utilities:
 - a. Protect visible, overhead utilities, including electrical power, communications, and piped utilities, and related supports, regardless of whether such items are shown or indicated in the Contract Documents.
 - b. When required by the Contract Documents or when acceptable to owner of such utility or facility, temporarily relocate overhead utilities or facilities as necessary perform the Work.
 - c. Provide temporary barriers, barricades, and warning signs identifying overhead utilities within reach of Contractor's construction equipment, machinery, or operations.

B. Temporary Removals of Surface Structures:

1. Existing surface facilities, including but not limited to guard rails, handrails, posts, guard cables, signs, poles, markers, curbs, and fencing, that are temporarily removed to facilitate the Work shall be replaced and restored promptly after the associated Work is performed.
2. Replace and restore such items in accordance with the Contract Documents. If not addressed in the Contract Documents, replace and restore such items to preconstruction condition or better.
3. Remedy damage to all items temporarily removed and later replaced and restored.
4. All such temporary relocations, replacement, and restoration is at Contractor's cost.

- C. Protection of Surface Structures:
 - 1. Sustain in their original location and protect from direct and indirect injury all surface structures located within or adjacent to the Site. Such sustaining and supporting shall be done carefully and as required by the party owning or controlling such structure or facility.
 - 2. Before proceeding with the Work of sustaining and supporting such structure or facility, Contractor shall, upon Engineer's request, promptly satisfy Engineer that methods and procedures to be used have been approved by party owning the surface structure or facility.
 - 3. Regardless of approval or acceptance by owner of property, structure, or facility, responsibility for protecting the Work and property is solely Contractor's.

3.7 PROTECTION OF FLOORS, WALLS, AND ROOFS

- A. Protection of Floors, Walls, and Roofs - General:
 - 1. Use proper protective covering when moving equipment, handling materials or other loads, when painting, handling mortar or grout, and when cleaning walls, ceilings, or structure contents.
 - 2. Use metal pans to collect oil and cuttings from piping, conduits, and rod threading machines, and under metal cutting machines.
 - 3. Maintain at the Site and use spill kits and absorbent pads for remedying spills.
 - 4. Do not load concrete floors less than 28 days after concrete placement without Engineer's written permission.
 - 5. Do not load slabs, floors, walls, or roofs in excess of design loading.
 - 6. Do not load roofs without Engineer's written permission.
 - 7. Restrict access to roofs, and keep Contractor's workers and personnel off existing roofs, except as necessary for the Work.
 - 8. If access to roofs is necessary, roofing, parapets, openings, and all other construction on or adjacent to roof shall be protected with suitable plywood, barricades, or other appropriate means.

3.8 PROTECTION OF INSTALLED MATERIALS, EQUIPMENT, AND LANDSCAPING

- A. General:
 - 1. Protect existing facilities and installed Work to prevent damage from subsequent operations.
 - 2. Remove protective items when no longer needed, prior to Substantial Completion of the associated Work.
 - 3. Where work will continue in adjacent area(s) after Substantial Completion of a portion of the Work, protect the substantially completed Work until all work in the area is complete.
- B. Control traffic (foot traffic, wheeled items such as carts, vehicles, and other traffic) to prevent damage to equipment, materials, and surfaces.
- C. Coverings:
 - 1. Provide temporary coverings to protect materials and equipment from damage.
 - 2. Cover: Projections, wall corners and jambs, sills, and soffits of openings, in areas used for traffic and for passage of materials and equipment in subsequent work.
 - 3. Fasten protective items without harming the Work. Use tape or adhesives that do not leave residue when removed.

END OF SECTION

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SECTION 01 73 20
OPENINGS AND PENETRATIONS IN CONSTRUCTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Methods of installing and sealing openings and penetrations in construction.
- B. Related Sections include, but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 05 50 00 - Miscellaneous Metals.
 - 5. Section 06 82 00 - Fiberglass Reinforced Plastic Fabrications.
 - 6. Section 07 92 00 - Joint Sealants.
 - 7. Section 09 96 00 - High Performance Industrial Coatings.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. A36, Standard Specification for Carbon Structural Steel.
 - b. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - c. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - d. A312, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
 - e. A351, Standard Specification for Castings, Austenitic, for Pressure-Containing Parts.
 - f. A554, Standard Specification for Welded Stainless Steel Mechanical Tubing.
 - g. A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - h. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - i. A995, Castings, Austenitic-Ferritic (Duplex) Stainless Steel, for Pressure-Containing Parts.
 - 2. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC):
 - 1) Article 501, Class 1 Locations.
 - b. 90A, Standard for Installation of Air Conditioning and Ventilating Systems.
 - c. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).

1.3 DEFINITIONS

- A. Hazardous Areas: Areas shown in the Contract Documents as having Class I or Class II area classifications.
- B. Washdown Areas: Areas having floor drains or hose bibbs.

1.4 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

- B. Shop Drawings:
 - 1. For each structure provide dimensioned or scaled (minimum 1/8 IN = 1 FT) Plan View Drawings containing the following information:
 - a. Vertical and horizontal location of all required openings and penetrations.
 - b. Size of all openings and penetrations.
 - c. Opening type.
 - d. Seal type.
 - 2. Manufacturer's installation instructions for standard manufactured products.

1.5 SITE CONDITIONS

- A. For purposes of this Project, water table level is assumed to be finished grade elevations.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Pipe Sleeves:
 - 1. Corrosive Areas:
 - a. Stainless steel, Type 304L.
 - b. Penetrations 24 IN DIA or less: ASTM A269, ASTM A312 or ASTM A554, Schedule 40.
 - c. Penetrations larger than 24 IN DIA: Stainless steel, ASTM A666, Minimum 1/4 IN thickness.
 - 2. All other Areas:
 - a. Steel, Hot-dipped galvanized after fabrication.
 - b. Penetrations 24 IN DIA or less: ASTM A53, Schedule 40.
 - c. Penetrations larger than 24 IN DIA: ASTM A36, Minimum 1/4 IN thickness.
- B. Backing Rod and Sealant: See Specification Section 07 92 00.
- C. Modular Mechanical Seals:
 - 1. Acceptable manufacturers:
 - a. Link-Seal.
 - 2. 316 stainless steel bolts, nuts and washers.
- D. Sheet Metal Sleeves:
 - 1. Corrosive Areas: Stainless steel: ASTM A240, Type 304L.
 - 2. All other areas: Galvanized steel: ASTM A653, G90.
 - 3. Minimum 12 GA.
- E. Commercial Wall Castings:
 - 1. Ductile iron, ASTM A536.
 - 2. Grade equal to connecting piping system.

PART 3 - EXECUTION

3.1 FABRICATION

- A. Fabricate pipe sleeves in accordance with Specification Section 05 50 00.
- B. Provide waterstop plate/anchor flange for piping, ducts, castings, and sleeves cast-in-place in concrete.
 - 1. For fabricated units, weld plate to sleeve, pipe, or ductwork.
 - 2. For commercial castings, cast water stop/anchor with wall pipe.
 - 3. Plate is to be same thickness as sleeve, pipe, casting or ductwork.
 - 4. For fabricated units, diameter of plate or flange to be 4 IN larger than outside diameter of sleeve, pipe or ductwork.
 - 5. For commercial castings, waterstop/anchor size to be manufacturer standard.

- 6. Provide continuous around entire circumference of sleeve, pipe, or ductwork.
- C. Factory or shop-coat painted components in accordance with Specification Section 09 96 00.

3.2 INSTALLATION AND APPLICATION

- A. Seal openings and penetrations in non-fire-resistance-rated construction in accordance with Specification Section 07 92 00.
- B. Obtain prior approval from Engineer when any opening larger than 100 SQIN must be made in existing or newly completed construction.
- C. Perform electrical penetrations in accordance with NFPA 70, Article 501.
- D. Where pipes, conduits, or ducts pass through floors in washdown areas, install sleeves with top 3 IN above finish floors.
 - 1. In non-washdown areas, install sleeves with ends flush with finished surfaces.
- E. Size sleeves, blockouts, and cutouts which will receive sealant seal such that free area to receive sealant is minimized and seal integrity may be obtained.
- F. For insulated piping and ducts, size sleeves, blockouts, and cutouts large enough to accommodate full thickness of insulation.
- G. Where pipes, conduits, or ducts pass through grating, provide banding at the entire perimeter of the opening.
 - 1. Metal grating: See Specification Section 05 50 00.
 - 2. FRP grating: See Specification Section 06 82 00.
- H. Where pipes, conduits, or ducts are removed where passing through grating:
 - 1. Metal grating:
 - a. Provide banding at perimeter and cover opening with 1/4 IN plate of the same material of the grating.
 - b. See Specification Section 05 50 00.
 - 2. FRP grating:
 - a. Provide full depth cover meeting same loading requirement as existing material or replace grating section.
 - b. See Specification Section 06 82 00.
- I. Do not cut into or core drill any beams, joists, or columns.
- J. Do not install sleeves in beams, joists, or columns.
- K. Do not install recesses in beams, joists, columns, or slabs.
- L. Field Cutting and Coring:
 - 1. Saw or core drill with non-impact type equipment.
 - 2. Mark opening and drill small 3/4 IN or less holes through structure following opening outline.
 - 3. Sawcut opening outline on both surfaces.
 - a. Knock out within sawcuts using impact type equipment.
 - b. Do not chip or spall face of surface to remain intact.
 - c. Do not allow any overcut with saw kerf.
- M. Precast-Prestressed Concrete Construction:
 - 1. Do not cut openings or core drill vertically or horizontally through stems of members.
 - 2. Do not locate or install sleeves or recess sleeves vertically or horizontally through or in stems of members.
 - 3. Cast openings and sleeves into flanges of units.
 - 4. Cast openings larger than 6 IN in diameter or 6 IN maximum dimension in units at time of manufacture.
 - 5. Cast openings smaller than 6 IN in diameter or 6 IN maximum dimensions in flanges of units at time of manufacture or field cut.

- N. Where alterations are necessary or where new and old work join, restore adjacent surfaces to their condition existing prior to start of work.
- O. Where area is blocked out to receive sheet metal sleeve at later date:
 - 1. If blockout size is sufficient to allow placement, utilize dowels for interface of initially placed concrete and sleeve encasement concrete which is placed later.
 - a. Size blockout based on sleeve size required plus 4 to 6 IN each side of sleeve for concrete encasement.
 - b. Provide #4 dowels at 12 IN spacing along each side of blockout with minimum of two dowels required per side.
 - 2. If blockout size is not sufficient to allow placement of dowels, provide keyway along all sides of blockout.
 - a. Size blockout based on sleeve size required plus 2 to 4 IN each side of sleeve for concrete encasement.
- P. For interior wall applications where backer rod and sealant are specified, provide backer rod and sealant at each side of wall.
- Q. Use full depth expanding foam sealant for seal applications where single or multiple pipes, conduits, etc., pass through a single sleeve.
- R. Do not make duct or conduit penetrations below high water levels when entering or leaving tankage, wet wells, or other water holding structures.
- S. Modular Mechanical Seals:
 - 1. Utilize one seal for concrete thickness less than 8 IN and two seals for concrete, 8 IN thick or greater.
 - 2. Utilize two seals for piping 16 IN diameter and larger if concrete thickness permits.
 - 3. Install seals such that bolt heads are located on the most accessible side of the penetration.
- T. Backer Rod and Sealant:
 - 1. Install in accordance with Specification Section 07 92 00.
 - 2. Provide backer rod and sealant for modular mechanical seal applications.
 - a. Apply on top side of slab penetrations and on interior, dry side wall penetrations.

3.3 SCHEDULES

- A. General Schedule of Penetrations through Floors, Roofs, Foundation Base Slabs, Foundation Walls, Foundation Footings, Partitions and Walls for Ductwork, Piping, and Conduit:
 - 1. Provide the following opening and penetration types:
 - a. Type A - Block out 2 IN larger than outside dimensions of duct, pipe, or conduits.
 - b. Type B - Saw cut or line-drill opening. Place new concrete with integrally cast sheet metal or pipe sleeve.
 - c. Type C - Fabricated sheet metal sleeve or pipe sleeve cast-in-place. Provide pipe sleeve with water ring for wet and/or washdown areas.
 - d. Type D - Commercial type casting or fabrication.
 - e. Type E - Saw cut or line-drill opening. Place new concrete with integrally cast pipe, duct or conduit spools.
 - f. Type F - Integrally cast pipe, duct or conduit.
 - g. Type G - Saw cut or line-drill and remove area 1 IN larger than outside dimensions of duct, pipe or conduit.
 - h. Type H - Core drill.
 - i. Type I - Block out area. At later date, place new concrete with integrally cast sheet metal or pipe sleeve.
 - j. Type J - Grating Banding for any field cut openings.
 - 2. Provide seals of material and method described as follows.
 - a. Category 1 - Modular Mechanical Seal.

- b. Category 2 - Roof curb and flashing according to SMACNA Specifications unless otherwise noted on Drawings. Refer to roofing Specification Sections for additional requirements.
 - c. Category 3 - 12 GA sheet metal drip sleeve set in bed of silicon sealant with backing rod and sealant used in sleeve annulus.
 - d. Category 4 - Backer rod and sealant.
 - e. Category 5 - Full depth compressible sealant with escutcheons on both sides of opening.
 - f. Category 6 - Full depth compressible sealant and flanges on both sides of opening. Flanges constructed of same material as duct, fastened to duct and minimum 1/2 IN larger than opening.
 - g. Category 7 - Full depth compressible sealant and finish sealant or full depth expanding foam sealant depending on application.
 - h. Category 8 - Banding for all grating openings and banding and cover plate of similar materials for abandoned openings.
- 3. Furnish openings and sealing materials through new floors, roofs, grating, partitions and walls in accordance with Schedule A, Openings and Penetrations for New Construction.
 - 4. Furnish openings and sealing materials through existing floors, grating, roofs, partitions and walls in accordance with Schedule B, Openings and Penetrations for Existing Construction.

**SCHEDULE A. OPENINGS AND PENETRATIONS SCHEDULE
FOR NEW CONSTRUCTION**

APPLICATIONS	DUCTS		PIPING		CONDUIT	
	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY
Grating openings and penetrations	J	8	J	8	J	8

**SCHEDULE B. OPENINGS AND PENETRATIONS SCHEDULE
FOR EXISTING CONSTRUCTION**

APPLICATIONS	DUCTS		PIPING		CONDUIT	
	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY
Through floors and walls where one side is a hazardous area	B E	7 Not Req	B ⁽¹⁾ B ⁽³⁾ E H ⁽²⁾	7 1 Not Req 7	B ⁽¹⁾⁽³⁾ E H ⁽²⁾	7 Not Req 7
Through exterior wall below grade	B	7	B ⁽¹⁾ B ⁽³⁾ H ⁽²⁾	7 1 7	B ⁽¹⁾⁽³⁾ H ⁽²⁾	7 7
Through wall from tankage or wet well to dry well or dry area	E	Not Req	E	Not Req	E	Not Req
Through exterior wall above grade	G	6	G ⁽¹⁾⁽³⁾ H ⁽²⁾	5 5	G ⁽¹⁾⁽³⁾ H ⁽²⁾	5 7
Through interior walls and slabs not covered by the above applications	G	4	G ⁽¹⁾⁽³⁾ H ⁽²⁾	4 4	G ⁽¹⁾⁽³⁾ H ⁽²⁾	4 4
Grating openings and penetrations	J	8	J	8	J	8

- (1) Multiple piping 3 IN and smaller or multiple conduits.
(2) Single pipe 3 IN and smaller or single conduit.
(3) Single pipe or conduit larger than 3 IN.

END OF SECTION

SECTION 01 73 29
CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: General requirements for cutting and patching Work.
- B. Scope:
 - 1. Contractor shall perform cutting and coring, and rough and finish patching of holes and openings in existing construction.
 - 2. Provide cutting, coring, fitting, and patching, including attendant excavation and fill, required to complete the Work, and to:
 - a. remove and replace defective Work;
 - b. remove samples of installed Work as specified or required for testing;
 - c. remove construction required to perform required alterations or additions to existing construction;
 - d. uncover the Work for Engineer's observation of covered Work, testing, or inspection by testing entities, or observation by authorities having jurisdiction;
 - e. connect to completed Work not performed in proper sequence;
 - f. remove or relocate existing utilities and piping that obstruct the Work in locations where connections are to be made;
 - g. make connections or alterations to existing or new facilities.
- C. Related Sections include, but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 03 09 00 - Concrete.
 - 5. Section 03 35 00 - Concrete Finishing and Repair of Surface Defects.
 - 6. Section 09 96 00 - High Performance Industrial Coatings.
 - 7. Section 31 23 00 - Earthwork.
 - 8. Section 31 23 33 - Trenching, Backfilling, and Compacting for Utilities.

1.2 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Action Submittals: Submit the following:
 - 1. Cutting and Patching Request:
 - a. Submit written request to Engineer, well in advance of executing cutting or alteration that affects one or more of the following:
 - 1) Design function or intent of Project.
 - 2) Work of Owner or other contractors retained by Owner.
 - 3) Structural capacity or integrity of an element of the Project, building, or structure.
 - 4) Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
 - 5) Efficiency, operational life, maintenance, or safety of operational elements.
 - 6) Visual qualities of elements that will be exposed to view after completion of the Work.
 - b. Request shall include:
 - 1) Identification of Project and Contract designation.
 - 2) Description of affected Work of Contractor and work of others (if any) retained by Owner.
 - 3) Necessity for cutting.

- 4) Effect on work or operations of Owner and other contractors (if any) retained by Owner, and on structural and weatherproof integrity of Project, building, or structure.
 - 5) Description of proposed Work, indicating: Scope of cutting and patching; trades that will execute the cutting and patching Work; materials and equipment to be used; extent of refinishing; schedule of operations; alternatives (if any) to cutting and patching, and net effect on aesthetics following completion of finishing Work.
 - 6) Indication of entity responsible for cost of cutting and patching, when applicable.
 - 7) Written permission of other prime contractors (if any) whose work will or may be affected.
2. Recommendation Regarding Cutting and Patching:
 - a. Should conditions of work or schedule indicate a change of materials or specified methods, furnish Submit written recommendation to Engineer including:
 - 1) Conditions indicating change.
 - 2) Recommendations for alternative materials or alternatives to specified methods.
 - 3) Material manufacturer's printed recommendations for the proposed product and recommendations of manufacturer's technical representative for the specific application(s). The latter shall be on technical representative's letterhead and shall explicitly indicate the Project and specific cutting and patching application(s) to which the recommendation(s) apply.
 - 4) Items required with request for approval of substitute, in accordance with the substitution request requirements of the Contract Documents.
 3. Product Data:
 - a. Submit manufacturer's published data for the protective compound to be applied to core-drilled surfaces and cut concrete surfaces.
 - b. When not required under other Specifications Sections, submit manufacturer's published data on materials to be used for finishing around the cut or patched area(s), together with indication of the location(s) where each is proposed for use.
 - c. Furnish Submittals for patching materials under the associated Specifications Section. Submittal to include letter of recommendation from product manufacturer's technical representative indicating on technical representative's letterhead, explicitly indicating:
 - 1) Project name and facility name;
 - 2) specific cutting and patching application(s) to which the recommendations apply;
 - 3) that product manufacturer's technical representative has personally observed and is familiar with conditions in the work area(s) of the subject cutting and patching;
 - 4) materials that are the subject of the Submittal are appropriate for the condition(s) of the proposed patch and will remain durable in the patch's final exposure upon Substantial Completion; and.
 - 5) patching material manufacturer's technical representative's recommendations for surface preparation, installation of patching material(s), and curing.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials - General:
 1. Provide materials that comply with the Contract Documents.
 2. If not shown or indicated in the Contract Documents, use materials identical to existing materials affected by cutting and patching Work.
 3. For exposed surfaces, use materials that visually match existing adjacent surfaces to fullest extent possible. If identical materials are unavailable or cannot be used, provide materials whose installed performance will equal or surpass that of existing materials.
 4. Replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, using materials that do not void required or existing warranties.

- B. Compound Applied to Core-Drilled Surfaces and Cut Concrete Surfaces:
 - 1. After core-drilling or sawcutting (as applicable) and before installing the utility or equipment through the penetration, coat exposed concrete and exposed steel with solvent-free, two-component, protective, epoxy resin coating.
 - 2. Color shall approximate the finish color of the existing surface to be coated.
 - 3. Product and Manufacturer: Subject to compliance with the Contract Documents, the following products and manufacturers are acceptable:
 - a. Sikagard 62, by Sika Corporation.
 - b. Or approved equal.
- C. Grout Materials:
 - 1. Comply with Specification Section 03 09 00 - Concrete.
- D. Epoxy Bonding Adhesive:
 - 1. Provide two-component, moisture-insensitive adhesive manufactured for the purpose of bonding fresh concrete to hardened concrete.
 - 2. Comply with Section 03 09 00 - Concrete.
 - 3. Product and Manufacturer: Subject to compliance with the Contract Documents, the following products and manufacturers are acceptable:
 - a. Euco No.452 MV by Euclid Chemical Co.
 - b. Sikadur 32, Hi-Mod by Sika Corporation.
 - c. Or approved equal.
- E. Epoxy Patch Material:
 - 1. Engage the manufacturer's representative to observe and recommend a suitable patching material of the actual construction conditions.
 - 2. Subject to compliance with the Contract Documents, the following products and manufacturers are acceptable:
 - a. Depth of patch greater than 3/4 IN:
 - 1) Five Star MP Epoxy Patch.
 - 2) Or approved equal.
 - b. Depth of patch between 1/8 IN and 3/4 IN:
 - 1) Five Star Fluid Epoxy.
 - 2) Or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examination and Assessment - General:
 - 1. Examine surfaces to be cut or patched, and conditions under which cutting or patching will be performed before starting cutting or patching Work.
 - 2. Report unsatisfactory or questionable conditions to Engineer in writing.
 - 3. Do not proceed with cutting or patching Work until unsatisfactory conditions are corrected.

3.2 PREPARATION

- A. Provide temporary support required to maintain structural integrity of facilities, to protect adjacent work from damage during cutting, and to support the element(s) to be cut.
- B. Protection of Existing Construction during Cutting and Patching:
 - 1. Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project and facility that will be exposed during cutting and patching operations.
 - 2. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
 - 3. Do not cut existing pipe, conduit, ductwork, or other utilities serving facilities scheduled to be removed or relocated until provisions have been made to bypass them.

3.3 CUTTING AND PATCHING - GENERAL

- A. Perform cutting and coring in such manner that limits extent of patching required.
- B. Structural Elements:
 - 1. Do not cut or patch structural elements in manner that would change the element's structural load-carrying capacity as load deflection ratio.
- C. Operating Elements:
 - 1. Do not cut or patch operating elements in manner that would reduce their capacity to perform as intended.
 - 2. Do not cut or patch operating elements or related components in manner that would increase maintenance requirements or decrease operational life or safety.
- D. Replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, using methods that do not void required or existing warranties.
- E. Provide adequate temporary covering over openings (whether cut or core-drilled) where not in use. Avoid creating tripping hazards for openings provided in floors and slabs.

3.4 CORING

- A. Use core-drilling to make penetrations through concrete and masonry walls, slabs, or arches, unless otherwise accepted by Engineer in writing.
- B. Coring:
 - 1. Perform coring with non-impact rotary tool using diamond core-drills. Size holes for pipe, conduit, sleeves, equipment or mechanical seals, as required, to be installed through the penetration.
 - 2. Do not core-drill through electrical conduit or other utilities embedded in walls or slabs without approval of Engineer. To extent possible, avoid cutting reinforcing steel in slabs and walls.
- C. Protection:
 - 1. Protect existing equipment, utilities, and adjacent areas from water and other damage caused by or resulting from core-drilling operations.
 - 2. After core-drilling and before installing the utility or equipment through the penetration, coat exposed concrete and steel with protective coating material indicated in Paragraph 2.1.B of this Specification Section. Apply protective coating in accordance with manufacturer's instructions.
- D. Cleaning:
 - 1. After core-drilling, vacuum or otherwise remove slurry and tailings from the work area.

3.5 CUTTING

- A. Cutting - General:
 - 1. Cut existing construction using methods least-likely to damage elements retained and adjoining construction and that provide proper surfaces to receive subsequent installation or repair.
 - 2. In general, use hand tools or small power tools suitable for sawing or grinding. When possible, avoid using hammering and avoid chopping. Carefully chip out concrete where necessary and as indicated in the Contract Documents.
 - 3. Cut holes and slots as small as possible, neatly to the size required, and with minimum disturbance of adjacent surfaces.
 - 4. Prior to starting cutting, provide adequate bracing of area to be cut.
 - 5. To avoid marring existing finished surfaces, cut or drill from exposed or finished side into concealed side.
 - 6. Use equipment of adequate size to remove the cut panel or "coupon."
- B. Cutting - Concrete and Masonry:
 - 1. Cut through concrete and masonry using concrete wall saw with diamond saw blades.

2. On both sides of the element being cut, provide for control of slurry generated during sawing.
3. Concrete Cutting:
 - a. Make openings by sawing through existing concrete. Core drill with 6 IN DIA core at the corners of openings to avoid overcutting at corners.
 - b. When the cut-out concrete or “coupon” cannot be removed in one piece, or where concrete is too thick for saw to penetrate fully, break out concrete after initial saw cuts.
 - c. Where saw cutting is not possible:
 - 1) Make openings by drilling holes around perimeter of required opening and subsequently carefully chip out concrete.
 - 2) Holes shall be sufficient in quantity to prevent damage to remaining concrete.
4. Sizing and Repair of Cut Concrete Surfaces:
 - a. Where reinforcing steel is cut, remove existing reinforcing steel back to 1.5 IN below concrete surface. When using heat or torching to remove ends of reinforcing steel, remove adjacent, heat-damaged concrete prior to patching. Sides of resulting hole to be patched shall be approximately perpendicular to finished concrete surface. Provide bonding adhesive on surfaces of resulting holes and fill resulting holes with non-shrink grout in accordance with the Contract Documents.
 - b. Oversize required openings in existing concrete by 1 IN on all sides and build back to required opening size by providing epoxy grout bonded to existing concrete.
 - c. Where oversizing the cut opening by one inch is not possible, cut the opening to the required dimensions. After cutting concrete and before installing subsequent construction on or through the opening, coat exposed concrete and steel with protective coating material indicated in Paragraph 2.1.B of this Specifications Section. Apply protective coating in accordance with manufacturer’s instructions.
 - d. Where indicated, finish remaining surfaces as indicated in Specification Section 03 35 00 - Concrete Finishing and Repair of Surface Defects.

3.6 PATCHING

A. Patching - General:

1. Patch large openings to be filled with concrete in accordance with the Contract Documents. Before installing new concrete, apply bonding adhesive indicated in Paragraph 2.1.C of this Specification Section in accordance with manufacture’s recommendations.
2. Where large openings to be filled with concrete are indicated on the Drawings as requiring reinforcing steel, provide reinforcing steel as shown and indicated in the Contract Documents. Where openings in existing reinforced concrete are larger than 2 FT in diameter or 2 FT by 2 FT and the Drawings or elsewhere in the Contract Documents do not expressly require reinforcing steel for the opening, submit a request for interpretation to Engineer and obtain Engineer’s response before proceeding.
3. Where concrete infill or grout repair materials are not used, patch using epoxy patch material indicated in Paragraph 2.1.D of this Specification Section unless otherwise indicated on Drawings.
4. Patch construction by filling, repairing, refinishing, closing-up, and similar operations following performance of other Work.
5. Patch with durable seams that are as inconspicuous as possible. Provide materials and comply with installation requirements indicated in the Contract Documents and the published installation instructions of the material’s manufacturer.
6. Patch to provide airtight and watertight connections to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
7. Where feasible, test patched areas to demonstrate integrity of installation.

B. Restoration:

1. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in manner that eliminates evidence of patching and refinishing.
2. For continuous surfaces, refinish to nearest intersection.
3. For an assembly, refinish the entire unit that was patched.

4. Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.7 CLEANING

A. Cleaning and Restoration:

1. Perform cleaning promptly after associated cutting, coring, and patching.
2. Clean areas and spaces where cutting, coring, or patching were performed.
3. Clean piping, conduit, and similar constructions before applying paint or other finishing materials.
4. Restore damaged coverings of pipe and other utilities to original condition.

END OF SECTION

SECTION 01 74 00 CLEANING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements for keeping the Site free of accumulations of waste materials during construction (“progress cleaning”).
 - 2. Cleaning for Substantial Completion and prior to final inspection (collectively, “closeout cleaning”).
- B. Scope:
 - 1. Contractor shall perform cleaning during the Project, including progress cleaning, as condition precedent to Substantial Completion, upon completion of the Work, and as required by this Specifications Section and elsewhere in the Contract Documents.
 - 2. Maintain in a clean manner the Site, the Work, and areas adjacent to or affected by the Work.
- C. Related Sections include, but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. National Fire Protection Association (NFPA):
 - a. 241, Safeguarding Construction, Alteration, and Demolition Operations.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 PROGRESS CLEANING

- A. Progress Cleaning - General:
 - 1. Clean the Site, work areas, and other areas occupied by Contractor not less than weekly. Dispose of waste materials in accordance with the Contract Documents, and the following:
 - a. Comply with NFPA 241 for removing combustible waste materials and debris.
 - b. Do not hold non-combustible materials at the Site more than three days if the ambient air temperature is expected to rise above 80 DEGF. When ambient air temperature is less than 80 DEGF, dispose of non-combustible materials within seven days of their generation.
 - c. Provide suitable containers for storage of waste materials and debris. Avoid generation of odors and creation of nuisances.
 - d. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately.
- B. Progress Cleaning - Site:
 - 1. Keep outdoor, dust-generating areas wetted down or otherwise control dust emissions.
 - 2. Not less than weekly, brush-sweep roadways and paved areas at the Site and adjacent areas used by construction vehicles or otherwise affected by construction activities.
 - 3. Comply with dust control requirements in accordance with SUDAS Division 1, Section 1070 – Legal Relations and Responsibility to the Public, Paragraph 2.10.

- C. Progress Cleaning - Work Areas:
1. Clean areas where the Work is in progress to maintain an extent of cleanliness necessary for proper execution of the Work and safety of personnel.
 2. Remove liquid spills promptly. Where spills may have harmful effects on health, safety, protection of facilities, or the environment, immediately report spills to Owner, Engineer, and Authorities Having Jurisdiction, in accordance with the Contract Documents and Laws and Regulations.
 3. Where dust would impair proper execution of or quality of the Work, broom-clean or vacuum entire work area, as necessary.
 4. Concealed Spaces: Remove waste material and debris from concealed spaces before enclosing the space.
- D. Progress Cleaning - Installed Work:
1. Keep installed Work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of installed materials and equipment, using only cleaning agents and methods specifically recommended by material or equipment Supplier.
 2. If Supplier does not recommend specific cleaning agents or methods, use cleaning agents and methods that are not hazardous to health and property and that will not damage or mar exposed surfaces.
- E. Progress Cleaning - Exposed Surfaces:
1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration until Substantial Completion.
- F. Progress Cleaning - Cutting and Patching:
1. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, trailings, cuttings, and similar materials.
 2. Comply with Specification Section 01 73 29 - Cutting and Patching, regarding cleaning during and after cutting and patching Work.
 3. Thoroughly clean piping, ductwork, conduits, and similar features before applying patching material, paint, or other finishing materials.
 4. Restore damaged insulation and coverings on piping, cutwork, and similar items to its pre-construction condition.
- G. Cleaning of Hydraulic Structures:
1. Clean hydraulic structures that will contain fluid, such as tanks and channels, in accordance with this Specification Section and the Concrete Documents.
 2. Do not perform field quality control activities such as testing tanks, channels, and other hydraulic structures for leakage or disinfecting (where applicable), and do not apply for inspection for Substantial Completion for hydraulic structures, until the associated hydraulic structures are clean and free of all waste materials, and ready for intended use.
- H. Waste Disposal:
1. Properly dispose of waste materials (including surplus materials, debris, rubbish, and other waste) off the Site.
 2. Do not burn or bury waste materials at the Site.
 3. Remove waste material and rubbish from excavations before backfilling.
 4. Do not discharge volatile or hazardous substances, such as mineral spirits, oil, or paint thinner, into storm sewers, gutters, sanitary sewers, or other location in the environment. Dispose of such materials in accordance with Laws and Regulations.
 5. Do not discharge wastes to surface waters, drainage routes, or groundwater.
 6. Contractor is solely responsible for complying with Laws and Regulations regarding storing, transporting, and disposing of waste generated by Contractor's operations or brought to the Site by Contractor.

- I. During handling and installation of materials and equipment, clean and protect construction in progress and adjoining materials and equipment already in place. Apply protective covering where necessary or required for protection from damage or deterioration, until Substantial Completion.
- J. Clean completed construction as frequently as necessary throughout the construction period.

3.2 CLOSEOUT CLEANING

- A. Complete the following prior to requesting inspection for Substantial Completion:
 - 1. Clean and remove from the Site waste material (including rubbish and debris) and other foreign and undesirable items and substances.
 - 2. Sweep broom-clean paved areas suitable for access by vehicles.
 - 3. Remove spills and stains or petroleum, oils, solvents, other chemicals, and other foreign and undesirable deposits.
 - 4. Hose-clean sidewalks and loading areas.
 - 5. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - 6. Surface waterways and drainage routes (including storm sewers, gutters, and ditches) shall be open and clean.
 - 7. Repair pavement, roads, sod, and other areas affected by construction operations and restore to specified condition; if condition is not specified, restore to preconstruction condition.
 - 8. Clean exposed exterior and interior hard-surfaced finishes to dirt-free condition, free of spatter, grease, stains, fingerprints, films, and similar foreign and undesirable substances.
 - 9. Clean, wax, and polish wood, vinyl, and painted floors.
 - 10. Remove waste material and surface dust from limited-access spaces, including roofs, plenums, shafts, trenchway, equipment vaults, manholes, and similar spaces.
 - 11. In unoccupied spaces, sweep concrete floors broom-clean.
 - 12. Clean transparent materials, including mirrors and glazing in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
 - 13. Remove non-permanent tags and labels.
 - 14. Surface Finishes:
 - a. Touch-up and otherwise repair and restore chipped, scratched, dented or otherwise marred surfaces to specified finish and match adjacent surfaces.
 - b. Do not paint over “UL” or similar labels, including mechanical and electrical nameplates.
 - 15. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint, and mortar droppings, and other foreign or undesirable substances.
 - 16. Clean plumbing fixtures to sanitary condition, free of stains, including stains resulting from water exposure.
 - 17. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - 18. Clean lighting fixtures, lamps, globes, and reflectors to function with full efficiency. Replace temporary lamps provided in permanent fixtures. Replace existing lighting fixture components that are burned out or noticeably dimmed from use during construction. Replace defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - 19. Leave the Site clean, and in neat, orderly condition, satisfactory to Owner and Engineer.
- B. Complete the following prior to requesting final inspection:
 - 1. After Substantial Completion of all the Work, following completion of items of incomplete or damaged Work (“punch list Work”), clean “punch list Work areas in accordance with Paragraph 3.2.A of this Specification Section.

2. Remove field offices, Contractor's storage sheds, and remaining stockpiles and clean all such areas in accordance with Paragraph 3.2.B of this Specification Section, and in accordance with Contract Documents for landscaping and restoration.

END OF SECTION

SECTION 01 75 00
CHECKOUT AND STARTUP PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Administrative and procedural requirements for checkout and startup of equipment, systems, and facilities.
- B. Scope:
1. Contractor shall initially check out, start up, and place equipment and systems installed under the Contract into successful operation, in accordance with the material and equipment manufacturers' written instructions, Suppliers' recommendations at the Site, and the Contract Documents.
 2. Provide the following:
 - a. All labor, tools, materials, and equipment required to complete equipment and system checkout and startup.
 - b. Chemicals, lubricants, and other required operating fluids necessary for checkout, startup, and initial operation of the Work.
 - c. Filters and other temporary or consumable items necessary for checkout, startup, and initial operation of the Work.
 - d. Fuel, electricity, water, and other temporary utilities and temporary facilities necessary for checkout and startup of equipment and systems, unless otherwise specified.
 3. The Contract Documents, and Specification Section 01 77 19 - Closeout Requirements, address requirements for documenting Substantial Completion.
- C. Related Sections include, but are not necessarily limited to:
1. SUDAS Division 1.
 2. Division 01 - General Requirements.
 3. Section 01 04 00 - Special Provisions.
 4. Section 01 61 03 - Equipment - Basic Requirements.
 5. Section 01 77 19 - Closeout Requirements.
 6. Section 01 78 23 - Operation and Maintenance Data.
 7. Section 01 79 23 - Instruction of Operations and Maintenance Personnel.
 8. Section 40 61 13 - Process Control Systems - General Requirements.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
1. Coordinate checkout and startup with other contractors, as necessary.
 2. Do not start up equipment or system(s) for continuous operation until all components of that equipment item or system, including instrumentation and controls, have been tested to the extent practicable and proven to be operable as intended by the Contract Documents.
 3. Subject to the constraints of this Specification Section, Owner will furnish sufficient personnel to assist Contractor in starting up equipment and system(s), but responsibility for proper operation of the Work is Contractor's.
 4. Supplier shall be present during checkout, startup, and initial operation, unless otherwise acceptable to Engineer or otherwise required by the Contract Documents.
 5. Do not start up equipment and system(s), without submitting acceptable preliminary operations and maintenance manuals by Contractor in accordance with the Contract Documents.

- B. Checkout and Startup Planning Meeting:
1. Contractor, with appropriate Subcontractors and Suppliers, shall attend and participate in a meeting with Owner and Engineer to discuss planning, scheduling, and coordination of checkout and startup activities.
 2. Upon mutual concurrence of Owner, Engineer, and Contractor, meeting may be concurrent with the training scheduling planning meeting required in Specification Section 01 79 23 - Instruction of Operations and Maintenance Personnel.
 3. Meeting shall be held by the earlier of: (1) not less than 60 days prior to first scheduled training session for the equipment and system(s) to be checked out and started-up, and (2) not less than 60 days prior to the checkout and startup of the associated equipment and system(s).
 4. Attend meeting prepared to knowledgably and effectively discuss:
 - a. Status of the Work and schedule-to-complete for requirements prerequisite to checkout and startup.
 - b. Schedule for and status of training required for each equipment item and system.
 - c. Schedule for checkout, startup, and field quality control activities for the subject Work.
 - d. Status and quantities of required consumables, lubricants, and utility services necessary for checkout and startup.
 5. Meeting will be chaired by Engineer. Engineer will prepare and distribute a record of topics discussed and decisions made during the meeting. If meeting is concurrent with the training planning meeting required under Specification Section 01 79 23 - Instruction of Operations and Maintenance Personnel, Contractor shall chair and prepare minutes of the training scheduling planning portion of the meeting and furnish its draft minutes to Engineer to incorporate into the overall minutes.
 6. Comply with decisions made at the meeting and the Contract Documents.
- C. Sequencing:
1. Comply with Specification Section 01 14 16 - Coordination with Owner's Operations, regarding staging (phasing) of the Work and allowable shutdowns.
- D. Scheduling:
1. Progress Schedule:
 - a. Clearly indicate in the Progress Schedule planned and actual dates for checkout, startup, and field quality control activities, including all demonstration testing activities addressed in this Specifications section and elsewhere in the Contract Documents. Separately indicate checkout, startup, and field quality control activities for each equipment item and system.
 - b. Perform startup and field quality control activities on the associated, scheduled dates, unless otherwise acceptable to Owner and Engineer.
 2. Restrictions for Scheduling:
 - a. Checkout of materials, equipment, and systems by Contractor that do not involve or require Owner's personnel may be performed at any time during normal working hours. Where required by the Contract Documents or requested by Engineer, perform checkout in the presence of Engineer or Resident Project Representative (RPR).
 - b. Startup, including initial operation of materials, equipment, and systems, shall not be initiated on: Monday, Friday, Saturday, Sunday, Owner's holidays, the day immediately prior to a holiday, or the day immediately following a holiday, unless otherwise acceptable to Owner and Engineer.
 - c. Unless otherwise indicated in the Contract Documents or acceptable to Owner and Engineer, perform all startup during normal working hours of the day shift.
 - d. To the extent practicable, where extended-duration startup or field quality control activities are required by the Contract, avoid having such activities extend into evening, night, weekend, or holiday hours.
 - e. Owner reserves the right to require a minimum seven days' notice of rescheduled startup when Contractor cannot perform the associated activities as scheduled.

3. Operation and Maintenance Data:
 - a. Comply with Specification Section 01 78 23 - Operation and Maintenance Data.
 - b. A preliminary copy of all operation and maintenance manuals shall be received by Engineer prior to the start of the demonstration period "OAT".
4. Training:
 - a. Comply with Specification Section 01 79 23 - Instruction of Operations and Maintenance Personnel.
5. Spare Parts, Tools, and Extra Materials.
 - a. Comply with Specification Section 01 78 43 - Spare Parts and Extra Materials, for furnishing spare parts, tools, and extra materials to Owner and for documenting Owner's or facility manager's (as applicable) receipt of such items.
 - b. Deliver to Owner (as applicable) all required spare parts, tools, and extra materials prior to commencing the demonstration period "OAT", unless earlier delivery is required elsewhere in the Contract Documents.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements:
1. Do not start up equipment or systems or place into initial operation until required operating permits are obtained from Authorities Having Jurisdiction.
 2. Where Owner (with or without assistance of Engineer) has applied for and obtained initial approvals or permits necessary for operation, Contractor shall furnish information and assistance to Owner or Engineer for Owner to secure final approvals from Authorities Having Jurisdiction for required operating permits.

1.4 DEFINITIONS

- A. The following defined terms are used in this Specifications Section:
1. Instrumentation Supplier: Entity retained by Contractor, Subcontractor, or Supplier to furnish instrumentation or controls that will be part of the completed Work, including manufacturers, manufacturer representatives, wholesalers, retailers, and others, including entities retained to perform systems integration Work.
 2. Project Classified System (PCS): An established, distinct part of the Project, consisting of an arrangement of items, such as equipment, structures, components, piping, cabling, materials, and incidentals, so related or connected to form an identifiable, unified, functional, operational, safe, and independent system. PCS's may be specifically indicated in this Specification Section or elsewhere in the Contract Documents, such as Section 01 14 16 - Coordination with Owner's Operations and others.
 3. Pre-Demonstration Period: The period of time, of unspecified duration after initial construction and installation activities during which Contractor, with assistance from manufacturer's representatives, performs in the following sequence:
 - a. Finishing type construction work to ensure each PCS has reached a state of Substantial Completion.
 - b. Equipment start-up.
 - c. Personnel training.
 4. Demonstration Period: A period of time, of specified duration, following the Pre-Demonstration Period, during which the Contractor initiates process flow through the PCS and starts up and operates the PCS, without exceeding specified downtime limitations, to prove the functional integrity of the mechanical and electrical equipment and components and the control interfaces of the respective equipment and components comprising the PCS as evidence of Substantial Completion.

1.5 PROJECT CLASSIFIED SYSTEMS (PCS)

- A. Project Classified Systems (PCS) are established as follows:
1. PCS No. 1 through PCS No. 12: Final Clarifier Nos. 1 through 12.
 - a. Each Final Clarifier is a separate PCS and includes the following work.
 - 1) Installation of new Final Clarifier sludge collection mechanism, access bridge, access stair and scum collection components.
 - 2) Installation and laser leveling of new weirs and scum baffles.
 - 3) Installation of new launder covers.
 - 4) Installation of new effluent drop box stop log.
 - 5) Installation of new Sludge Blanket level transmitter.
 - 6) Installation of new Final Clarifier Control Panel.
 - 7) Electrical and Controls Modifications.
 - 8) CCTV inspection of Final Clarifier Influent pipe (48-ML) from center well to the final clarifier influent sluice gate north of return sludge pump station (50, 51, 52).
 - 9) CCTV inspection of Final Clarifier Return Sludge pipe (24-RSL) from center well to RSL wet well in return sludge pump station (50, 51, 52).
 - 10) Concrete surface repair and crack repair identified by Engineer, Owner, and RPR.
 - 11) All incidentals necessary for a complete system.
 2. PCS No. 13: Sluice Gate Replacement for Building 50 and Final Clarifier Nos. 1 through 4.
 - a. Replacement of 48 IN x 48 IN final clarifier influent sluice gates.
 - 1) Tag Numbers: 55-FC-G-1, 55-FC-G-2, 55-FC-G-3, and 55-FC-G-4.
 - b. Replacement of 12 IN x 12 IN secondary scum sluice gate (50-SSC-G-1).
 - c. Replacement of 36 IN x 36 IN return sludge wet well equalization sluice gate (50-RSL-G-1).
 - d. Installation of new electric open/close actuators and SCADA controls.
 - e. All incidentals necessary for a complete system.
 3. PCS No. 14: Sluice Gate Replacement for Building 51 and Final Clarifier Nos. 5 through 8.
 - a. Replacement of 48 IN x 48 IN final clarifier influent sluice gates:
 - 1) Tag Numbers: 55-FC-G-5, 55-FC-G-6, 55-FC-G-7, and 55-FC-G-8.
 - b. Replacement of 12 IN x 12 IN secondary scum sluice gate (51-SSC-G-1).
 - c. Replacement of 36 IN x 36 IN return sludge wet well equalization sluice gate (51-RSL-G-1).
 - d. Installation of new electric open/close actuators and SCADA controls.
 - e. All incidentals necessary for a complete system.
 4. PCS No. 15: Sluice Gate Replacement for Building 52 and Final Clarifier Nos. 9 through 12.
 - a. Replacement of 48 IN x 48 IN final clarifier influent sluice gates.
 - 1) Tag Numbers: 55-FC-G-9, 55-FC-G-10, 55-FC-G-11, and 55-FC-G-12.
 - b. Replacement of 12 IN x 12 IN secondary scum sluice gate (52-SSC-G-1).
 - c. Replacement of 36 IN x 36 IN return sludge wet well equalization sluice gate (52-RSL-G-1).
 - d. Installation of new electric open/close actuators and SCADA controls.
 - e. All incidentals necessary for a complete system.
 5. PCS No. 16: Secondary Effluent Channel:
 - a. Effluent channel structural repairs.
 - b. Installation of new FRP effluent channel covers.

1.6 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Action Submittals: Submit the following:
1. Reporting log for each required Demonstration Period.
- C. Informational Submittals: Submit the following:
1. Progress Schedules indicating dates for checkout, startup, and field quality control activities.

2. Completed checkout and startup log required in Paragraph 3.2.C of this Specification Section.
3. Manufacturer's installation check letters (also known as Manufacturer's Field Services Report) required in Paragraph 3.2.C of this Specification Section.
4. Instrumentation Supplier's Instrumentation Installation Certificate, required in Paragraph 3.2.C of this Specification Section.
5. Letter verifying completion of all pre-demonstration startup activities, required in Paragraph 3.2.C of this Specification Section.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 CHECKOUT AND STARTUP - GENERAL

- A. Facility Startup Divided into Two Periods:
 1. Pre-Demonstration Period including:
 - a. Obtain Engineer's approval or acceptance (as applicable) of Submittals required prior to checkout and startup, including all Shop Drawings, Samples, source quality control (shop testing) Submittals, preliminary operation and maintenance manuals, and other Submittals required by the Contract Documents, other than Submittals that cannot be furnished until after startup.
 - b. Complete the Work to a point ready for checkout and startup, including operation available in all manual, automatic, and other modes.
 - c. Checkout and initial field quality control activities that can be performed prior to startup of the equipment or system.
 - d. Startup of the associated Work.
 - e. Field quality control activities for the subject Work as indicated elsewhere in the Specifications and other Contract Documents, other than this Section.
 - f. Training of operations and maintenance personnel.
 2. Demonstration Period, including:
 - a. Demonstration of functional integrity of equipment, system, or PCS.
- B. Contractor to pay all costs associated with Checkout and Startup.

3.2 PRE-DEMONSTRATION PERIOD

- A. Prior to the Pre-Demonstration Period, complete the Work to the point where each PCS is ready for checkout and startup.
- B. Checkout.
 1. Comply with Specification Section 01 61 03 - Equipment - Basic Requirements, including provisions concerning installation checks.
- C. Startup:
 1. Comply with requirements for startup of materials, equipment, and systems indicated in the associated Specification sections and elsewhere in the Contract Documents.
 2. Prepare the Work so it will operate properly and safely and be ready to demonstrate functional integrity during the Demonstration Period.
 3. Perform startup to extent possible without introducing process flow.
 4. Introduce process flow to complete startup for each of the PCS's.
 5. Procedures include but are not necessarily limited to the following:
 - a. Test or check and correct deficiencies of:
 - 1) Power, control, and monitoring circuits for continuity prior to connection to power source.
 - 2) Voltage of all circuits.
 - 3) Phase sequence.

- 4) Cleanliness of connecting piping systems.
- 5) Alignment of connected machinery.
- 6) Vacuum and pressure of all closed systems.
- 7) Lubrication.
- 8) Valve orientation and position status for manual operating mode.
- 9) Tankage for integrity using clean water or process flow as approved by Engineer and Owner.
- 10) Pumping equipment using process flow.
- 11) Instrumentation and control signal generation, transmission, reception, and response.
 - a) Comply with Section 40 61 13 - Process Control System General Requirements.
- 12) Tagging and identification systems.
- 13) Proper connections, alignment, calibration and adjustment.
- b. Calibrate safety equipment.
- c. Manually rotate or move moving parts to assure freedom of movement.
- d. "Bump-start" electric motors to verify proper rotation.
- e. Perform other tests, checks, and activities required to make the Work ready for Demonstration Period.
- f. Checkout and Startup Log:
 - 1) Prepare a log showing each equipment item and system requiring checkout and startup. Indicate in the log activities to be accomplished during checkout and startup.
 - 2) Provide a place for Contractor to record date and person performing required checkout and startup. Indicate associated date(s), personnel, and employer of each.
 - 3) Submit completed checkout and startup log to Engineer and obtain Engineer's acceptance.
6. Obtain Suppliers' certifications of the installed and operational Work, without restrictions, and submit to Engineer:
 - a. Manufacturer's installation check letters (sometimes referred to as Manufacturer's Field Services Report).
 - b. Instrumentation Supplier's Instrumentation Installation Certificate.
7. Letter verifying completion of all pre-demonstration startup activities including receipt of all specified items from Suppliers as final item prior to initiation of Demonstration Period.
8. Personnel Training.

3.3 DEMONSTRATION PERIOD

A. General:

1. Demonstrate the operation and performance of mechanical, electrical, instrumentation, and control interfaces of the Work undergoing the Demonstration Period, in accordance with the Contract Documents.
2. Duration of Demonstration Period: 120 consecutive hours.
3. If, during the Demonstration Period, the aggregate time used for repair, alteration, or unscheduled adjustments to any part of the Work that renders the affected Work inoperative or operation outside of recommended ranges exceeds 10% of the Demonstration Period, the demonstration of operation and performance will be deemed unacceptable and Contractor shall provide appropriate adjustments and remedies and re-perform the Demonstration Test, at no additional cost to Owner or facility manager, until acceptable results are obtained. Re-performance of the Demonstration Period shall comply with the same requirements as the original Demonstration Period.
4. Perform the demonstration of operation and performance of the Work under full operational conditions.

5. Owner's Personnel:
 - a. Owner (as applicable) will make available operations personnel to make process decisions affecting facility performance and compliance with applicable operating permits.
 - b. Owner's assistance will be available only for process decisions.
 - c. Contractor will perform all other functions associated with the Demonstration Period including but not limited to equipment operation and maintenance until successful completion of the Demonstration Period in accordance with the Contract Documents.
6. Owner reserves the right to simulate operational variables, equipment failures, routine maintenance scenarios, and similar actions and events during the Demonstration Period to verify the operation and performance of the Work in automatic, manual, and other types of operating modes, backup systems, and alternate operating modes.
7. Prior to Starting Demonstration Period:
 - a. Prepare reporting log for data to be obtained. Not less than 30 days prior to the start of the Demonstration Period, submit the data collection and reporting log to Engineer for acceptance.
8. Timing of Start and End of Demonstration Period:
 - a. Time of beginning and ending Demonstration Period shall be agreed upon by Contractor, Owner, and Engineer in advance of initiating Demonstration Period.
9. Throughout the Demonstration Period, provide knowledgeable personnel to answer Owner's questions, provide final field instruction on select systems (where appropriate), and to respond to problems or failures of the Work.
10. Provide all labor, supervision, utilities, chemicals, maintenance, equipment, vehicles, or any other item necessary to operate and demonstrate all systems being demonstrated.

END OF SECTION

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SECTION 01 77 19
CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Administrative and procedural requirements for:
 - 1. Substantial Completion.
 - 2. Final inspection.
 - 3. Request for final payment and acceptance of the Work.
- B. Related Sections include, but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.

1.2 SUBSTANTIAL COMPLETION

- A. Substantial Completion - General:
 - 1. Prior to requesting inspect for Substantial Completion, perform the following for the substantially completed Work:
 - a. Materials and equipment for which Substantial Completion is requested shall be fully ready for their intended use, including full operating and monitoring capability in automatic, manual, and other operating modes set forth in the Contract Documents.
 - b. Permanent provisions for safety and protection, shown and indicated in the Contract Documents and associated with the substantially completed Work or for personnel accessing and using the substantially completed Work, shall be in place and ready for their intended use.
 - c. Complete field quality control Work, including inspections and testing at the Site, indicated in Specifications sections for individual materials and equipment items and related Contract Documents. Submit results of, and obtain Engineer's acceptance of, field quality control tests and inspections required by the Contract Documents.
 - d. Complete checkout and startup in accordance with Specification Section 01 75 00 - Checkout and Startup Procedures, requirements of the Specifications for the various materials and equipment in the substantially completed Work, and related Contract Documents.
 - e. Cleaning for Substantial Completion shall be completed in accordance with Specification Section 01 74 00 - Cleaning.
 - f. Spare parts, tools, and extra materials shall be delivered and accepted in accordance with the Contract Documents and documentation of Owner's acceptance thereof has been submitted to Engineer in acceptable form in accordance with Specification Section 01 78 43 - Spare Parts and Extra Materials.
 - g. Training of the facility's operations and maintenance personnel shall be completed in accordance with the Contract Documents, including Specification Section 01 79 23 - Instruction of Operations and Maintenance Personnel.
 - h. Submit and obtain Engineer's acceptance of final operations and maintenance manuals in accordance with Specification Section 01 78 23 - Operation and Maintenance Data.
 - i. Obtain and submit to Engineer all required permits, inspections, and approvals of Authorities Having Jurisdiction for the substantially completed Work to be occupied and used by Owner.
 - j. Complete other tasks that the Contract requires be completed prior to Substantial Completion.
 - 2. Procedures for requesting and documenting Substantial Completion are in the Contract Documents.

3. Sample letter for Contractor's request for inspection for Substantial Completion is attached to this Specifications Section. Use the model language of the sample letter, modified to suit the Project and the needs of Contractor's request.
4. Unless decided otherwise by Owner and Engineer, form of certificate of Substantial Completion will be EJCDC C-625, "Certificate of Substantial Completion" (2018 edition or later), prepared by Engineer.
5. Refer to the Agreement and Specification Section 01 29 76 - Progress Payment Procedures, for requirements regarding consent of surety to partial release of or reduction in retainage.

1.3 FINAL INSPECTION

A. Final Inspection - General:

1. Prior to requesting final inspection, verify that all the Work is fully complete and ready for final payment. Partial checklist for this purpose is attached to this Specification Section.
2. Sample letter for Contractor to request final inspection is attached to this Specification Section. Use the model language of the sample letter, modified to suit the Project.
3. Procedures for requesting and documenting the final inspection are in the Agreement, Contract Documents, and as augmented in this Specification Section.

1.4 REQUEST FOR FINAL PAYMENT AND ACCEPTANCE OF THE WORK

A. Procedure:

1. After successful completion of the final inspection, submit request for final payment in accordance with the Agreement and Contract Documents, and using procedure specified in Specification Section 01 29 76 - Progress Payment Procedures, and this Specification Section.
2. Acceptance of the Work:
 - a. Upon Engineer's concurrence that the Work is complete and ready for final payment (as a result of the final inspection and other communications between the parties and Engineer) and receipt of the final Application for Payment, accompanied by other required Contract closeout documentation, all in accordance with the Contract Documents, Engineer will issue to Owner and Contractor a notice of acceptability of the Work, in accordance with the Contract Documents.
 - b. Unless decided otherwise by Owner and Engineer, form of acceptance will be EJCDC C-626, "Notice of Acceptability of Work", (2018 edition or later).
 - c. Nothing other than receipt of such notice of acceptability from Engineer constitutes acceptance of the Work.
 - d. Receipt of Engineer's notice of acceptability of the Work does not relieve Contractor of Contractor's continuing obligations under the Contract, including correction period obligations, warranty obligations, indemnification obligations, insurance requirements, and Contractor's other obligations following acceptance of the Work by Engineer and final payment. Such obligations shall commence and remain in effect as indicated elsewhere in the Contract Documents.

B. Request for final payment shall include:

1. Documents required for progress payments in Specification Section 01 29 76 - Progress Payment Procedures.
2. Documents required in the Agreement and Contract Documents.
3. List, on Contractor's letterhead, of all Change Proposals, Claims, and disputes that Contractor believes are unsettled. If there are no such Change Proposals, Claims, or disputes, so indicate in writing.
4. Consent of Surety to Final Payment:
 - a. Acceptable form includes AIA G707, "Consent of Surety to Final Payment" (1994 or later edition), or other form acceptable to Owner.
5. Releases of Liens:
 - a. Submit complete and legally effective releases (satisfactory to Owner) of all Liens filed in connection with the Work, regardless of whether such Lien was filed by Contractor, Subcontractor, or Supplier.

- b. Each release of Lien shall be signed by an authorized representative of the entity submitting the release of Lien, and shall include Contractor's, Subcontractor's, or Supplier's (as applicable) corporate seal, when applicable.
- 6. Waivers of Lien Rights:
 - a. Submit legally-binding waivers of rights to file Liens, acceptable to Owner, as required in the Agreement and Contract Documents from Contractor and each Subcontractor and Supplier that furnished or provided labor, material, or equipment totaling \$1,000 or more for the Work.
 - b. Furnish final list of Subcontractors and Suppliers indicating final amount of the associated subcontract or purchase order for each. Include on the list all lower-tier Subcontractors and Suppliers retained by higher-tier Subcontractors and Suppliers. Prepare the list using the form included in Specification Section 01 29 76 - Progress Payment Procedures.
 - c. Each waiver of Lien rights shall be signed by an authorized representative of the entity submitting waiver of Lien rights, and shall include Contractor's, Subcontractor's, or Supplier's (as applicable) corporate seal, when applicable.
 - d. Waiver of Lien rights may be conditional upon receipt of final payment.
 - e. Required Affidavits: Submit the following:
 - 1) Affidavit of payment of debts and claims, submitted by Contractor. Acceptable form includes AIA G706, "Contractor's Affidavit of Payment of Debts and Claims" (1994 or later edition), or other form acceptable to Owner, and;
 - 2) Affidavit of release of Liens, submitted by Contractor. Acceptable form includes AIA G706A, "Affidavit of Release of Liens" (1994 or later edition).
 - 3) Each affidavit shall be signed by an authorized representative of Contractor and shall bear Contractor's corporate seal, as applicable.
 - f. In the event Contractor is unable to obtain one or more required waivers of Lien rights, recourse is set forth in the Agreement and Contract Documents.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The documents listed below, following this Specification section's "End of Section" designation, are part of this Specifications Section:
 - 1. Sample letter for Contractor's use in requesting inspection for Substantial Completion (two pages).
 - 2. Sample partial checklist to identify readiness for final inspection (four pages).
 - 3. Sample letter for Contractor's use in requesting final inspection (one page).
- B. In the model language of the attached sample letters for Contractor to request inspection for Substantial Completion and the final inspection, italicized language in brackets, e.g., "[**insert date**]" indicates instructions to the drafter of the letter and often indicates specific information to be inserted by Contractor; do not include bracketed, italicized text in the final version of the letter(s) prepared for the Project. Non-italicized language in brackets is optional language; use the appropriate language to complete the actual letter for the Project and edit where required to suit the specific circumstances.

END OF SECTION

**SAMPLE LETTER FOR CONTRACTOR'S USE IN
REQUESTING INSPECTION FOR SUBSTANTIAL COMPLETION**

SENT VIA E-MAIL AND U.S. CERTIFIED MAIL/RETURN RECEIPT REQUESTED

{Date}

{Name of Engineer's contact person}

HDR

{Street address}

{City, state, postal code}

Subject:

{Project name, Contract designation}

Request for Inspection for Substantial Completion

Dear {addressee}:

In our opinion, {all of} {or} {a portion of} the Work under the above-referenced Contract is substantially complete as of {insert month, day, year on which Substantial Completion was achieved}. {The specific portion of the Work that we believe is substantially complete is {insert identification of that portion of the Work that is substantially complete}.}

Enclosed is our listing of uncompleted Work items ("punch list"). In accordance with the Contract Documents, we hereby request: (1) That the Engineer schedule and perform the inspection for Substantial Completion as soon as possible, and (2) Issuance of the certificate of Substantial Completion.

In accordance with the Contract Documents, upon Substantial Completion, we propose the following relative to apportionment of responsibilities between the Owner and the Contractor:

1. Security, Protection, Insurance:

- a. Site Security: {insert proposal; address whether Owner or Contractor will be responsible for security of the Site}.
- b. Protection of the Substantially Completed Work: {insert proposal; address whether Owner or Contractor will be responsible for protection}.
- c. Property Insurance: {insert proposal; typically Owner assumes responsibility for property insurance upon Substantial Completion}

2. Operation and Maintenance:

- a. Operation: {insert proposal; address whether Owner or Contractor will be responsible for operating the substantially completed Work}.
- b. Maintenance: {insert proposal; address whether Owner or Contractor will be responsible for maintaining the substantially completed Work}.

3. Utilities: {for each of the following, indicate whether Owner or Contractor will be responsible for utilities and services, or whether responsibility will be shared; if shared, indicate proposed cost-sharing}

- a. Electricity: {insert proposal}.
- b. Natural Gas/Fuel/Heating: {insert proposal}.
- c. Water Supply: {insert proposal}.
- d. Wastewater: {insert proposal}.

e. Communications (Telephone, Internet, Video): {insert proposal}.

In accordance with the Contract Documents, we understand that the Contract's correction period for the Work covered by the certificate of Substantial Completion commences on the Substantial Completion date documented in said certificate.

Should you have questions or comments regarding this notice, please contact {the undersigned} {or} {insert other contact person's name}, at {insert telephone number and e-mail address}.

Sincerely,

{Contractor's company name}

{Signatory name}

{Signatory's title}

Attachments:

Preliminary list of uncompleted Work items ("punch list"; {##} pages)

Copies:

{Owner's project manager}

SAMPLE PARTIAL CHECKLIST TO IDENTIFY READINESS FOR FINAL INSPECTION

Project: _____

Contract: _____

Contractor: _____

Item No./Description	Completed/Date	In Progress	Not Started	Not Applicable	Target Date	Responsible Entity/Person
1. All Submittals, including all Shop Drawings and Samples, approved or accepted by Engineer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						
1. Final services completed by Suppliers, including submittal of "Manufacturer Field Service Report" in Section 01 61 03 Equipment - Basic Requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						
2. Final Work completed by Subcontractors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						
3. Permits closed out and regulatory compliance transitioned from construction to operations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						
4. All outstanding change issues are addressed and all Change Proposals submitted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						
5. All Change Proposals and Claims are resolved	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Item No./Description	Completed/Date	In Progress	Not Started	Not Applicable	Target Date	Responsible Entity/Person
<i>Remarks:</i>						
6. All defective Work of which Contractor is aware has been corrected in accordance with the Contract Documents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						
7. Issues related to Constituents of Concern and potential Hazardous Environmental Condition have been fully addressed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						
8. All spare parts, tools, and extra materials have been furnished in accordance with the Contract Documents, and documentation thereof submitted to Engineer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						
9. All final operations & maintenance manuals have been submitted and accepted by Engineer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						
10. Manufacturer warranties and software license(s) furnished	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						
11. Instruction and training of operations and maintenance personnel is complete and records of training submitted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Item No./Description	Completed/Date	In Progress	Not Started	Not Applicable	Target Date	Responsible Entity/Person
<i>Remarks:</i>						
12. MBE/WBE/DBE/VBE compliance report(s) submitted (when applicable)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						
13. All field engineering Submittals, including survey data, furnished	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						
14. All Work on "punch list" is complete in accordance with the Contract Documents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						
15. All record documents submitted to and accepted by Engineer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						
16. Contractor is fully demobilized from the Site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						
17. All Site restoration is complete	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						
18. Final cleaning of all work areas is complete	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						
19. Releases of Liens and waivers of Lien rights (or acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Item No./Description	Completed/Date	In Progress	Not Started	Not Applicable	Target Date	Responsible Entity/Person
alternative) obtained from Subcontractors and Suppliers						
<i>Remarks:</i>						
20. Evidence of Contractor liability insurance furnished for correction period	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						
21. All other required Contract closeout documents obtained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						
<i>Remarks:</i>						
22. All other Work and documentation required prior to final payment is complete and provided in accordance with the Contract Documents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<i>Remarks:</i>						

**SAMPLE LETTER FOR CONTRACTOR'S USE IN
REQUESTING FINAL INSPECTION**

SENT VIA E-MAIL AND U.S. CERTIFIED MAIL/RETURN RECEIPT REQUESTED

{Date}

{Name of Engineer's contact person }

HDR

{Street address }

{City, state, postal code }

Subject:

{Project name, Contract designation }

Request for Final Inspection

Dear {addressee}:

The Work under the above-referenced Contract is complete and ready for final payment as of {insert month, day, year on which final completion was achieved}. In accordance with the Contract Documents, we hereby request that the Engineer schedule and perform the final inspection as soon as possible. Upon successful completion of the final inspection, we will submit our final Application for Payment accompanied by the required Contract closeout documentation in accordance with the Contract Documents.

Should you have questions or comments regarding this notice, please contact {the undersigned} {or} {insert other contact person's name}, at {insert telephone number and e-mail address}.

Sincerely,

{Contractor's company name }

{Signatory name }

{Signatory's title }

Attachments:

None

Copies:

{Owner's project manager }

SECTION 01 78 23
OPERATION AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Requirements for Contractor-furnished, manufacturers' operation and maintenance (O&M) data, including:
 - a. Required operation and maintenance data groupings into operation and data manuals and timing of such Submittals.
 - b. Requirements for paper copies of operation and maintenance data and related Electronic Documents.
 - c. Content of operation and maintenance data Submittals.
 2. Requirements for furnishing program code and configuration files.
- B. Scope:
1. Contractor shall submit operation and maintenance data, and related information, in accordance with this Specification Section and requirements elsewhere in the Contract Documents, as instructional and reference information for use by: (a) Owner's operation and maintenance personnel, and (b) others retained by or working for Owner.
 2. In addition to operation and maintenance data expressly required elsewhere in the Contract Documents, also submit operation and maintenance data for:
 - a. All equipment and systems, including facility equipment, conveying equipment, fire suppression systems, plumbing equipment, HVAC equipment, electrical equipment, communications equipment, electronic safety and security systems, utility equipment, transportation equipment, waterway and marine equipment, and process equipment, and other equipment.
 - b. Valves, gates, actuators, and related accessories.
 - c. Instrumentation and control devices and systems.
 - d. Building materials, systems, and finishes that need post-construction troubleshooting, cleaning, or maintenance, such as roofing, doors, windows, louvers, flooring, paint and coatings, other finishes, and other items.
- C. Related Sections include, but are not necessarily limited to:
1. SUDAS Division 1.
 2. Division 01 - General Requirements.
 3. Section 01 04 00 - Special Provisions.
 4. Section 01 33 00 - Submittal Procedures.
 5. Section 01 75 00 - Checkout and Startup Procedures.
 6. Section 01 78 36 - Warranties.

1.2 SUBMITTALS

- A. Closeout Submittals: Submit the following:
1. Operation and Maintenance Data:
 - a. Submit operation and maintenance data required by the Contract Documents.
 - b. For each required operation and maintenance manual Submittal, furnish preliminary Submittal and final Submittal. Timing of preliminary and final operation and maintenance manual Submittals, and differences between preliminary and final Submittals, are indicated in this Specification Section.

2. Program Code and Configuration Files:
 - a. Submit as Electronic Documents transmitted in accordance with Specification Section 01 33 00 - Submittal Procedures, program code for programmable logic controllers, human-machine interfaces, operator interface terminals, and other programmable controllers, and configuration files, in accordance with requirements of this Specification Section.
 - b. Engineer's review of such Electronic Documents will be only to verify required Submittals were furnished. Engineer is not responsible for verifying completeness or accuracy of program code and configuration file Submittals.
- B. Timing of Submittals and Quantity Required:
1. Preliminary Operation and Maintenance Manual Submittals:
 - a. Paper Copies: None, exclusive of copies required for Contractor's use.
 - b. Electronic Documents: In accordance with Specification Section 01 33 00 - Submittal Procedures.
 - c. Submit to entity indicated in Specification Section 01 33 00 - Submittal Procedures, by the earlier of: 45 calendar days following approval of Shop Drawings and product data Submittals, or 30 calendar days prior to starting training of operation and maintenance personnel, or 14 calendar days prior to field quality control testing at the Site.
 - d. Do not perform checkout, startup, and training without Engineer's acceptance of preliminary operation and maintenance data Submittals for the associated Work.
 2. Final Operation and Maintenance Manual Submittals: Furnish final Submittal prior to Substantial Completion of the associated Work, unless submittal is required prior to an interim Milestone.
 - a. Paper Copies: Two copies, exclusive of copies required for Contractor's use.
 - b. Electronic Documents:
 - 1) Two electronic copies on flash drives in accordance with Specification Section 01 33 00 - Submittal Procedures.
 - 2) Submit to entity indicated in Specification Section 01 33 00 - Submittal Procedures.
 - c. Work will not be eligible for Substantial Completion until associated, required final operation and maintenance data Submittals are accepted by Engineer.
 3. Program Code and Configuration Files:
 - a. Paper Copies: Not required.
 - b. Electronic Documents: Submit in accordance with Specification Section 01 33 00 - Submittal Procedures, except submit Electronic Documents in both of the following formats:
 - 1) Portable document format (".pdf") files.
 - 2) Operable code and configuration files suitable for Owner's use in modifying program code and configuration with Owner's own personnel.
 - c. Work will not be eligible for Substantial Completion until associated, required program code and configuration Electronic Documents Submittals are accepted by Engineer.
 - d. If Contractor (whether or not via Subcontractor or Supplier), revises program code or configuration files between acceptance of Submittal by Engineer and end of the Contract's correction period and Contractor's general warranty obligation, furnish updated program code and configuration files to Owner. Before modifying program code and configuration files after Substantial Completion, verify that Owner modifications of program code or configuration files were incorporated into the modified files, subject to the provisions of this Specification Section.
- C. Contractor's Transmittal Letters for Operation and Maintenance Manual Submittals:
1. Furnish separate transmittal letter with each Submittal. Use transmittal forms attached to this Specification Section (Exhibit 01 78 23-A and Exhibit 01 78 23-B) unless other transmittal form is acceptable to Engineer and Owner at the start of the Project's construction.

1.3 PAPER COPIES OF O&M MANUALS

A. Binding and Cover:

1. Bind each operation and maintenance manual in durable, permanent, stiff-cover binder(s), comprising one or more volumes per copy, as necessary.
2. Binders shall be not less than one inch wide and maximum of three inches wide. Binders for each copy of each volume shall be same size and color.
3. Binders shall be locking three-ring ("D"-ring) type, or three-post type. Three-ring binders shall be riveted to back cover and include plastic sheet lifter (page guard) at front and back of each volume.
4. Do not overfill binders.
5. Covers shall be oil-, moisture-, and wear-resistant, including identifying information on cover and spine of each volume.
6. Indicate the following information on cover of each volume:
 - a. Title: "OPERATING AND MAINTENANCE INSTRUCTIONS". For submittal of preliminary operation and maintenance data, include the word, "PRELIMINARY" in the title. For submittal of final operation and maintenance data, include the word, "FINAL" in the title.
 - b. Name or type of material or equipment covered in the manual.
 - c. Volume number, if more than one volume is submitted, listed as "Volume __ of __", with appropriate volume-designating numbers filled in.
 - d. Name of Project and, when applicable, Contract name and number.
 - e. Name of building or structure, as applicable.
7. Provide the following information on spine of each volume:
 - a. Title: "OPERATING AND MAINTENANCE INSTRUCTIONS". For submittal of preliminary operation and maintenance data, include the word, "PRELIMINARY" in the title. For submittal of final operation and maintenance data, include the word, "FINAL" in the title.
 - b. Name or type of material or equipment covered in the manual.
 - c. Volume number, when more than one volume is submitted, listed as "Volume __ of __", with appropriate volume-designating numbers filled in.
 - d. Project name and building or structure name.

B. Pages:

1. Print pages in paper copies of operation and maintenance manuals on 30 LB (minimum) paper, 8-1/2 by 11 IN size.
2. Reinforce binding holes in each individual paper sheet with plastic, cloth, or metal. When published, separately-bound booklets or pamphlets are part of manuals, reinforcing of pages within booklet or pamphlet is not required.
3. Furnish each page with binding margin not less than 3/4 IN wide.
4. Properly punch each paper page with holes suitable for associated binding. Provide not less than 3/8 IN of paper between outer edge of punched holes and edge of paper. Manuals with improperly punched holes will be returned to Contractor as unacceptable.
5. In paper copies of manuals, each page in each copy shall be properly bound-through by the binder's rings or posts. Paper manuals where some pages are not so bound will be returned to Contractor as unacceptable.

C. Drawings:

1. Bind into operation and maintenance manuals, Drawings, diagrams, and illustrations up to and including 11 by 17 IN size, with reinforcing and punched holes specified for paper pages.
2. Drawings or sheets larger than 11 by 17 IN shall be:
 - a. Paper Copies: Neatly folded and inserted into clear plastic pockets bound into the manual. Neatly and permanently label each pocket with printed text indicating content and Drawing Numbers. Include not more than 2 Drawings or sheets per pocket.
 - b. Electronic Documents Copies: Included in electronic file at appropriate location.

D. Copy Quality and Document Clarity:

1. Provide original-quality copies. Documents in operation and maintenance manuals shall be either original manufacturer-printed documents or first-generation photocopies indistinguishable from originals. If original is in color, copies shall be in color. Manuals with copies that are unclear, not completely legible, off-center, skewed, or where text or drawings are cut by binding holes, are unacceptable. Pages that contain approval or date stamps, comments, or other markings that cover text or Drawing are unacceptable.
2. Clearly mark, using ink, to indicate all components of materials and equipment on catalog pages for ease of identification. In standard or pre-printed documents, indicate options furnished and cross out inapplicable content. Using highlighters to so indicate options furnished is unacceptable.

E. Organization:

1. Indexed tabs between major categories of information, such as operating instructions, preventive maintenance instructions, and other major subdivisions of data in each manual.

1.4 ELECTRONIC DOCUMENT OPERATION AND MAINTENANCE MANUALS

A. Electronic Documents of Operation and Maintenance Manuals:

1. Each Electronic Document copy of operation and maintenance data shall include all information included in the corresponding paper copy.
2. Submit Electronic Documents operation and maintenance data to Submittal Exchange in accordance with Specification Section 01 33 00 - Submittal Procedures.
3. File Format:
 - a. Unless otherwise required by Specification Section 01 33 00 - Submittal Procedures, operation and maintenance data Electronic Documents shall be “portable document format” (PDF) files.
 - b. Electronic Documents shall be electronically searchable upon delivery.
 - c. Electronic Documents shall not be password-protected and shall not be protected against Owner’s copying and printing such files for Owner’s use in operating and maintaining the facility.
 - d. Electronic Documents shall open to its first page.
 - e. Submit each operation and maintenance manual as a single Electronic Document file, unless file size is over-large, in which case divide into as few separate files, each with similar filename, as possible.
 - f. Within each Electronic Document, provide bookmarks for the following:
 - 1) Each chapter and subsection indicated in the corresponding printed copy document’s table of contents.
 - 2) Each figure.
 - 3) Each table.
 - 4) Each appendix and attachment.

B. Operation and Maintenance Manual Submittal Identification:

1. Submittal Number:
 - a. A unique number shall be assigned to each individual Submittal.
 - b. Assign Submittal numbers as follows:
 - 1) First part of Submittal number shall be the applicable Specifications section number, followed by a hyphen.
 - 2) Second part of Submittal number shall be a two-digit number (sequentially numbered from 01 through 99) assigned to each separate Submittal furnished under the associated Specifications Section.
2. Review Cycle Number:
 - a. Each resubmittal of a given Submittal shall be indicated with an upper-case letter designation:
 - 1) No letter designation for initial (first) submittal of the Submittal number.
 - 2) No hyphen between Submittal number and review cycle number.
 - 3) “A” shall indicate first resubmittal of the Submittal number.

- 4) "B" shall indicate second resubmittal of the Submittal number.
3. Submittal Type:
 - a. Each Submittal shall be identified with an upper-case three letter designation:
 - 1) "POM" shall indicate a preliminary operation and maintenance manual Submittal.
 - 2) "FOM" for shall indicate a final operation and maintenance manual Submittal.
 - 3) A hyphen shall be included between Review Cycle Number and Submittal type.
4. Submittal Title:
 - a. A unique title shall be assigned to each individual Submittal.
 - 1) Hyphen between review cycle number and title.
 - 2) "Resubmittal of" shall be first words of Submittal title to indicate first resubmittal.
 - 3) "Resubmittal 2 of" shall be first words of Submittal title to indicate second resubmittal.
5. Examples of Submittal number, review recycle number, Submittal type, and Submittal title:
 - a. Initial (first) review cycle of the second preliminary operation and maintenance manual Submittal furnished under Specification Section 40 72 00 - Level Instrumentation, would be as follows:
 - 1) "40 72 00-02-POM - Preliminary Level Instrumentation O&M Manual".
 - b. Second (first resubmittal) review cycle of the second preliminary operation and maintenance manual Submittal furnished under Specification Section 40 72 00 - Level Instrumentation, would be as follows:
 - 1) "40 72 00-02A-POM - Resubmittal of Preliminary Level Instrumentation O&M Manual".
 - c. Third (second resubmittal) review cycle of the second preliminary operation and maintenance manual Submittal furnished under Specification Section 40 72 00 - Level Instrumentation, would be as follows:
 - 1) "40 72 00-02B-POM - Resubmittal 2 of Preliminary Level Instrumentation O&M Manual".
 - d. Initial (first) review cycle of the second final operation and maintenance manual Submittal furnished under Specification Section 40 72 00 - Level Instrumentation, would be as follows:
 - 1) "40 72 00-02-FOM - Final Level Instrumentation O&M Manual."

1.5 CONTENT OF OPERATION AND MAINTENANCE MANUALS

- A. Operation and Maintenance Manual Content - General:
 1. Prepare each operation and maintenance manual specifically for the Project. Include in each manual all pertinent instructions, As-Constructed Drawings as applicable, bills of materials, technical information, installation and handling requirements, maintenance and repair instructions, and other information required for complete, accurate, and comprehensive data for safe and proper operation, maintenance, and repair of materials and equipment furnished for the Project. Include in manuals specific information required in the Specification Section for the material or equipment, data required by Laws and Regulations, and data required by Authorities Having Jurisdiction.
 2. Provisions of this Article were written for equipment. Where operation and maintenance data are required for building products, such as finishes, openings, thermal and moisture protection, and similar items, comply with this Article to the extent practical and reasonable for the associated item.
 3. Completeness and Accuracy:
 - a. Operation and maintenance manuals that include language stating or implying that the manual's content may be insufficient or stating that the manual's content is not guaranteed to be complete and accurate are unacceptable.
 - b. Operation and maintenance manuals shall be complete and accurate.
 - c. Operation and maintenance manuals shall indicate the specific alternatives and features furnished, and the specific operation and maintenance provisions for the material or equipment furnished.

4. Provide dividers and include manufacturer's information, diagrams, schematics, and equipment cutaways. Avoid submitting catalog excerpts unless they are the only document available showing identification or description of particular component of the equipment. Where published documents, included in operation and maintenance data, pertain to multiple models or types, mark the literature to indicate specific material or equipment supplied. Marking may be in the form of checking, arrows, or underlining to indicate pertinent information, or by crossing out or other means of obliterating information that does not apply to the materials and equipment furnished.
 5. Identify each equipment item consistent with names and identification numbers shown or indicated in the Contract Documents, rather than manufacturer's model numbers.
 6. Neatly type data not furnished in computer-printed text. Handwriting, except for strikeouts, arrows, and the like, is unacceptable.
 7. Include copy of warranty in accordance with the Contract Documents, including Specification Section 01 78 36 - Warranties.
 8. Include copy of proposed service contract, when applicable.
 9. When copyrighted material is used in operation and maintenance manuals, obtain copyright holder's written permission to use such material in the operation and maintenance manual.
- B. Differences Between Preliminary and Final Operation and Maintenance Manuals:
1. In preliminary operation and maintenance manuals, include flysheet or placeholder for information to be included in final operation and maintenance manual Submittal.
 2. In final operation and maintenance manuals, include information such as the following, as applicable for the associated materials and equipment:
 - a. Equipment data that requires collection after startup, for example: (1) system and equipment balancing reports, including those for HVAC systems; and (2) final settings for electrical switchgear, automatic transfer switches, and circuit breakers; and (3) materials and equipment field testing results.
 - b. Equipment startup reports and Suppliers' field service reports (the latter on form in Specification Section 01 75 00 - Checkout and Startup Procedures).
- C. Initial Documents in Operation and Maintenance Manuals:
1. Table of Contents:
 - a. Provide table of contents in each volume of each operation and maintenance manual.
 - b. In table of contents and not less than once in each chapter or section, identify materials and equipment by their functional names. Thereafter, abbreviations and acronyms may be used if their meaning is clearly indicated in a table bound at or near beginning of each volume. Using material or equipment model or catalog designations for identifying items is unacceptable.
 2. Equipment Record:
 - a. Provide "Equipment Record" section of operation and maintenance manual immediately following the table of contents. "Equipment Record" section is not required for operation and maintenance data for other than equipment (such as building materials and finishes).
 - b. Provide "Equipment Record" on forms included as this Specification Section's Attachments 1, 2, and 3.
 - c. For instrumentation and control equipment, International Society of Automation (ISA) data sheets are acceptable in lieu of the forms included as this Specification Section's Attachments 1, 2, and 3.
 - d. This Specification Section's Attachments 1, 2, and 3 are available from Engineer as "fillable PDF forms".
 - e. Complete in detail each section of "Equipment Record". Merely referencing the associated equipment's operation and maintenance data for nameplate, maintenance, spare parts, lubricants, or other required information, is unacceptable.
 - f. For equipment or systems with multiple, separate components (for example, motor and gearbox), fully completed "Equipment Record" is required for each component.

- g. Operation and maintenance data Submittals without complete and accurate “Equipment Record” sheets are unacceptable.
3. Supplier’s Field Service Reports:
 - a. Include in final operation and maintenance manuals copies of associated Supplier’s field services reports in accordance with Specification Section 01 75 00 - Checkout and Startup Procedures.
 - b. Include Supplier’s completed field service reports in operation and maintenance manual in section immediately following “Equipment Record” section.
- D. Operation and Maintenance Instructions:
1. Safety Considerations:
 - a. Submit written descriptions of safety considerations relating to operation and maintenance procedures for materials and equipment.
 - b. Describe safety devices and alarms provided with materials and equipment and proper operation and use.
 - c. Indicate procedures for proper, safe operating and maintenance of materials and equipment furnished, including manufacturer’s recommended personal protection equipment, apparatus, and devices not furnished under the Contract.
 - d. Describe recommended safety-related training for personnel operating and maintaining the subject materials or equipment.
 - e. Include in appendix to operation and maintenance manual manufacturers’ relevant “safety data sheets” (SDS), formerly “material safety data sheets” (MSDS).
 - f. Engineer’s review of operation and maintenance data expressly does not extend to adequacy, completeness, and accuracy of SDS or other safety and protection practices and procedures indicated in the operation and maintenance data.
 2. Operation:
 - a. Include in operation and maintenance data Submittals complete, detailed written operating instructions for each material or equipment item including: Function; operating characteristics; limiting conditions; and regulation and control. Also include, as applicable, written descriptions of alarms generated by equipment and proper responses to such alarm conditions.
 - b. Include pre-startup instructions and checklists and complete startup instructions for each material and equipment item.
 - c. Indicate recommended operating instructions for all operating modes and conditions, with associated recommendations for safe operation.
 - d. Explain available controls and instrumentation and associated function(s).
 - e. Indicate required shutdown checklists and procedures for: Normal shutdown, emergency shutdown, and long-term shutdowns.
 - f. Troubleshooting instructions.
 3. Maintenance - General:
 - a. Include in operation and maintenance data complete, written instructions for necessary and recommended maintenance, including mechanical maintenance and electrical/instrumentation and controls maintenance, as applicable.
 - b. Include in operation and maintenance data complete instructions for necessary assembly, disassembly, installation, re-installation, storage, and shipping for materials and equipment.
 - c. Tools: Include list of required maintenance tools and equipment.
 - d. Spare Parts and Extra Materials:
 - 1) Submit complete instructions for ordering replaceable parts, including reference numbers (such as shop order number or serial number) that will expedite the ordering process.
 - 2) Submit manufacturer’s recommended inventory levels for spare parts, extra stock materials, and consumable supplies for the initial two years of operation. Consumable supplies are items consumed or worn by operation of materials or equipment, and items used in maintaining the operation of material or equipment, including items such as lubricants, seals, reagents, and testing chemicals used for

- calibrating or operating the equipment. Include estimated delivery times, shelf life limitations, and special storage requirements.
- 3) Also refer to this Article's provision, "Bills of Materials", below, for additional requirements regarding ordering replacement parts.
- 4. Routine and Preventative Maintenance:
 - a. Submit complete, detailed, written instructions for routine and preventive maintenance including all information and instructions to keep materials, equipment, and systems properly lubricated, adjusted, and maintained so that materials, equipment, and systems function economically throughout their expected service life. Instructions shall include:
 - 1) Written explanations with illustrations for each routine and preventive maintenance task such as inspection, adjustment, lubrication, calibration, cleaning, replacement of filters, and the like.
 - 2) Recommended schedule for each routine and preventive maintenance task.
 - b. Lubricants:
 - 1) Provide lubrication charts indicating recommended types of lubricants, frequency of application or change, and where each lubricant is to be used or applied.
 - 2) Table of alternative lubricants.
- 5. Major Maintenance:
 - a. Include detailed, written instructions and illustrations for required periodic (non-routine, non-preventative) maintenance.
 - b. Indicate relative level of training and expertise required to perform such maintenance and recommended tools and equipment.
- 6. Special Maintenance:
 - a. Include maintenance instructions for long-term shutdowns and storage.
- E. Bills of Materials:
 - 1. Include in operation and maintenance manuals complete bills of material or parts lists for materials and equipment furnished. Lists or bills of material may be furnished on a per-drawing or per-equipment assembly basis. Bills of material shall indicate:
 - 2. Manufacturer's name, physical address, telephone number, internet website address.
 - 3. Manufacturer's local service representative's or local parts supplier's name, physical address, telephone number, internet website address, and e-mail addresses.
 - 4. Manufacturer's shop order and serial number(s) for materials, equipment or assembly furnished.
 - 5. For each part or piece include the following information:
 - a. Parts cross-reference number. Cross-reference number shall be used to identify the part on assembly drawings, Shop Drawings, or other type of graphic illustration where the part is clearly shown or indicated.
 - b. Part name or description.
 - c. Manufacturer's part number.
 - d. Quantity of each part used in each assembly.
 - e. Current unit price of the part at the time the operation and maintenance manual is submitted. Price list shall be dated.
- F. Record Copy of Shop Drawings, Product data, and Other Previously Approved and Accepted Submittals:
 - 1. Submit original-quality copies of each approved and accepted (as applicable) Shop Drawing, product data Submittal, written results of source quality control activities, and other Submittals, updated to indicate as-installed condition. Do not include prior Submittals that were not approved or were not accepted. Reduced Drawings are acceptable only when reduction is to not less than one-half original size and all lines, dimensions, lettering, and text are completely legible on the reduction.
- G. Electrical Schematics, Diagrams, and Information:
 - 1. Submit complete electrical schematics and wiring diagrams, including complete point-to-point wiring and wiring numbers or colors between all terminal points.

2. Include As-Constructed Drawings of layouts of electrical panels (such as switchgear and motor control centers) and control panels.
- H. NFPA 70 (National Electric Code) Documentation:
1. Include in operation and maintenance manuals for electrically-powered equipment documented calculations of: (1) arc-fault current, equipment available fault current and (2) short-circuit current rating (SCCR), provided as part of equipment Submittals.

1.6 COPIES OF PROGRAM CODE AND CONFIGURATION FILES

- A. Copies of Program Code and Configuration Files - General:
1. Submit as Electronic Documents only. Paper Submittals are not required for program code and configuration files.
 2. File Types: As indicated in this Specification Section's "Submittals" Article.
 3. Timing: Submit not later than time indicated in this Specification Section's "Submittals" Article.
 4. In accordance with the Contract Documents, following Substantial Completion, Owner shall have right to: (a) modify program code and configuration files, (b) update software and firmware, (c) revise system security settings, such as passwords, IP addresses, and other security settings, and (d) implement related modifications, without restriction or interference from Contractor, Subcontractor, Supplier, and others.
 5. Owner agrees to use program code and configuration files only with Owner's facilities, as may be transferred to Owner's successors and assigns.
 6. Owner will not be subject to any Supplier-requested non-disclosure agreement that is not part of the Contract Documents.
 7. Engineer agrees to not distribute program code and configuration files obtained under the Project, except in exchanging such files with Owner or their successors and assigns. Engineer will not be party to any Supplier-requested non-disclosure agreement.
- B. Configuration Files:
1. Submit copies of system configuration prepared for the Project, such as setpoints for programmable controllers, facility SCADA display configurations, and similar configuration files.
 2. Submit as separate files configuration files for each separate control and monitoring device for which configuration files are furnished. Clearly distinguish the device(s) associated with each file.
 3. Contractor (including Subcontractors and Suppliers) is not responsible for configurations and control setpoints subsequently changed by Owner or others for whom either is responsible, not in accordance with Supplier's written recommendations and operation and maintenance instructions.
- C. Program Code:
1. Submit copies of program code for programmable logic controllers (PLC), human-machine interfaces (HMI), operator interface terminals (OIT), and other programmable controllers, subject to the following:
 - a. Submit for all PLCs, HMI, OITs, and other programmable controllers furnished as part of the Work, and where Owner's existing devices were modified as part of the Work, regardless of whether such program code is manufacturer's standard, or developed specifically for the Project, or a combination of manufacturer's standard program code and Project-specific program code. Contractor and associated Subcontractors and Suppliers are not responsible for program code modifications made by Owner (or third-parties retained by Owner) that result in improper operation of materials, equipment, or systems or that invalidate applicable warranties and manufacturer's recommended operating instructions.
 - b. Third-party, licensed, commercially available software (such as, but not limited to, Microsoft operating system software sold at retail, and commercial SCADA system software platforms) is excluded from requirements of this Article. Furnish copies of

commercially-available, licensed, third-party software, where required, in accordance with the Contract Documents.

2. Submit complete logic listings in Owner required format.
3. Format Requirements:
 - a. For ladder diagram logic, include complete cross-referencing of all logic elements. Annotate all elements with clearly understandable tags or descriptive labels.
 - b. For function block diagram, label each function block with understandable tags or descriptive labels. Describe purpose and action of each function block.
 - c. For sequential function chart, include extensive comments for each step to describe program step function.
 - d. For instruction list and structured text, include extensive comments for each program line to describe program line function.
4. Submit complete programmable logic controller listing of all input/output address assignments, tag assignments, and pre-set constant values, with functional point descriptions.
5. Submit complete manufacturer's program code manuals.

1.7 ENGINEER'S REVIEW OF OPERATION AND MAINTENANCE MANUAL SUBMITTALS

A. Timing and Engineer's Review:

1. In accordance with Specification Section 01 33 00 - Submittal Procedures.

B. Meaning of Submittal disposition Assigned by Engineer:

1. Preliminary Operation and Maintenance Manual Submittals:
 - a. "Approved" (Action Code A): Upon return of Preliminary Operation and Maintenance Manual Submittal marked "Approved", submit Final Operation and Maintenance Manual submittal for final review per this Specification Section.
 - b. "Approved as Noted" (Action Code B): Upon return of Preliminary Operation and Maintenance Manual Submittal marked "Approved as Noted", submit Final Operation and Maintenance Manual submittal for final review per this Specification Section and in accordance with Engineer's comments and notes indicated in Engineer's Submittal response.
 - c. "Revise and Resubmit" (Action Code C): Upon return of Preliminary Operation and Maintenance Manual Submittal marked "Revise and Resubmit", make the revisions necessary and indicated in Engineer's Submittal response and resubmit to Engineer for approval.
 - d. "Not Approved" (Action Code D): This disposition indicates Preliminary Operation and Maintenance Manual Submittal cannot be approved. "Not Approved" disposition may also be applied to Submittals that are incomplete. Upon return of Submittal marked "Not Approved", repeat initial submittal procedure utilizing approvable material or equipment, with a complete Submittal that clearly includes all information required.
2. Final Operation and Maintenance Manual Submittals:
 - a. "Approved" (Action Code A): Provide two paper copies and two electronic copies on flash drives of the Final Operation and Maintenance Manual per this Specification Section.
 - b. "Not Approved" (Action Code D): This disposition indicates Final Operation and Maintenance Manual Submittal that cannot be approved. "Not Approved" disposition may also be applied to Final Operation and Maintenance Manual Submittals that are incomplete. Upon return of Final Operation and Maintenance Manual Submittal marked "Not Approved", repeat initial submittal procedure utilizing approvable Final Operation and Maintenance Manual, with a complete Submittal that clearly includes all information required.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

- A. The documents listed below, following this Specification Section's "End of Section" designation, are part of this Specification Section:
1. "Exhibit 01 33 00-A - Preliminary O&M Manual Transmittal No. _____ - __ - POM" (one page).
 2. "Exhibit 01 33 00-B - Final O&M Manual Transmittal No. _____ - __ - FOM" (one page).
 3. Attachment 1 - Equipment Data and Spare Parts Summary form (one page).
 4. Attachment 2 - Recommended Maintenance Summary form (one page).
 5. Attachment 3 - Lubrication Summary form (one page).

END OF SECTION



Equipment Data and Spare Parts Summary

Project Name			Specification Section:		
Equipment Name			Year Installed:		
Project Equipment Tag No(s).					
Equipment Manufacturer				Project/Order No.	
Address				Phone	
Website		Web Site		E-mail	
Local Representative/Service Center					
Address				Phone	
Website				E-mail	

MECHANICAL NAMEPLATE DATA

Equip.			Serial No.		
Make			Model No.		
ID No.	Frame No.	HP	RPM	Cap.	
Size	TDH	Imp. Size	CFM	PSI	
Other:					

ELECTRICAL NAMEPLATE DATA

Equip.			Serial No.					
Make			Model No.					
ID No.	Frame No.	HP	V.	Amp.	Hertz	PH	RPM	SF
Duty	Code	Ins. Cl.	Type	NEMA	C Amb.	Temp. Rise	Rating	
Other:								

SPARE PARTS PROVIDED PER CONTRACT

Part No.	Part Name	Quantity

RECOMMENDED SPARE PARTS

Part No.	Part Name	Quantity

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Lubrication Summary

Equipment Description	Project Equip. Tag No(s).
-----------------------	---------------------------

Lubricant Point						
Lubricant Type	Manufacturer		Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type	Manufacturer		Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type	Manufacturer		Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type	Manufacturer		Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type	Manufacturer		Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					
Lubricant Point						
Lubricant Type	Manufacturer		Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

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SECTION 01 78 36 WARRANTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. General requirements for warranties required in the various Specifications.
 - 2. Provisions addressing:
 - a. Suppliers' standard warranties.
 - b. Suppliers' special or extended warranties.
 - c. Implied warranties.
 - d. Commencement and duration of warranties.
- B. Related Sections include, but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.

1.2 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. General:
 - 1. For each item of equipment furnished under the Contract, submit Supplier's standard warranty, regardless of whether such warranty or Submittal thereof is required by the associated Specifications for that item. Submit such warranties for materials where such Submittal is required in the Specifications for the material.
 - 2. For each item of material or equipment where Supplier's special (or extended) warranty is required by the Contract Documents, submit appropriate special warranty that complies with the Contract Documents.
 - 3. Supplier's warranties shall be specifically endorsed to Owner, Contractor, and the entity purchasing the item (if other than Contractor) by the entity issuing such warranty.
 - 4. Submit Suppliers' standard warranties and special warranties as Submittals in accordance with the Schedule of Submittals accepted by Engineer.

1.3 CONTRACTOR'S GENERAL WARRANTY AND CORRECTION PERIOD OBLIGATIONS

- A. Contractor's General Warranty and Guarantee: Comply with requirements of the Contract Documents.
- B. Contractor's Warranty of Title: Comply with requirements of the Contract Documents.
- C. Correction Period: Comply with requirements of the Contract Documents.

1.4 SUPPLIERS' WARRANTIES FOR MATERIALS AND EQUIPMENT

- A. Warranty Types:
 - 1. Required by the Contract Documents:
 - a. Warranties specified for materials and equipment shall be in addition to, and run concurrent with, Contractor's general warranty and guarantee and requirements for the Contract's correction period.
 - b. Disclaimers and limitations in specific materials and equipment warranties do not limit Contractor's general warranty and guarantee, nor does such affect or limit Contractor's performance obligations under the correction period.

2. Material or equipment manufacturer's standard warranty is pre-printed, written warranty published by item's manufacturer and specifically endorsed by manufacturer to the entities indicated Article 1.2 of this Specification Section.
 3. Special warranty is written warranty that either extends the duration of material or equipment manufacturer's standard warranty or provides other, increased rights to Owner and other beneficiaries (if any) of such warranty. Where the Contract Documents indicate specific requirements for warranties that differ from the manufacturer's standard warranty for that item, special warranty is implied.
- B. Requirements for Special Warranties:
1. Submit written special warranty document that contains appropriate provisions and identification, ready for signature by material or equipment manufacturer, Owner, and other beneficiaries indicated in Article 1.2 of this Specification Section. Submit draft warranty with Submittals required prior to fabrication and shipment of the item from the Supplier's facility.
 2. Manufacturer's Standard Form: Modified to include Project-specific information and properly signed by product manufacturer and other entities as appropriate.
 3. Specified Form: When specified forms for special warranties are included in the Contract Documents, prepare written document, properly signed by item manufacturer, Owner, and other beneficiaries indicated in Article 1.2 of this Specification Section, using the required form.
 4. Refer to the Specifications for content and requirements for submitting special warranties.

1.5 IMPLIED WARRANTIES

- A. Warranty of Title and Intellectual Property Rights:
1. Except as may be otherwise indicated in the Contract Documents, implied warranty of title required by Laws and Regulations is applicable to the Work and to materials and equipment incorporated therein.
- B. Warranty of Merchantability:
1. Notwithstanding any other provision of the Contract to the contrary, implied warranties of merchantability required by Laws and Regulations apply to the materials and equipment incorporated into the Work.
- C. Warranty of Fitness-for-Purpose:
1. Implied warranty of fitness-for-purpose for materials and equipment to be incorporated into the Work, for which specific material or features are indicated in the Contract Documents, is hereby disclaimed by Owner and Contractor.
 2. When Supplier is aware of, or has reason to be aware of, specified materials or features of the Work that are contrary to the intended use, purpose, service, application, or environment in which the material or item will be used, submit request for interpretation in accordance with Section 01 04 00 - Special Provisions. Where appropriate, such request for interpretation shall indicate the apparent discrepancy and propose appropriate, alternative materials or equipment.

1.6 COMMENCEMENT AND DURATION OF WARRANTIES

- A. Commencement of Warranties:
1. Contract correction period and Contractor's general warranty commence as indicated in the Contract Documents.
 2. Suppliers' standard warranties and special warranties commence running on the date that the associated item is certified by Engineer as substantially complete in accordance with the Contract Documents. In no event shall special warranties commence running prior to Engineer's review and acceptance of special warranty Submittal for the item.
 3. Implied warranties commence in accordance with Laws and Regulations.
- B. Duration of Warranties:
1. Duration of correction period is set forth in the Contract Documents.

2. Duration of Contractor's general warranty and guarantee is in accordance with Laws and Regulations.
3. Duration of Suppliers' standard warranties is in accordance with the applicable standard warranty document accepted for the Project by Engineer.
4. Duration of required Suppliers' special warranties shall be in accordance with the requirements of the Contract Documents for the subject item.
5. Duration of implied warranties shall be in accordance with Laws and Regulations.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

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SECTION 01 78 39
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements for Project Record Documents, to supplement Record Documents requirements of the Contract Documents.
- B. Scope:
 - 1. Contractor shall provide all labor, materials, equipment, and services to establish, maintain, continuously update, and submit to Engineer Project Record Documents in accordance with the Contract Documents.
- C. Related Sections include, but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 01 29 73 - Schedule of Values.
 - 5. Section 01 29 76 - Progress Payment Procedures.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Obtain necessary field measurements and record all data required for Project Record Documents before covering up the Work or building on subsequent phases of the Work.
 - 2. Promptly after obtaining measurements and information, record the data and information on Project Record Documents.
 - 3. Where a licensed, registered Professional Land Surveyor is retained on the Project, whether by Contractor or others, to perform field measurements and record other data for as-constructed Project or Site conditions, coordinate with such entity and schedule and perform the Work accordingly. Allow surveyor sufficient time and proper conditions for performing surveyor's work. Assist the surveyor as necessary in performance of surveyor's responsibilities.
- B. Monthly Status Evaluation:
 - 1. Not less than once per month, as a condition precedent to submitting Application for Payment, Contractor's site superintendent will meet with either Engineer or Resident Project Representative (RPR) at the Site to review status of Contractor's Project Record Documents.
 - 2. When Engineer or RPR directs corrections to Project Record Documents, promptly make such corrections on the Project Record Documents. Engineer's or RPR's directions or lack thereof do not in any way relieve or mitigate Contractor's sole responsibility for the accuracy, completeness, and clarity of Project Record Documents.
 - 3. Requirements for review of Record Documents status as a condition precedent to progress payments is in Specification Section 01 29 73 - Schedule of Values, and Specification Section 01 29 76 - Progress Payment Procedures.

1.3 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

- B. Closeout Submittals: Submit the following:
1. Record Documentation:
 - a. Prior to readiness for final payment, submit to Engineer one copy of Project's final Record Documents and obtain Engineer's acceptance of same. Submit complete Record Documents; do not make partial Submittals without Engineer's concurrence.
 - b. Submit the following Project Record Documents:
 - 1) Record Drawings, including those issued via Addenda, Change Orders, Work Change Directives, Field Orders, and allowance authorizations.
 - 2) Record project manual, including Specifications, indicating changes made via Addenda, Change Orders, Work Change Directives, Field Orders, and allowance authorizations.
 - c. Submit Record Documents with transmittal letter on Contractor's letterhead in accordance with requirements in Section 01 33 00 - Submittal Procedures.
 2. Certifications:
 - a. Record Documents Submittal shall include certification, with original signature of official authorized to sign legally-binding contracts on behalf of Contractor, reading as follows:
 - 1) (Contractor's legal/contractual entity name) has maintained, continuously updated, and submitted Project record documentation in accordance with the Contract Documents and Section 01 78 39 - Project Record Documents, for the Des Moines Metropolitan Wastewater Reclamation Authority, Des Moines, Iowa, Des Moines WRF Clarifier Improvements Phase 2. We certify that each record document submitted is complete, accurate, and legible relative to the Work performed under our Contract, and that the Record Documents comply with the requirements of the Contract Documents.

By: _____ (signature)

Print Name: _____

Title: _____

1.4 MAINTENANCE OF RECORD DOCUMENTS

- A. Maintain in Contractor's field office, in clean, dry, legible condition, complete sets of the following Record Documents:
1. Drawings, Specifications, and Addenda.
 2. Shop Drawings, Samples, and other Submittals, including records of test results, approved or accepted as applicable, by Engineer.
 3. Change Orders, Work Change Directives, Field Orders, allowance authorizations.
 4. Copies of all interpretations and clarifications issued.
 5. Photographic documentation.
 6. Survey data.
 7. All other documents pertinent to the Work.
- B. Provide files and racks for proper storage and easy access to Project Record Documents. File Record Documents in accordance with the edition of the Construction Specification Institute's *MasterFormat* used for organizing the project manual, unless otherwise accepted by Engineer or RPR.
- C. Promptly make Project Record Documents available for observation and review upon request of Engineer, RPR, or Owner.
- D. Do not use Project Record Documents for any purpose other than serving as Project record. Do not remove Project Record Documents from Contractor's field office without Engineer's approval.

1.5 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

- A. Recording Changes, Field Conditions, and Other Information - General:
1. At the start of the Project, label each record document to be submitted as, "PROJECT RECORD" using legible, printed letters. Letters on record copy of the Drawings shall be two inches high.
 2. Keep Record Documents current consistent with the progress of the Work. Make entries on Record Documents within two working days of receipt of information required to record the change, field condition, or other pertinent information.
 3. Do not permanently conceal the Work until required information has been recorded for Project Record Documents.
 4. Accuracy of Record Documents shall be such that future searches for items shown on the Record Documents may rely reasonably on information obtained from Engineer-accepted Project Record Documents.
 5. Marking of Entries:
 - a. Use erasable, colored pencils (not ink or indelible pencil) for marking changes, revisions, additions, and deletions to Project Record Documents.
 - b. Clearly describe the change by graphic line and make notations as required. Use straight-edge to mark straight lines. Writing shall be legible and sufficiently dark to allow scanning of Record Documents into legible electronic files in "portable document format" (.PDF) files.
 - c. Date each entry on Record Documents.
 - d. Indicate changes by drawing a "cloud" around the change(s) indicated.
 - e. Mark initial revisions in red. In the event of overlapping changes, use different colors for subsequent changes.
- B. Drawings:
1. Record changes on copy of the Drawings. Submittal of Contractor-originated or -produced Drawings as a substitute for recording changes on a copy of the Drawings is unacceptable.
 2. Record changes on plans, sections, elevations, schematics, schedules, and details as required for clarity, accuracy, and completeness, making reference dimensions and elevations (to Project datum) for complete record documentation.
 3. Record actual construction including:
 - a. Depths of various elements of foundation relative to Project datum.
 - b. Horizontal and vertical location of Underground Facilities referenced to permanent surface improvements and Project elevation datum. For each Underground Facility, including pipe fittings, show and indicate dimensions to not less than two permanent, visible surface improvements.
 - c. Location of exposed utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure and, where applicable, to Project elevation datum.
 - d. Changes in structural and architectural elements of the Work, including changes in reinforcing.
 - e. Field changes of dimensions, arrangements, and details.
 - f. Changes made in accordance with Addenda, Change Orders, Work Change Directives, Field Orders, and allowance authorizations.
 - g. Changes in details on the Drawings. Submit additional details prepared by Contractor when required to document such changes.
 4. Recording Changes for Schematic Layouts:
 - a. In some cases on the Drawings, arrangements of conduits, circuits, piping, ducts, and similar items are shown schematically and are not intended to portray physical layout. For such cases, the final physical arrangement shall be determined by Contractor subject to acceptance by Engineer.

- b. Record on the Project Record Documents all revisions to schematics on the Drawings, including: Piping schematics, ducting schematics, process and instrumentation diagrams, control and circuitry diagrams, electrical one-line diagrams, motor control center layouts, and other schematics when included in the Drawings. Show and indicate actual locations of equipment, lighting fixtures, in-place grounding system, and other pertinent data.
 - c. When dimensioned plans and dimensioned sections or elevations on the Drawings show the Work schematically, indicate on the Project Record Documents, by dimensions accurate to within one inch in the field, centerline location of items of Work such as conduit, piping, ducts, and similar items.
 - 1) Clearly identify each item of the Work by accurate notations such as “cast iron drain”, “rigid electrical conduit”, “copper waterline”, and similar descriptions.
 - 2) Show by symbol or by note the vertical location of each item of the Work; for example, “embedded in slab”, “under slab”, “in ceiling plenum”, “exposed”, and similar designations. For piping not embedded, also indicate elevation dimension relative to Project elevation datum.
 - 3) Descriptions shall be sufficiently detailed to be related to the Specifications.
 - d. Engineer may furnish written waiver of requirements relative to schematic layouts shown on plans, sections, and elevations when, in Engineer’s judgment, dimensioned layouts of Work shown schematically will serve no useful purpose. Do not rely on such waiver(s) being issued.
5. Supplemental Drawings:
- a. In some cases, Drawings produced during construction by Engineer or Contractor supplement the Drawings and shall be included with Project Record Documents submitted by Contractor. Supplemental Record Drawings shall include Drawings or sketches that are part of Change Orders, Work Change Directives, Field Orders, and allowance authorizations and that cannot be incorporated into the Drawings because of space limitations.
 - b. Supplemental Drawings submitted with record drawings shall be integrated with the Drawings and include necessary cross-references between Drawings. Supplemental Record Drawings shall be on sheets the same size as the Drawings.
 - c. When supplemental drawings developed by Contractor using computer-aided drafting/design (CAD), building information models (BIM), or civil information models (CIM) software are to be included in Record Drawings, submit electronic files for such Drawings in accordance with Section 01 33 00 – Submittal Procedures, as part of record drawing Submittal. Label such files, “Supplemental Record Drawings”, including with Contractor’s name, Project name, and Contract designation.

1.6 ELECTRONIC DOCUMENTS FURNISHED BY ENGINEER

- A. CAD, BIM, or CIM files of the Drawings will be furnished by Engineer upon the following conditions:
 - 1. Contractor shall submit to Engineer a letter on Contractor letterhead requesting CAD, BIM, or CIM files of the Drawings and indicating specific definition(s) or description(s) of how such Electronic Documents will be used by Contractor, and specific description of benefits to Owner (including credit proposal, if applicable) if the request is granted.
 - 2. Engineer does not guarantee that Electronic Documents are available in the format(s) requested by Contractor. Some projects may have Drawings developed using only CAD software instead of BIM or CIM software. Engineer will not create BIM or CIM files for Contractor if such files do not already exist.
 - 3. Contractor shall sign Engineer’s standard agreement with Contractor for release of Electronic Documents and shall abide by the provisions of such agreement for release of Electronic Documents.

4. Layering system incorporated in CAD, BIM, and CIM files shall be maintained as transmitted by Engineer. CADD, BIM, and CIM files transmitted by Engineer containing cross-referenced files shall not be bound by Contractor. Drawing cross-references and paths shall be maintained. If Contractor alters layers or cross-reference files, Contractor shall restore all layers and cross-references prior to submitting Project Record Documents to Engineer.
5. Contractor shall submit Project Record Drawings to Engineer in same CAD, BIM, or CIM format that files were furnished to Contractor.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

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SECTION 01 78 43
SPARE PARTS AND EXTRA MATERIALS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Administrative and procedural requirements for furnishing spare parts, extra materials, maintenance supplies, and special tools required for maintenance (collectively, “spare parts and extra materials”) required by the Contract Documents.
- B. Scope:
1. Contractor shall furnish spare parts, extra materials, and associated information, for materials and equipment furnished in accordance with the Contract Documents. Furnish such items in accordance with the requirements of this Specifications Section and the Specifications sections in which such items are indicated.
 2. Contractor is fully responsible for loss and damage to spare parts and extra materials until such items are received by Owner.
 3. Promptly replace spare parts and extra materials furnished by Owner to Contractor for use in remedying defective Work.
- C. List of Spare Parts and Extra Materials:
1. With the Shop Drawings and product data Submittals for each Specifications Section, submit a complete listing of spare parts and extra materials necessary for maintenance for two years of operation, together with unit prices in current United States funds, and source(s) of supply for each.
 2. Also include listing of spare parts and extra materials, with pricing and sources, in the operations and maintenance data submitted in accordance with Specification Section 01 78 23 - Operation and Maintenance Data.
- D. Related Sections include, but are not necessarily limited to:
1. SUDAS Division 1.
 2. Division 01 - General Requirements.
 3. Section 01 04 00 - Special Provisions.

1.2 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Maintenance Material Submittals: Furnish and submit the following:
1. Spare Parts and Extra Materials:
 - a. Furnish to Owner in accordance with requirements of this Specification Section, and the Specification Section(s) in which the spare parts and extra materials are specified.
 2. Transfer Documentation: For each delivery of spare parts and extra materials, submit to Engineer the following:
 - a. Submit, on Contractor’s letterhead, a letter of transmittal for spare parts and extra materials furnished under each Specifications Section. Letter of transmittal shall accompany spare parts and extra materials. Do not furnish letter of transmittal separate from associated spare parts and extra materials.

- b. Furnish three original, identical, signed letters of transmittal for each delivery of spare parts and extra materials furnished under each Specifications Section. Upon delivery of specified quantities and types of spare parts and extra materials to Owner, designated person from Owner will countersign each original letter of transmittal indicating Owner's receipt of spare parts and extra materials in the quantity, type, and quality required by the Contract Documents. Owner will retain one fully-signed original, Contractor shall submit one fully-signed original to Engineer. Contractor shall retain one fully-signed original for Contractor's records.
- c. Letter of transmittal shall include the following:
 - 1) Information required for letters of transmittal in Specification Section 01 33 00 - Submittal Procedures.
 - 2) Transmittal shall list spare parts and extra materials furnished under the associated Specifications section. Indicate each individual part, material, equipment item, tool, and product and the associated quantity furnished.
 - 3) Include space for countersignature by Owner as follows: Space for signature, space for printed name, space for signatory's title, and date.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Packaging and Labeling of Spare Parts and Extra Materials:
 - 1. Furnish spare parts and extra materials in manufacturer's unopened cartons, boxes, crates, or other original, protective covering suitable for preventing corrosion and deterioration.
 - 2. Protect and package spare parts and extra materials for maximum shelf life normally anticipated by manufacturer.
 - 3. Packaging of spare parts and extra materials shall be clearly marked and identified with name of manufacturer, applicable material or equipment, part number, part description, and part location in the equipment or system.
- B. Storage Prior to Delivery to Owner:
 - 1. Prior to furnishing spare parts and extra materials to Owner, store spare parts and extra materials in accordance with the Contract Documents and manufacturers' written recommendations.
- C. Procedure for Delivery to Owner:
 - 1. Deliver spare parts and extra materials to Owner's permanent storage rooms at the Site or area(s) at the Site designated by Owner.
 - 2. When spare parts and extra materials are delivered, Contractor and Owner will mutually inventory the spare parts and extra materials delivered to verify compliance with the Contract Documents regarding quantity, part numbers, and quality.
 - 3. Additional procedures for delivering spare parts and extra materials to Owner or, if required, will be developed by Engineer and complied with by Contractor.
 - 4. Contractor shall reimburse Owner for all costs and expenses incurred by Owner, including professional services, for delivery of inadequate, incorrect, or defective spare parts and extra materials. Owner may withhold such amounts from payments due Contractor via set-offs in accordance with the Contract Documents.
- D. Delivery Time and Eligibility for Payment:
 - 1. Deliver to Owner spare parts and extra materials prior to date of Substantial Completion for materials and equipment associated therewith.
 - 2. Do not deliver spare parts and extra materials before commencing startup for associated material or equipment.
 - 3. Spare parts and extra materials are not eligible for payment until delivered to Owner and Contractor's receipt of Owner's countersignature on letter of transmittal as required in this Specification Section.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

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SECTION 01 79 23

INSTRUCTION OF OPERATIONS AND MAINTENANCE PERSONNEL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Administrative and procedural requirements for instruction of operations and maintenance personnel.
 2. Qualifications requirements for Suppliers' training personnel.
 3. General requirements for training.
 4. Schedule of required training sessions.
- B. Scope:
1. Contractor shall furnish services of Suppliers' operation and maintenance training specialists to instruct Owner's personnel in recommended operating and maintenance procedures for materials and equipment furnished, in accordance with the Contract Documents.
 2. Each Supplier shall provide a combination of classroom and field training at the Site, unless otherwise required elsewhere in the Contract Documents.
Owner reserves the right to record training sessions on video for Owner's later use in instructing Owner's personnel.
- C. Related Sections include, but are not necessarily limited to:
1. SUDAS Division 1.
 2. Division 01 - General Requirements.
 3. Section 01 04 00 - Special Provisions.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Scheduling of Training Sessions:
1. General:
 - a. Contractor shall coordinate training services with checkout, startup, and initial operation of materials and equipment on days and times, and in manner, acceptable to Owner, in accordance with the Contract Documents.
 - b. Training may be required outside of normal business hours to accommodate schedules of operations and maintenance personnel. Provide training services at the required days and times at no additional cost to Owner.
 2. Prerequisites to Training:
 - a. Training of facility operations and maintenance personnel shall commence after preliminary operation and maintenance data has been submitted and accepted by Engineer, and the Work required in Specification Section 01 75 00, Checkout and Startup Procedures, is complete.
 - b. At option of Owner or Engineer, training may be allowed to take place before, during, or after checkout and startup of materials and equipment.
 3. Training Schedule Submittal:
 - a. Training Schedule Required: Contractor shall prepare and submit proposed training schedule for review and acceptance by Engineer and Owner. Proposed training schedule shall show and indicate all training required in the Contract Documents and shall demonstrate compliance with specified training requirements relative to number of hours of training for various elements of the Work, number of training sessions, and scheduling.

- b. Timing of Training Schedule Submittal: Submit initial training schedule not less than 60 days before scheduled start of first training session. Submit final training schedule, incorporating revisions in accordance with Engineer's comments, not later than 30 days prior to starting the first training session.
 - c. Owner reserves the right to modify personnel availability for training in accordance with process or emergency needs at the facility.
- B. Training Scheduling Conference:
- 1. Prior to preparing initial training schedule Submittal, schedule and hold training scheduling conference at the location where progress meetings are held, to review:
 - a. Training requirements indicated in the Contract Documents.
 - b. Work to be completed prior to commencing training.
 - c. Work progress and Progress Schedule relative to startup and training.
 - d. Scheduling constraints for Owner's personnel, relative to days and times of training sessions.
 - e. Preferred days for training.
 - f. Location where training will be performed and facilities available.
 - g. Required Submittals relative to training.
 - h. Other issues relative to training of operations and maintenance personnel.
 - 2. Attendance is mandatory for the following:
 - a. Contractor's project manager.
 - b. Contractor's Site superintendent.
 - c. Project manager of Subcontractors responsible for furnishing materials and equipment for which training of operations and maintenance personnel is required.
 - d. Suppliers invited by Contractor.
 - e. Engineer.
 - f. Resident Project Representative (RPR).
 - g. Owner's Site Representative (OSR).
 - h. Owner's staff responsible for training coordination, and staff responsible for scheduling operations and maintenance personnel.
 - 3. If additional information must be developed to adequately cover agenda items, reconvene conference as soon as possible.
 - 4. Contractor shall prepare minutes summarizing the discussions of conference, decisions made, and agreements and disagreements, and distribute the minutes to each conference attendee and others as appropriate.

1.3 QUALITY ASSURANCE

- A. Qualifications:
- 1. Supplier's Instructors:
 - a. Shall be factory-trained by manufacturer of material or equipment.
 - b. Supplier's instructors shall be proficient and experienced in performing training of the types required.
 - c. Instructors shall be proficient, clear, and easily understandable in spoken and written English language.
 - d. Qualifications of instructors are subject to acceptance by Engineer. If Engineer does not accept qualifications of proposed instructor, provide services of replacement instructor with acceptable qualifications.

1.4 SUBMITTALS

- A. Action Submittals: Submit the following:
- 1. Training Schedule: Detailed schedule of training sessions, demonstrating compliance with number of training sessions, hours required in the Contract Documents, and complying with the Contract Times. Submit training schedule Submittals in accordance with time frames specified in this Specification Section.

- B. Informational Submittals: Submit the following:
 - 1. Lesson Plan: Acceptable lesson plan for training on each material or equipment item, in accordance with Table 01 79 23-A and the Contract Documents. Lesson plan shall comply with requirements of this Specification Section as may be supplemented by Specification Sections where materials and equipment are specified. Include with lesson plan copy of handouts that will be used during training sessions. Submit lesson plan Submittals in accordance with time frames specified in this Specification Section.
 - 2. Qualifications:
 - a. Credentials of Supplier's proposed operations and maintenance instructor(s). Credentials shall demonstrate compliance with requirements of this Specifications Section and shall include brief resume' and specific details of instructor's operating, maintenance, and training experience relative to the specific material and equipment for which instructor will provide training.
 - 3. Minutes of training scheduling conference.
- C. Closeout Submittals: Submit the following:
 - 1. Trainee sign-in sheets for each training session. Submit to Owner's training coordinator with copy to Engineer.

1.5 LESSON PLAN

- A. Supplier's lesson plan shall describe specific instruction topics, system components for which training will be provided, and training procedures. Handouts, if any, to be used in training shall be included with the lesson plan. Describe in lesson plan "hands-on" demonstrations planned for training sessions.
- B. Submit acceptable lesson plan not less than 30 days prior to starting associated training.
- C. Indicate in lesson plan estimated duration of each training segment.
- D. Lesson plan shall include the following:
 - 1. Material and Equipment Overview (required for all types of operations and maintenance training):
 - a. Describe material and equipment's operating (process) function and performance objectives.
 - b. Describe material and equipment's fundamental operating principles and dynamics.
 - c. Identify equipment's mechanical, electrical, and electronic components and features. Group related components into subsystems and describe function of subsystem and subsystem's interaction with other subsystems.
 - d. Identify all support materials and equipment associated with operation of subject equipment, such as air intake filters, valve actuators, motors, and other appurtenant items and equipment.
 - e. Identify and describe safety precautions and potential hazards related to operation.
 - f. Identify and describe in detail safety and control interlocks.
 - 2. Operations Personnel Training:
 - a. Material and Equipment Overview: As described in Paragraph 1.5.D.1 of this Specification Section.
 - b. Operation:
 - 1) Describe operating principles and practices.
 - 2) Describe routine operating, startup, and shutdown procedures.
 - 3) Describe abnormal or emergency startup, operating, and shutdown procedures that may apply.
 - 4) Describe alarm conditions and responses to alarms.
 - 5) Describe routine monitoring and recordkeeping procedures.
 - 6) Describe recommended housekeeping procedures.
 - c. Troubleshooting:
 - 1) Describe how to determine if corrective maintenance or an operating parameter adjustment is required.

3. Mechanical Maintenance Training:
 - a. Material and Equipment Overview: As described in Paragraph 1.5.D.1 of this Specification Section.
 - b. Material and Equipment Preventive Maintenance:
 - 1) Describe preventative maintenance inspection procedures required to:
 - a) Inspect materials and equipment in operation.
 - b) Identify potential trouble symptoms and anticipate breakdowns.
 - c) Forecast maintenance requirements (predictive maintenance).
 - 2) Define recommended preventative maintenance intervals for each component.
 - 3) Describe lubricant and replacement part recommendations and limitations.
 - 4) Describe appropriate cleaning practices and recommend intervals.
 - 5) Identify and describe use of special tools required for maintenance of materials and equipment.
 - 6) Describe component removal, installation, and disassembly and assembly procedures.
 - 7) Perform “hands-on” demonstrations of preventative maintenance procedures.
 - 8) Describe recommended measuring instruments and procedures, and provide instruction on interpreting alignment measurements, as appropriate.
 - 9) Define recommended torqueing, mounting, calibrating, and aligning procedures, tolerances, and settings, as appropriate.
 - 10) Describe recommended procedures to check and test equipment following corrective maintenance.
 - c. Troubleshooting:
 - 1) Define recommended systematic troubleshooting procedures.
 - 2) Provide component-specific troubleshooting checklists.
 - 3) Describe applicable materials and equipment testing and diagnostic procedures to facilitate troubleshooting.
 - 4) Describe common corrective maintenance procedures with “hands-on” demonstrations.
4. Instrumentation/Controls and Electrical Maintenance Training:
 - a. Materials and Equipment Overview: As described in Paragraph 1.5.D.1 of this Specification Section.
 - b. Preventative Maintenance and Troubleshooting of Instrumentation and Control Systems: Engineer may grant waiver(s) to allow all training for a given system to be at the location of Owner’s training facility.
 - c. Preventative Maintenance and Troubleshooting of Other Electrical Systems: In accordance with requirements for Paragraph 1.5.D.3 of this Specification Section.

1.6 TRAINING AIDS

- A. Supplier’s instructor(s) shall incorporate training aids as appropriate to assist in the instruction. Provide handouts of text, tables, graphs, and illustrations as required. Other appropriate training aids include:
 1. Audio-visual aids, such as videos, Microsoft PowerPoint presentations, overhead transparencies, posters, Drawings, diagrams, catalog sheets, or other items.
 2. Equipment cutaways and samples, such as spare parts and damaged equipment.
 3. Tools, such as repair tools, customized tools, and measuring and calibrating instruments.
- B. Handouts:
 1. Supplier’s instructor(s) shall distribute and use descriptive handouts during training. Customized handouts developed especially for training for the Project are encouraged.
 2. Photocopied handouts shall be good quality and completely legible.
 3. Handouts shall be coordinated with the instruction, with frequent references made to the handouts.
 4. Provide not less than 50 paper copies of each handout for each training session, unless otherwise coordinated with the Engineer and Owner.

- C. Audio-Visual Equipment: Training provider shall provide audio-visual equipment required for training sessions. If suitable equipment is available at the Site, Owner may make available facility's expiring audio-visual equipment; however, do not count on facility's expiring audio-visual equipment, if any, being available. Audio-visual equipment that training provider shall provide, as required, includes:
1. Laptop computer, presentation software, and suitable projector.
 2. Power cords, power strips/surge protectors.
 3. As required, extension cords, HDMI cables and other video cabling, and spare bulb for projector.
 4. Laser pointer/slideshow remote controller with extra batteries.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 TRAINING DELIVERY

- A. Training Delivery - General:
1. Instructors shall be fully prepared for the training sessions. Training delivery shall be communicative, clear, and proceed according to lesson plan accepted by Engineer, with lesson content appropriate for trainees. If Owner or Engineer deems that training delivery does not comply with the Contract Documents, training shall be postponed, rescheduled, and re-performed in acceptable manner at no additional cost to Owner.
 2. Trainee Sign-in Sheets: In format acceptable to Owner, furnish sign-in sheet for trainees for each session. Sign-in sheets shall include the Project name; materials, equipment, or system for which training was provided; and type of training (e.g., operations, mechanical maintenance, instrumentation/controls and electrical maintenance, or other), and full name and operator license number (when applicable) of each trainee. Upon completion of training, submit copy of each sign-in sheet as indicated in Article 1.4 of this Specification Section.
- B. "Hands-on" Demonstrations:
1. Supplier's instructor(s) shall present "hands-on" demonstrations of operations and maintenance of materials and equipment for each training session, in accordance with lesson plan accepted by Engineer.
 2. Contractor and manufacturer shall furnish tools necessary for demonstrations.

3.2 SCHEDULE OF REQUIRED TRAINING

- A. Supplier shall provide not less than the hours of training and number of sessions indicated in Table 01 79 23-A of this Specification Section. Travel time and expenses are responsibility of Supplier and are excluded from required training time indicated in the Contract Documents.
- B. Shifts and Training Sessions Required:
1. Operations at the Site take place 24 HRS per day, divided into three shifts as follows: Day, evening, and night shift.
 2. Training Sessions per Shift:
 - a. Operators: Maximum training per day is 4 HRS; sessions longer than 4 HRS shall be spread over multiple, preferably consecutive, days. Provide identical training sessions as follows:
 - 1) One session during the morning for day and night shift.
 - 2) One session during the afternoon for day and evening shift.
 - b. Mechanical Maintenance: Provide two identical training sessions during day shift, each session in a separate week, for indicated materials and equipment. Maximum training per day is 4 HRS; sessions longer than 4 HRS shall be spread over multiple, preferably consecutive, days.

- c. Instrument/Controls and Electrical Maintenance: Provide two identical training sessions during day shift, each session in a separate week, for indicated equipment.
- d. Maximum training per day is 4 HRS; sessions longer than 4 HRS will be spread over multiple, preferably consecutive, days.

TABLE 01 79 23-A, TRAINING SUMMARY TABLE

Material or Equipment	Specification Division or Section(s)	Total Training (HRS)	Training Sessions Required		
			Operations	Mechanical Maintenance	Instrumentation / Controls & Electrical Maintenance
Effluent Channel Covers	06 82 00	2	0	2 sessions, 1 hr each	0
Instrumentation & Controls	Division 40	16	2 sessions, 2 hr each	2 sessions, 2 hr each	4 sessions, 2 hr each
Sluice Gates	40 05 59	6	3 sessions, 2 hr each		
Stop Logs	40 05 59.16	6	2 sessions, 2 hr each	1 session, 2 hr each	0
Level Instrumentation	40 72 00	8	2 sessions, 2 hr each	0	2 sessions, 2 hr each
Effluent Launder Covers	46 13 19	4	2 sessions, 1 hr each	2 sessions, 1 hr each	0
Secondary Clarifier Equipment	46 43 22	16	4 sessions, 2 hr each	2 sessions, 2 hr each	2 sessions, 2 hr each

Note 1: Required hours listed for training in Table 01 79 23-A are per session as defined above in Article 3.2.B.

END OF SECTION

SECTION 02 41 00 DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. General provisions applicable to all demolition and removals.
 - 2. Civil/site demolition and removals.
 - 3. Architectural and structural demolition and removals.
 - 4. Electrical demolition and removals.
 - 5. Disposal of demolition debris, materials, and equipment.
- B. Scope:
 - 1. Contractor shall provide all labor, materials, equipment, tools, and incidentals as shown, specified and required for demolition, removals, and disposal Work.
 - 2. The Work under this Specifications section includes, but is not necessarily limited to:
 - a. Demolition and removal of existing materials and equipment as shown or indicated in the Contract Documents. The Work includes demolition of structural concrete, walls, metals, slabs, and appurtenances and similar existing materials, equipment, and items.
 - 3. Demolitions and removals indicated in other Specifications Sections shall comply with requirements of this Specifications Section.
 - 4. Perform demolition Work within areas shown or indicated.
 - 5. Pay all costs associated with transporting and, as applicable, disposing of materials and equipment resulting from demolition and removals Work.
- C. Related Specification Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. National Fire Protection Association (NFPA):
 - a. 241, Safeguarding Construction, Alteration, and Demolition Operations.
- B. Regulatory Requirements:
 - 1. Demolition, removals, and disposal Work shall be in accordance with 29 CFR 1926.850 through 29 CFR 1926.860 (Subpart T – Demolition), and all other Laws and Regulations.
 - 2. Comply with requirements of Authorities Having Jurisdiction.
- C. Qualifications:
 - 1. Electrical Removals: Entity and personnel performing electrical removals shall be electrician(s) legally qualified to perform electrical construction and electrical work in the jurisdiction where the Site is located.
 - 2. Entity performing Hydro Demolition:
 - a. Entity performing hydro demolition of concrete, whether Contractor or Subcontractor, and including installers and applicators, shall possess not less than five years current experience hydro demolition of concrete in similar facilities or situations.
 - b. Entity performing hydro demolition shall submit to Engineer documentation of qualifications and experience, including:
 - 1) Documentation of successfully completing not less than three projects of similar size and complexity to the hydro demolition Work of this Project within the past five years.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Review procedures under this and other Specifications sections and coordinate the Work that will be performed with or before demolition and removals.

1.4 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Procedure Submittals:

- a. Demolition and Removal Plan: Not less than ten days prior to starting demolition Work, submit acceptable plan for demolition and removal Work, including:
 - 1) Plan for coordinating shut-offs, capping, temporary services, and continuing utility services.
 - 2) Other proposed procedures as applicable.
 - 3) Equipment proposed for use in demolition operations.
 - 4) Recycling/disposal facility(ies) proposed, including facility owner, facility name, location, and processes. Include copy of appropriate permits and licenses, and compliance status.
 - 5) Planned demolition operating sequences.
 - 6) Detailed schedule of demolition Work in accordance with the Schedule accepted by Engineer.
 - 7) Contractor shall submit specific Hydro Demolition removal plan with the following minimum content:
 - a) Equipment to be used.
 - b) Proposed removal plan and equipment to protect existing structural components.
 - c) Phases of demolition if applicable.
 - d) Qualifications and personnel completing the work.

1.5 SITE CONDITIONS

- A. Owner makes no representation of condition or structural integrity of area(s) to be demolished or where removals are required by the Contract Documents.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 PREPARATION

A. Notification:

1. Not less than 48 HRS prior to commencing demolition or removal, advise Engineer in writing of planned start of demolition Work. Do not start removals without permission of Engineer.

B. Protection of Adjacent Areas and Facilities:

1. Perform demolition and removal Work in manner that prevents damage and injury to property, structures, occupants, the public, and facilities. Do not interfere with use of, and free and safe access to and from, structures and properties unless allowed by the Contract Documents otherwise allowed in writing by Owner.
2. Closing or obstructing of roads, drives, sidewalks, and passageways adjacent to the Work is not allowed unless indicated otherwise in the Contract Documents. Conduct the Work with minimum interference to vehicular and pedestrian traffic.
3. Provide temporary partitions between demolition work areas and (a) areas that will be occupied during demolition and removals, and (b) areas accessible to the public or visitors. Temporary partitions shall be sturdy, braced plywood in good condition, of dimensions sufficient to adequately screen demolition work from view of occupants, public, and

- visitors. Maintain temporary partitions in place until demolition and removals work in the subject area is complete or until other Work requires removal of temporary partitions.
4. Provide appropriate temporary barriers, lighting, sidewalk sheds, and other necessary protection.
 5. Repair damage to facilities that are to remain which such damages results from Contractor's operations.
- C. Existing Utilities: In addition to requirements of the General Conditions, Supplementary Conditions, and Division 01 Specifications, perform the following:
1. Should unforeseen, unknown, or incorrectly shown or indicated Underground Facilities be encountered, Contractor responsibilities shall be in accordance with the General Conditions as may be modified by the Supplementary Conditions. Cooperate with utility owners in keeping adjacent services and facilities in operation.
 2. Water Piping and Related Facilities: Before proceeding with demolition, locate and cap all potable and non-potable waterlines and service laterals serving the building or structure being demolished. Ensure compliance with Laws and Regulations regarding water quality.
 3. Other Utilities: Before proceeding with demolition, locate and cap as required all other utilities, such as fuel and gas; compressed air; heating, ventilating, and air conditioning; electric; and communications; and service laterals serving the building or structure being demolished.
 4. Shutdown of utility services shall be coordinated by Contractor, assisted by Owner as required relative to contacting utility owners.
- D. Remediation:
1. If unanticipated Hazardous Environmental Condition is believed to be encountered during demolition and removals, comply with requirements of the General Conditions, as may be modified by the Supplementary Conditions.

3.2 DEMOLITION - GENERAL

- A. Locate construction equipment used for demolition Work and remove demolished materials and equipment to avoid imposing excessive loading on supporting and adjacent walls, floors, framing, facilities, and Underground Facilities.
- B. Pollution Controls:
1. Use water sprinkling, temporary enclosures, and other suitable methods to limit emissions of dust and dirt to lowest practical level.
 2. Do not use water when water may create hazardous or objectionable conditions such as icing, flooding, or pollution.
 3. Clean adjacent structures, facilities, properties, and improvements of dust, dirt, and debris caused by demolition Work, in accordance with the General Conditions and Section 01 74 00 - Cleaning.
- C. Explosives:
1. Explosives are not allowed at the Site. Do not use explosives for demolition and removal Work.
- D. Comply with Section 01 73 29 - Cutting and Patching and NFPA 241.
- E. Building or Structure Demolition and Removals:
1. Unless otherwise approved by Engineer, proceed with demolition from top of building or structure to the ground. Complete demolition Work above each floor or tier before disturbing supporting members of lower levels.
 2. Demolish concrete and masonry in small sections.
 3. Remove structural framing members and lower to ground using hoists, cranes, or other suitable methods. Do not throw or drop to the ground.
 4. Break up and remove foundations, mats, and slabs-on-grade unless otherwise shown or indicated as remaining in place.

5. Temporary Bracing and Supports:
 - a. Provide temporary bracing and supports sufficient to maintain safety, stability, and resist all loads to which the structure may be subject during demolition and removals, until entirety is permanently removed or permanently stabilized.
 - b. Temporary bracing and supports shall be sufficient for associated dead load, live load, transient loading, and dynamic loads such as wind, seismic, and other loads to which the temporary bracing or support may be subject.
 - c. Where appropriate, retain a Professional Structural Engineer, duly licensed and registered in the same jurisdiction as the Site, to design temporary bracing and supports.
- F. Finishing of Surfaces Exposed by Removals: Unless otherwise shown or indicated in the Contract Documents, surfaces of walls, floors, ceilings, and other areas exposed by removals, and that will remain as finished surfaces, shall be repaired and re-finished with materials that match existing adjacent surface, or as otherwise approved by Engineer.

3.3 STRUCTURAL REMOVALS

- A. Remove structures to lines and grades shown or indicated, unless otherwise directed by Engineer. Where limits are not shown or indicated, limits shall be 4 IN outside item to be installed. Removals beyond limits shown or indicated shall be at Contractor's risk and expense and such excess removals shall be reconstructed to satisfaction of Engineer without additional cost to Owner.
- B. Recycling and Reuse of Demolition Materials:
 1. All concrete, brick, tile, masonry, roofing materials, reinforcing steel, structural metals, miscellaneous metals, plaster, wire mesh, and other items contained in or upon building or structure to be demolished shall be removed, transported, and disposed of away from the Site, unless otherwise approved by Engineer.
 2. Do not use demolished materials as fill or backfill adjacent to structures, in pipeline trenches, or as subbase under structures or pavement.
- C. After removing concrete and masonry walls or portions thereof, mats, slabs, and similar construction that ties into the Work or to existing construction, neatly repair the junction point to leave exposed only finished edges and finished surfaces.
- D. Where parts of existing structures are to remain in service following demolition, remove the portions shown or indicated for removal, repair damage, and leave the building or structure in proper condition for the intended use.
 1. Remove concrete and masonry to the lines shown or indicated by sawing, drilling, chipping, and other suitable methods. Leave the resulting surfaces true and even, with sharp, straight corners that will result in neat joints with new construction and be satisfactory for the purpose intended.
 2. Do not damage reinforcing bars beyond the area of concrete and masonry removal. Do not saw-cut beyond the area to be removed.
 3. Reinforcing bars that are exposed at surfaces of removed concrete and masonry that will not be covered with new concrete or masonry shall be removed to 1.5 IN below the final surface. Repair the resulting hole, with repair mortar for concrete and grout for masonry, to be flush with the surface.
 4. Where existing reinforcing bars are shown or indicated to extend into new construction, remove existing concrete so that reinforcing bars are clean and undamaged.
- E. Removal of Anchorages and Protruding Metals:
 1. Where equipment or material anchored to concrete or masonry are removed and anchors are not to be re-used, and where existing metals (and to be removed) protrude from concrete, remove the anchors and other metal to not less than 1.5 IN beneath surface of concrete or masonry member. Repair the resulting hole, using repair mortar for concrete and grout for masonry, to be flush with the surface.
 2. Alternately, when the anchor is stainless steel, the anchor may be cut flush with the surface of the concrete or masonry, when so approved by Engineer.

- F. Where anchoring materials, including bolts, nuts, hangers, welds, and reinforcing steel, are required to attach the Work to existing construction, provide such materials under this Specifications section, unless specified elsewhere in the Contract Documents.
- G. Equipment Demolition and Removals:
 - 1. Where required, disassemble equipment to avoid imposing excessive loading on supporting walls, floors, framing, facilities, and Underground Facilities. Disassemble equipment as required for access through and egress from building or structure. Disassembly and removal shall comply with Laws and Regulations. Provide required means to remove equipment from building or structure.

3.4 ELECTRICAL REMOVALS

- A. Electrical Demolition Work Includes Removing Existing:
 - 1. Conduits, raceways, cable trays, hangers and supports, cabling, and related items.
 - 2. Lighting fixtures and related items.
 - 3. Appurtenances and miscellaneous electrical equipment, as shown, specified, or required.
- B. Electrical Removals – General:
 - 1. Comply with Laws and Regulations, including the National Electric Code.
 - 2. Lock Out and Tagging:
 - a. Contractor shall lock out and tag circuit breakers and switches operated by Owner and shall verify that affected cabling are de-energized to ground potential before commencing electrical removals Work.
 - b. Upon completion of electrical removals Work, remove the locks and tags and promptly advise Resident Project Representative (RPR) or Engineer and Owner that existing facilities are available for use.
 - 3. Remove existing electrical equipment, fixtures, and systems to avoid damaging systems to remain, to keep existing systems in operation, and to maintain integrity of grounding systems.
 - 4. Disconnect and remove motors, control panels, and other electrical gear where shown or indicated.
- C. Removal of Cabling, Conduits, Raceways and Similar Items:
 - 1. Verify the function of each cable before disconnecting and removing.
 - 2. Remove cabling, conduits, hangers and supports, and similar items back to the power source or control panel, unless otherwise shown or indicated.
 - 3. Remove cabling, conduits, and similar items where shown or indicated for removal. Abandoned conduits concealed in floor, ceiling slabs, or in walls shall be cut flush with the slab or wall (as applicable) at point of entrance, suitably capped, and the area repaired in a flush, smooth manner acceptable to Engineer.
 - 4. Disassemble and remove exposed conduits, junction boxes, other electrical appurtenances, and their supports.
 - 5. Repair all areas of the Work to prevent rusting on exposed surfaces.
- D. Lighting fixtures, wall switches, receptacles, starters, and other miscellaneous electrical equipment, not designated as remaining as Owner’s property, shall be removed and properly disposed off-Site as required in accordance with Laws and Regulations.

3.5 HYDRODEMOLITION

- A. Hydro demolition equipment:
 - 1. Computerize, self-propelled machine capable of horizontal movement as required by the demolition being indicated.
 - 2. No handheld wands or equipment.
 - 3. Machine shall produce water jet through an orifice of sufficient pressure to remove concrete. Minimum 15,000 PSI.
 - 4. Machine shall be capable of removing existing concrete to the extents shown on the documents without causing damage to the existing reinforcing or surrounding structure.

- B. Contractor shall maintain control of equipment at all times to prevent damage to surrounding structure to remain. If any surrounding structure is damaged without prior written approval of the Engineer, Contractor shall replace or repair it at no additional cost to the Owner.
- C. Contractor shall provide means to protect adjacent structure such as steel plates, guides on equipment, or shields.

3.6 DISPOSAL OF DEMOLITION DEBRIS

- A. Disposal – General:
 - 1. Promptly remove from the Site all debris, waste, rubbish, material, and equipment resulting from demolition and removal operations. Promptly upon completion of demolition and removal operations, remove from the Site construction equipment used in demolition Work.
 - 2. Do not sell at the Site demolition materials or removed equipment. If materials, equipment or debris will be sold by Contractor, remove the items from the Site and perform the sale or transaction elsewhere, in accordance with Laws and Regulations.
 - 3. Cleaning and Removal of Debris: Comply with the General Conditions, Supplementary Conditions, and Section 01 74 00 - Cleaning.
- B. Transportation and Disposal:
 - 1. Non-Hazardous Materials, Equipment, and Debris: Properly transport and dispose of non-hazardous demolition materials, equipment, and debris at appropriate landfill or other suitable location, in accordance with Laws and Regulations. Non-hazardous material does not contain Constituents of Concern such as (but not limited to) asbestos, PCBs, petroleum, hazardous waste, radioactive material, or other material designated as hazardous in Laws or Regulations.
 - 2. Hazardous Materials, Equipment, and Debris: When handling and disposal of items containing Constituents of Concern is included in the Work, properly transport and dispose of such items in accordance with the Contract Documents and Laws and Regulations.

END OF SECTION



DIVISION 03

CONCRETE



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SECTION 03 09 00
CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Cast-in-place concrete and grout.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Concrete Institute (ACI):
 - a. 117, Specification for Tolerances for Concrete Construction and Materials.
 - b. 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
 - c. 212.3R, Chemical Admixtures for Concrete.
 - d. 304R, Guide for Measuring, Mixing, Transporting, and Placing Concrete.
 - e. 304.2R, Placing Concrete by Pumping Methods.
 - f. 305.1, Hot Weather Concreting.
 - g. 306.1, Cold Weather Concreting.
 - h. 318, Building Code Requirements for Structural Concrete.
 - i. 347, Guide to Formwork for Concrete.
 - j. CT-13, Concrete Terminology.
 - 2. ASTM International (ASTM):
 - a. A82, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - b. A185, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - c. A615, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - d. A1064, Standard Specification for Steel Wire and Welded Wire Replacement, Plain and Deformed, for Concrete.
 - e. C31, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - f. C33, Standard Specification for Concrete Aggregates.
 - g. C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - h. C94/C94M, Standard Specification for Ready-Mixed Concrete.
 - i. C138, Standard Method of Test for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
 - j. C143, Standard Test Method for Slump of Hydraulic Cement Concrete.
 - k. C150, Standard Specification for Portland Cement.
 - l. C172, Standard Practice for Sampling Freshly Mixed Concrete.
 - m. C173, Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
 - n. C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 - o. C260, Standard Specification for Air-Entraining Admixtures for Concrete.
 - p. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - q. C494, Standard Specification for Chemical Admixtures for Concrete.

- r. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 - s. C1293, Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction.
 - t. C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
 - u. D882, Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
 - v. D994, Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
 - w. D1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
 - x. D1709, Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.
 - y. D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
 - z. E96, Standard Test Methods for Water Vapor Transmission of Materials.
 - aa. E329, Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.
3. Corps of Engineers (COE):
 - a. CRD-C621, Standard Specification for Packaged, Dry, Hydraulic-Cement Grout (Non-shrink).
 4. National Ready Mixed Concrete Association (NRMCA).
 5. National Sanitation Foundation (NSF):
 - a. 61, Drinking Water System Components - Health Effects.
- B. Quality Control:
1. Concrete testing agency:
 - a. Contractor to employ and pay for services of a testing laboratory to:
 - 1) Perform materials evaluation.
 - 2) Design concrete mixes.
 - b. Concrete testing agency to meet requirements of ASTM E329.
 2. Do not begin concrete production until proposed concrete mix design has been approved by Engineer.
 - a. Approval of concrete mix design by Engineer does not relieve Contractor of his responsibility to provide concrete that meets the requirements of this Specification.
 3. Adjust concrete mix designs when material characteristics, job conditions, weather, strength test results or other circumstances warrant.
 - a. Do not use revised concrete mixes until submitted to and approved by Engineer.
 4. Perform structural calculations as required to prove that all portions of the structure in combination with remaining forming and shoring system has sufficient strength to safely support its own weight plus the loads placed thereon.
- C. Qualifications: Ready mixed concrete batch plant certified by NRMCA.

1.3 DEFINITIONS

- A. Per ACI CT-13 except as modified herein:
1. Concrete fill: Non-structural concrete.
 2. Concrete Testing Agency: Testing agency employed to perform materials evaluation, design of concrete mixes or testing of concrete placed during construction.
 3. Exposed concrete: Exposed to view after construction is complete.
 4. Indicated: Indicated by Contract Documents.
 5. Non-exposed concrete: Not exposed to view after construction is complete.
 6. Required: Required by Contract Documents.
 7. Specified strength: Specified compressive strength at 28 days.
 8. Submitted: Submitted to Engineer.

1.4 SUBMITTALS

- A. Shop Drawings:
1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 2. Concrete mix designs proposed for use.
 - a. Concrete mix design submittal to include the following information:
 - 1) Sieve analysis and source of fine and coarse aggregates.
 - 2) Test for aggregate organic impurities.
 - 3) Test for deleterious aggregate per ASTM C1293.
 - 4) Proportioning of all materials.
 - 5) Type of cement with mill certificate for cement.
 - 6) Type of fly ash with certificate of conformance to specification requirements.
 - 7) Slump.
 - 8) Air content.
 - 9) Brand, type, ASTM designation, and quantity of each admixture proposed for use.
 - 10) 28-day cylinder compressive test results of trial mixes per ACI 318 and as indicated herein.
 3. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturers and types:
 - 1) Joint fillers.
 - 2) Curing agents.
 - 3) Chemical sealer.
 - 4) Bonding and patching mortar.
 - 5) Construction joint bonding adhesive.
 - 6) Non-shrink grout with cure/seal compound.
 - 7) Waterstops.
 4. Reinforcing steel:
 - a. Show grade, sizes, number, configuration, spacing, location and all fabrication and placement details.
 - b. In sufficient detail to permit installation of reinforcing without having to make reference to Contract Drawings.
 - c. Obtain approval of Shop Drawings by Engineer before fabrication.
 - d. Mill certificates.
 5. Scaled (minimum 1/8 IN/FT) Drawings showing proposed locations of construction joints, control joints, expansion joints (as applicable) and joint dimensions.
 6. Strength test results of in place concrete including slump, air content and concrete temperature.
 7. Certifications:
 - a. Certification of standard deviation value in psi for ready mix plant supplying the concrete.
 - b. Certification that the material and sources submitted in the mix design will be used in the concrete for this project.
 8. Test reports:
 - a. Cement mill reports for all cement to be supplied.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Storage of Material:
1. Cement and pozzolan:
 - a. Store in moisture proof, weathertight enclosures.
 - b. Do not use if caked or lumpy.
 2. Aggregate:
 - a. Store to prevent segregation and contamination with other sizes or foreign materials.
 - b. Obtain samples for testing from aggregates at point of batching.

- c. Do not use frozen or partially frozen aggregates.
 - d. Do not use bottom 6 IN of stockpiles in contact with ground.
 - e. Allow sand to drain until moisture content is uniform prior to use.
 - 3. Admixtures:
 - a. Protect from contamination, evaporation, freezing, or damage.
 - b. Maintain within temperature range recommended by manufacturer.
 - c. Completely mix solutions and suspensions prior to use.
 - 4. Reinforcing steel: Support and store all rebars above ground.
- B. Delivery:
- 1. Concrete:
 - a. Prepare a delivery ticket for each load for ready-mixed concrete.
 - b. Truck operator shall hand ticket to Owner's Representative at the time of delivery.
 - c. Ticket to show:
 - 1) Mix identification mark.
 - 2) Quantity delivered.
 - 3) Amount of each material in batch.
 - 4) Outdoor temp in the shade.
 - 5) Time at which cement was added.
 - 6) Numerical sequence of the delivery.
 - 7) Amount of water added.
 - 2. Reinforcing steel:
 - a. Ship to jobsite with attached plastic or metal tags with permanent mark numbers.
 - b. Mark numbers to match Shop Drawing mark number.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following products and manufacturers are acceptable:
- 1. Non-shrink, nonmetallic grout:
 - a. Sika "SikaGrout 212."
 - b. Euclid Chemical "NS Grout."
 - c. BASF Admixtures, Inc. "Masterflow 713."
 - 2. Epoxy grout:
 - a. BASF Admixtures, Inc. "Brutem MPG."
 - b. Euclid Chemical Company, "E3-G."
 - c. epFosroc, "Conbextra EPHF".
 - 3. Expansion joint fillers:
 - a. Permaglaze Co.
 - b. Rubatex Corp.
 - c. Williams Products, Inc.
 - 4. Waterstops, Preformed - Strip-Type:
 - a. Greenstreak (Hydrotite).
 - b. Adeka Ultra Seal (2010MN).
 - c. DeNeef (Swellseal Plus).
 - 5. Form coating:
 - a. Richmond "Rich Cote."
 - b. Industrial Lubricants "Nox-Crete Form Coating."
 - c. Euclid Chemical "Kurez DR VOX."
 - 6. Cementitious concrete coating:
 - a. Aquafin International.
 - b. BASF Building Systems.
 - c. Euclid Chemical Company.

7. Chemical sealer:
 - a. L&M Construction Chemicals, Inc.
 - b. Euclid Chemical Company.
 - c. Dayton Superior.
- B. Submit request for substitution in accordance with Specification Section 01 25 00.

2.2 MATERIALS

- A. Portland Cement: Conform to ASTM C150 Type II.
- B. Fly Ash:
 1. ASTM C618, Class F or Class C.
 2. Non-staining.
 - a. Hardened concrete containing fly ash to be uniform light gray color.
 3. Maximum loss on ignition: 4%.
 4. Compatible with other concrete ingredients.
 5. Obtain proposed fly ash from a source approved by the State Highway Department in the state where the Project is located for use in concrete for bridges.
- C. Admixtures:
 1. Air entraining admixtures: ASTM C260.
 2. Water reducing, retarding, and accelerating admixtures:
 - a. ASTM C494 Type A through E.
 - b. Conform to provisions of ACI 212.3R.
 - c. Do not use retarding or accelerating admixtures unless specifically approved in writing by Engineer and at no cost to Owner.
 - d. Follow manufacturer's instructions.
 - e. Use chloride free admixtures only.
 3. Maximum total water soluble chloride ion content contributed from all ingredients of concrete including water, aggregates, cementitious materials and admixtures by weight percent of cement:
 - a. 0.10 all concrete.
 4. Do not use calcium chloride.
 5. Pozzolanic admixtures: ASTM C618.
 6. Provide admixtures of same type, manufacturer and quantity as used in establishing required concrete proportions in the mix design.
- D. Water: Potable, clean, free of oils, acids and organic matter.
- E. Aggregates:
 1. Normal weight concrete: ASTM C33, except as modified below.
 2. Fine aggregate:
 - a. Clean natural sand.
 - b. No manufactured or artificial sand.
 3. Coarse aggregate:
 - a. Crushed rock, natural gravel, or other inert granular material.
 - b. Maximum amount of clay or shale particles: 1%.
 4. Gradation of coarse aggregate:
 - a. Lean concrete and concrete topping: Size #7.
 - b. All other concrete: Size #57 or #67.
- F. Concrete Grout:
 1. Non-shrink, nonmetallic grout:
 - a. Nonmetallic, noncorrosive, non-staining, premixed with only water to be added.
 - b. Grout to produce a positive but controlled expansion.
 - c. Mass expansion not to be created by gas liberation.
 - d. Minimum compressive strength of non-shrink grout at 28 days: 6500 PSI.
 - e. In accordance with COE CRD-C621.

2. Epoxy grout:
 - a. 3-component epoxy resin system.
 - 1) Two liquid epoxy components.
 - 2) One inert aggregate filler component.
 - b. Each component packaged separately for mixing at jobsite.
- G. Reinforcing Steel:
1. Reinforcing bars: ASTM A615, Grade 60.
- H. Forms:
1. Prefabricated or job built.
 2. Wood forms:
 - a. 5/8 or 3/4 IN 5-ply structural plywood of concrete form grade.
 - b. Built-in-place or prefabricated type panel.
 3. Metal forms:
 - a. Metal forms may be used except for aluminum in contact with concrete.
 - b. Forms to be tight to prevent leakage, free of rust and straight without dents to provide members of uniform thickness.
 4. Chamfer strips: Clear white pine, surface against concrete planed.
- I. Form Ties:
1. Commercially fabricated for use in form construction.
 - a. Field fabricated ties are unacceptable.
 2. Constructed so that ends or end fasteners can be removed without causing spalling at surfaces of the concrete.
 3. 3/4 IN minimum to 1 IN maximum diameter cones on both ends.
 4. Embedded portion of ties to be not less than 1-1/2 IN from face of concrete after ends have been removed.
 5. Cone size:
 - a. 3/4 IN minimum to 2 1/2 IN maximum diameter cones on both ends.
 - b. Depth of cone not to exceed the concrete reinforcing cover.
 6. Form release: Non-staining and shall not prevent bonding of future finishes to concrete surface.
 7. Provide hog rings or grommets spaced at maximum 12 IN OC along the length of the water stop.
 8. Provide factory made waterstop fabrications at all changes of direction, intersections and transitions leaving only straight butt splices for the field.
- J. Chairs, Runners, Bolsters, Spacers, and Hangers:
1. Stainless steel, epoxy coated, or plastic coated metal.
 - a. Plastic coated: Rebar support tips in contact with the forms only.
- K. Water Swelling Sealant:
1. Compatible with strip-type waterstop.
 2. Single component, gun applied.
 3. Moisture cured.
 4. Minimum 70% volumetric expansion swelling capability.
- L. Cementitious Concrete Coating:
1. Polymer modified Portland cement based coating for concrete and masonry.
 - a. Waterproof.
 - b. Resistant to both positive and negative hydrostatic pressure.
 - c. Breathable.
 2. BASF "Masterseal 581 Thoroseal".
 - a. Color:
 - 1) Interior surfaces: Standard gray.
 - 2) Exterior surfaces: Custom color to match concrete surface.
 - 3) Texture: Fine.

M. Membrane Curing Compound:

1. ASTM C309, Type 1D, Class A or B.
2. Fugitive dye shall dissipate over time and exposure.
3. Curing compound shall not prevent bonding of any future coverings, coatings or finishes.
4. Curing compound film shall be removed prior to application of any coverings, coatings or finishes to ensure adequate bond to the concrete.
5. Curing compounds used in water treatment plant or water storage construction to be NSF 61 approved.

N. Bonding Agent:

1. High solids acrylic latex base liquid for interior or exterior application as a bonding agent to improve adhesion and mechanical properties of concrete patching mortars.
2. Euclid Chemical Co. "Flex-Con."
3. BASF Admixtures, Inc. "Acryl-Set."
4. L&M Construction Chemicals "Everbond."
5. Other use:
 - a. Fiber expansion joint filler.
 - b. ASTM D1751.

2.3 CONCRETE MIXES

A. General:

1. All concrete to be ready mixed concrete conforming to ASTM C94/C94M.
2. Provide concrete of specified quality capable of being placed without segregation and, when cured, of developing all properties required.
3. All concrete to be normal weight concrete.
4. Provide pozzolan content for all cast-in-place construction.

B. Strength:

1. Provide specified strength and type of concrete for each use in structure(s) as follows:

TYPE	WEIGHT	SPECIFIED STRENGTH*
All other general use concrete	Normal weight	4500 PSI

* Minimum 28-day compressive strength.

C. Air Entrainment:

1. Provide air entrainment in all concrete resulting in a total air content percent by volume as follows:

MAX AGGREGATE SIZE	TOTAL AIR CONTENT PERCENT
1 IN or 3/4 IN	6 ±1-1/2
<3/4 IN	6-1/2 ±1-1/2

2. Air content to be measured in accordance with ASTM C231, ASTM C173, or ASTM C138.

D. Slump - 4 IN maximum, 1 IN minimum:

1. Measured at point of discharge of the concrete into the concrete construction member.
2. 8 IN maximum after addition of superplasticizer (if used).
3. Concrete of lower than minimum slump may be used provided it can be properly placed and consolidated.
4. Pumped concrete:
 - a. Provide additional water at batch plant to allow for slump loss due to pumping.
 - b. Provide only enough additional water so that slump of concrete at discharge end of pump hose does not exceed maximum slump specified and the maximum specified water-cement ratio is not exceeded.

5. Slump may be adjusted in the field through the use of water reducers.
 - a. Coordinate dosage and mixing requirements with concrete supplier.
 6. Determine slump per ASTM C143.
- E. Selection of Proportions:
1. General:
 - a. Proportion ingredients to:
 - 1) Produce proper workability, durability, strength, and other required properties.
 - 2) Prevent segregation and collection of excessive free water on surface.
 2. Minimum cement contents and maximum water cement ratios for concrete to be as follows:

SPECIFIED STRENGTH	MINIMUM CEMENT, MAXIMUM AGGREGATE SIZE			MAXIMUM WATER CEMENT RATIO BY WEIGHT
	1/2 IN	3/4 IN	1 IN	
4500	611	611	--	0.42

3. Fly ash:
 - a. For cast-in-place concrete only, a maximum of 25% by weight of Portland cement content per cubic yard may be replaced with fly ash at rate of 1 LB fly ash for 1 LB of cement.
 - b. When fly ash is used, the water to cementitious materials ratio shall not exceed the maximum value specified herein.
4. Concrete mix proportioning methods for normal weight concrete:
 - a. Proportion mixture to provide desired characteristics using one of methods described below:
 - 1) Method 1 (Trial Mix):
 - a) Per ACI 318, Chapter 5, except as modified herein.
 - b) Air content within range specified above.
 - c) Record and report temperature of trial mixes.
 - d) Proportion trial mixes per ACI 211.1.
 - 2) Method 2 (Field Experience):
 - a) Per ACI 318, Chapter 5, except as modified herein:
 - b) Field test records must be acceptable to Engineer to use this method.
 - c) Test records shall represent materials, proportions and conditions similar to those specified.
5. Required average strength to exceed the specified 28-day compressive strength by the amount determined or calculated in accordance with the requirements of Chapter 5 of ACI 318 using the standard deviation of the proposed concrete production facility.

PART 3 - EXECUTION

3.1 FORMING AND PLACING CONCRETE

- A. Formwork:
1. Contractor is responsible for design and erection of formwork.
 2. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation and position.
 - a. Allowable tolerances: As recommended in ACI 347.
 3. Provide slabs and beams of minimum indicated depth when sloping foundation base slabs or elevated floor slabs to drains.
 - a. For slabs on grade, slope top of subgrade to provide floor slabs of minimum uniform indicated depth.
 - b. Do not place floor drains through beams.

4. Openings:
 - a. Provide openings in formwork to accommodate work of other trades.
 - b. Accurately place and securely support items built into forms.
 5. Chamfer strips: Place 3/4 IN chamfer strips in forms to produce 3/4 IN wide beveled edges on permanently exposed corners of members.
 6. Clean and adjust forms prior to concrete placement.
 7. Tighten forms to prevent mortar leakage.
 8. Coat form surfaces with form release agents prior to placing reinforcing bars in forms.
- B. Reinforcement:
1. Position, support and secure reinforcement against displacement.
 2. Locate and support with chairs, runners, bolsters, spacers and hangers, as required.
 3. Set wire ties so ends do not touch forms and are directed into concrete, not toward exposed concrete surfaces.
 4. Lap splice lengths: ACI 318 Class B top bar tension splices unless indicated otherwise on the Drawings.
 5. Extend reinforcement to within 2 IN of concrete perimeter edges.
 - a. If perimeter edge is earth formed, extend reinforcement to within 3 IN of the edge.
 6. Minimum concrete protective covering for reinforcement: As shown on Drawings.
 7. Unless otherwise indicated, provide minimum concrete cover as follows:
 - a. Concrete deposited against earth: 3 IN.
 - b. Formed surfaces exposed to weather or in contact with earth: 2 IN for reinforcing bars #6 or larger; 1-1/2 IN for reinforcing bars less than #6.
 - c. Formed surfaces exposed to or located above any liquid: 2 IN.
 - d. Interior surfaces: 1-1/2 IN for beams, girders and columns; 3/4 IN or bar diameter, whichever is greater, for slabs, walls and joists.
 8. Do not weld reinforcing bars.
- C. Embedments:
1. Set and build in anchorage devices and other embedded items required for other work that is attached to or supported by concrete.
 2. See Specification Section 03 15 19 - Anchorage to Concrete.
 3. Use setting diagrams, templates and instructions for locating and setting.
 4. Secure waterstops in correct position using hog rings or grommets spaced along the length of the waterstop and wire tie to adjacent reinforcing steel.
- D. Waterstops, General:
1. Lap all types of waterstop to create continuous watertight joints.
 2. Do not mix different types of waterstop materials in the same structure without specific approval from the Engineer.
 3. Contractor is responsible for waterstop selection and installation to provide leak-tight joints, to the minimum standard shown in the Contract Documents.
 4. Base selection on anticipated differential movement of mating surfaces.
 5. Waterstop manufacturer's representative shall provide on-site training of waterstop installation, splicing, welding and inspection procedures prior to construction, and at no additional cost.
- E. Waterstops - Preformed Strip Type:
1. Install in a bed of swelling sealant on a smooth surface of hardened concrete by use of nails, screws or other means as recommended by manufacturer to prevent movement of waterstop during placement of new concrete.
 2. Roughened joints shall be specially prepared during concrete placement to provide smooth surface for proper waterstop installation.
 3. Unless otherwise noted, use in joints against existing concrete and where indicated on Drawings.
- F. Placing Concrete:
1. Place concrete in compliance with ACI 304R and ACI 304.2R.

2. Place in a continuous operation within planned joints or sections.
 3. Begin placement when work of other trades affecting concrete is completed.
 4. Place concrete by methods which prevent aggregate segregation.
 5. Do not allow concrete to free fall more than 4 FT.
 6. Where free fall of concrete will exceed 4 FT, place concrete by means of tremie pipe or chute.
- G. Consolidation: Consolidate all concrete using mechanical vibrators supplemented with hand rodding and tamping, so that concrete is worked around reinforcement and embedded items into all parts of forms.
- H. Protection:
1. Protect concrete from physical damage or reduced strength due to weather extremes.
 2. In cold weather comply with ACI 306.1 except as modified herein.
 - a. Do not place concrete on frozen ground or in contact with forms or reinforcing bars coated with frost, ice or snow.
 - b. Do not place heated concrete that is warmer than 80 DEGF.
 - c. If freezing temperatures are expected during curing, maintain the concrete temperature at or above 50 DEGF for 7 days or 70 DEGF for 3 days.
 - d. Do not allow concrete to cool suddenly.
 3. In hot weather comply with ACI 305.1 except as modified herein.
 - a. At air temperature of 90 DEGF and above, keep concrete as cool as possible during placement and curing.
 - b. Do not allow concrete temperature to exceed 90 DEGF at placement.
 - c. Prevent plastic shrinkage cracking due to rapid evaporation of moisture.
 - d. Do not place concrete when the actual or anticipated evaporation rate equals or exceeds 0.2 LBS/SF/HR as determined from ACI 305.1, Figure 2.1.5.
- I. Curing:
1. Begin curing concrete as soon as free water has disappeared from exposed surfaces.
 2. Cure concrete by use of moisture retaining cover, burlap kept continuously wet or by membrane curing compound.
 3. Provide protection as required to prevent damage to concrete and to prevent moisture loss from concrete during curing period.
 4. Provide curing for minimum of 7 days.
 5. Form materials left in place may be considered as curing materials for surfaces in contact with the form materials except in periods of hot weather.
 6. In hot weather follow curing procedures outlined in ACI 305.1.
 7. In cold weather follow curing procedures outlined in ACI 306.1.
 8. Curing vertical surfaces with a curing compound:
 - a. Cover vertical surfaces with a minimum of two coats of the curing compound.
 - b. Allow the preceding coat to completely dry prior to applying the next coat.
 - c. Apply the first coat of curing compound immediately after form removal.
 - d. Vertical surface at the time of receiving the first coat shall be damp with no free water on the surface.
 - e. A vertical surface is defined as any surface steeper than 1 vertical to 4 horizontal.
- J. Form Removal:
1. Remove forms after concrete has hardened sufficiently to resist damage from removal operations or lack of support.
 2. Where no reshoring is planned, leave forms and shoring used to support concrete until it has reached its specified 28-day compressive strength.

3.2 CONCRETE FINISHES

- A. Tolerances:
1. Class A: 1/8 IN in 10 FT.
 2. Class B: 1/4 IN in 10 FT.

- B. Surfaces Exposed to View:
1. Provide a smooth finish for exposed concrete surfaces and surfaces that are:
 - a. To be covered with a coating or covering material applied directly to concrete.
 - b. Scheduled for grout cleaned finish.
 2. Remove fins and projections, and patch voids, air pockets, and honeycomb areas with cement grout.
 3. Cementitious concrete coating:
 - a. Form facing material shall produce a smooth, hard, uniform texture.
 - 1) Use forms specified for surfaces exposed to view.
 - b. Prepare the surface in accordance with manufactures printed installation instructions.
 - c. Brush on coating to entire surface.
 - 1) As a mixing liquid for the coating, use bonding agent and water mixture as recommended by the manufacture.
 - 2) Apply two (2) coats at 2 LB/SQYD per coat.
 - d. When second coat is set, float to a uniform texture with a sponge coat.
 - e. Provide this finish at the following locations:
 - 1) Walls exposed to view.
- C. Surfaces Not Exposed to View:
1. Patch voids, air pockets and honeycomb areas with cement grout.
 2. Fill tie holes with non-shrink, non-metallic grout.
- D. Slab Float Finish:
1. After concrete has been placed, consolidated, struck off, and leveled, do no further work until ready for floating.
 2. Do not use water to aid in finishing.
 3. Begin floating when water sheen has disappeared and surface has stiffened sufficiently to permit operation.
 4. During or after first floating, check planeness of entire surface with a 10 FT straightedge applied at not less than two different angles.
 5. Cut down all high spots and fill all low spots during this procedure to produce a surface within Class B tolerance throughout.
 6. Refloat slab immediately to a uniform sandy texture.
- E. Troweled Finish:
1. Float finish surface.
 2. Next power trowel, and finally hand trowel.
 3. Do not use water to aid in finishing.
 4. Produce a smooth surface which is relatively free of defects with firsthand troweling.
 5. Perform additional trowelings by hand after surface has hardened sufficiently.
 6. Final trowel when a ringing sound is produced as trowel is moved over surface.
 7. Thoroughly consolidate surface by hand troweling.
 8. Leave finished surface essentially free of trowel marks, uniform in texture and appearance and plane to a Class A tolerance.
 9. On surfaces intended to support floor coverings remove any defects of sufficient magnitude that would show through floor covering by grinding.
- F. Broom Finish: Immediately after concrete has received a float finish as specified, give it a transverse scored texture by drawing a broom across surface.

3.3 GROUT

- A. Preparation:
1. Non-shrinking, non-metallic grout:
 - a. Clean concrete surface to receive grout.
 - b. Saturate concrete with water for 24 HRS prior to grouting.

2. Epoxy grout: Apply only to clean, dry, roughened, sound surface.
- B. Application:
1. Non-shrinking, non-metallic grout:
 - a. Mix in a mechanical mixer.
 - b. Use no more water than necessary to produce flowable grout.
 - c. Place in accordance with manufacturer's instructions.
 - d. Completely fill all spaces and cavities below the bottom of baseplates.
 - e. Provide forms where baseplates and bedplates do not confine grout.
 - f. Where exposed to view, finish grout edges smooth.
 - g. Except where a slope is indicated on Drawings, finish edges flush at the baseplate, bedplate, member, or piece of equipment.
 - h. Protect against rapid moisture loss by covering with wet rags or polyethylene sheets.
 - i. Wet cure grout for seven days, minimum.
 2. Epoxy grout:
 - a. Mix and place in accordance with manufacturer's instructions.
 - b. Completely fill all cavities and spaces around dowels and anchors without voids.
 - c. Obtain manufacturer's field technical assistance as required to ensure proper placement.

3.4 FIELD QUALITY CONTROL

- A. Owner will employ and pay for services of a concrete testing laboratory to perform testing of concrete placed during construction.
1. Contractor to cooperate with Owner in obtaining and testing samples.
- B. Tests During Construction:
1. Strength test:
 - a. For each strength test, mold and cure cylinders from each sample in accordance with ASTM C31.
 - 1) Cylinder size: Per ASTM C31.
 - a) 4 IN cylinders may not be used for concrete mixes with concrete aggregate size larger than 1 IN.
 - 2) Quantity:
 - a) 6 IN DIA by 12 IN high: Four cylinders.
 - b) 4 IN DIA by 8 IN high: Six cylinders.
 - b. Field cure one (1) cylinder for the seven day test.
 - 1) Laboratory cure the remaining.
 - c. Test cylinders in accordance with ASTM C39.
 - 1) 6 IN DIA cylinders:
 - a) Test two cylinders at 28 days for strength test result and the one field cured sample at seven days for information.
 - b) Hold remaining cylinder in reserve.
 - 2) 4 IN DIA cylinders:
 - a) Test three cylinders at 28 days for strength test result and the one (1) field cured cylinder at seven days for information.
 - b) Hold remaining cylinders in reserve.
 - d. Strength test result:
 - 1) Average of strengths of two 6 IN DIA cylinders or three 4 IN DIA cylinders from the same sample tested at 28 days.
 - 2) If one cylinder in a test manifests evidence of improper sampling, molding, handling, curing, or testing, discard and test reserve cylinder(s); average strength of remaining cylinders shall be considered strength test result.
 - 3) Should all cylinders in any test show any of above defects, discard entire test.
 - e. Frequency of tests:
 - 1) All concrete:
 - a) One strength test to be taken not less than once a day, nor less than once for each 60 CUYD or fraction thereof placed in any one day.

- b) Once for each 5000 SQFT of slab or wall surface area placed each day.
 - c) If total volume of concrete on Project is such that frequency of testing required in above paragraph will provide less than five strength tests for each concrete mix, tests shall then be made from at least five randomly selected batches or from each batch if fewer than five batches are provided.
 - 2. Slump test:
 - a. Per ASTM C143.
 - b. Determined for each strength test sample.
 - c. Additional slump tests may be taken.
 - 3. Air content:
 - a. Per ASTM C231, ASTM C173, and ASTM C138.
 - b. Determined for each strength test sample.
 - 4. Temperature: Determined for each strength test sample.
- C. Employ and pay for services of a concrete testing laboratory to perform testing of concrete placed during construction.
- D. Concrete Quality Control During Construction:
 - 1. Strength tests:
 - a. Secure concrete samples in accordance with ASTM C172.
 - b. Obtain each sample from a different batch of concrete on a random basis.
 - c. For each strength test mold and cure three cylinders from each sample in accordance with ASTM C31.
 - 1) Record any deviations from requirements on test report.
 - d. Test cylinders in accordance with ASTM C39.
 - e. Test one cylinder at seven days.
 - f. Test two cylinders at 28 days.
 - 2. Provide strength tests as follows:
 - a. One strength test consisting of 6 IN DIA x 12 IN high cylinders shall be taken:
 - 1) Not less than one test each day concrete placed.
 - 2) Not less than one test for each 50 CUYD or fraction thereof placed in 1 day.
 - 3) Not less than one test for each type of concrete poured.
 - 4) Not less than one test for each concrete structure exceeding 2 CUYD in volume.
 - 3. Determine slump of concrete sample for each strength test.
 - a. Additional slump tests shall be taken if consistency of concrete appears to vary.
 - b. Determine slump in accordance with ASTM C143.
 - 4. Determine air content of concrete sample for each strength test in accordance with either ASTM C231, ASTM C173, or ASTM C138.
 - 5. Determine temperature of concrete sample for each strength test.
 - 6. Determine unit weight (LB/CUFT) of fresh lightweight concrete at point of discharge into construction member for each strength test.
 - 7. Submit results of all concrete strength tests to Engineer in writing as soon as tests are completed.
- E. Evaluation of Tests:
 - 1. Strength test results:
 - a. Average of 28-day strength of two cylinders from each sample.
 - 1) If one cylinder manifests evidence of improper sampling, molding, handling, curing or testing, strength of remaining cylinder will be test result.
 - 2) If both cylinders show any of above defects, test will be discarded.
- F. Acceptance of Concrete:
 - 1. Strength level of each type of concrete shall be considered satisfactory if both of the following requirements are met:
 - a. Average of all sets of three consecutive strength tests equals or exceeds the required specified 28-day compressive strength.

- b. No individual strength test falls below the required specified 28-day compressive strength by more than 500 PSI.
- 2. If tests fail to indicate satisfactory strength level, perform additional tests and/or corrective measures as directed by Engineer.
 - a. Perform additional tests and/or corrective measures at no additional cost to Owner.

G. Concrete tolerances per ACI 117.

3.5 SCHEDULES

A. Form Types:

- 1. Surfaces exposed to view:
 - a. Prefabricated or job-built wood forms.
 - b. Laid out in a regular and uniform pattern with long dimensions vertical and joints aligned.
 - c. Produce finished surfaces free from offsets, ridges, waves, and concave or convex areas.
 - d. Construct forms sufficiently tight to prevent leakage of mortar.
- 2. Surfaces normally submerged or not normally exposed to view: Wood or steel forms sufficiently tight to prevent leakage of mortar.
- 3. Other types of forms may be used:
 - a. For surfaces not restricted to plywood or lined forms.
 - b. As backing for form lining.

B. Grout:

- 1. Non-shrinking, non-metallic grout: General use.
- 2. Epoxy grout: Other uses indicated on Drawings.

C. Concrete:

- 1. Normal weight concrete: All concrete.
- 2. General use concrete: All other locations.

D. Concrete Finishes:

- 1. Slab finishes:
 - a. Use following finishes as applicable, unless otherwise indicated:
 - 1) Floated finish: Surfaces intended to receive roofing, concrete topping, lean concrete, concrete fill and waterproofing.
 - 2) Troweled finish: Interior floor slabs, exposed roof slabs and base slabs of structures, equipment bases, and column bases.
 - 3) Broom finish: Sidewalks, docks, concrete stairs, and ramps.

END OF SECTION

SECTION 03 15 19
ANCHORAGE TO CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Requirements for all cast-in-place anchor bolts, anchor rods, reinforcing adhesive anchorage, and post-installed concrete anchors required for the Project but not specified elsewhere in the Contract Documents.
 2. Design of all concrete anchors not indicated on the Drawings including, but not limited to, installation of anchors into concrete for the following structural and nonstructural components:
 - a. Structural members and accessories.
 - b. Metal, wood, and plastic fabrications.
 - c. Architectural components.
 - d. Mechanical and electrical equipment and components.
 - e. Plumbing, piping, and HVAC work.
 - f. All other components requiring attachment to concrete.
- B. Related Sections include but are not necessarily limited to:
1. SUDAS Division 1.
 2. Division 01 - General Requirements.
 3. Section 01 04 00 - Special Provisions.
 4. Section 09 96 00 - High Performance Industrial Coatings.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. American Concrete Institute (ACI):
 - a. 318, Building Code Requirements for Structural Concrete and Commentary.
 - b. 350, Code Requirements for Environmental Engineering Concrete Structures and Commentary.
 2. American Concrete Institute/Concrete Reinforcing Steel Institute (ACI-CRSI):
 - a. Adhesive Anchor Installation Certification Program: Adhesive Anchor Installer.
 3. American Institute of Steel Construction (AISC):
 - a. 303, Code of Standard Practice for Steel Buildings and Bridges.
 4. ASTM International (ASTM):
 - a. A36, Standard Specification for Carbon Structural Steel.
 - b. A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
 - c. A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - d. A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - e. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - f. A496, Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
 - g. A563, Standard Specification for Carbon and Alloy Steel Nuts.
 - h. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - i. F436, Standard Specification for Hardened Steel Washers.
 - j. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - k. F594, Standard Specification for Stainless Steel Nuts.
 - l. F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

- m. F2329, Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners
- 5. ICC Evaluation Service (ICC-ES):
 - a. AC193, Acceptance Criteria for Mechanical Anchors in Concrete Elements.
 - b. AC308, Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements.
- 6. Building Code:
 - a. International Code Council (ICC):
 - 1) International Building Code and associated standards, 2015 Edition including all amendments, referred to herein as Building Code.
- B. Qualifications:
 - 1. Anchor designer for Contractor-designed post-installed anchors and cast in place anchorage shall be a Professional Structural Engineer licensed in the State of Iowa.
 - 2. Installer for post-installed anchors shall be trained by the manufacturer or certified by a training program approved by the Engineer.
- C. Post-installed anchors and related materials shall be listed by the following agencies:
 - 1. ICC-ES.
 - 2. Engineer approved equivalent.

1.3 DEFINITIONS

- A. Adhesive Anchors:
 - 1. Post-installed anchors developing their strength primarily from chemical bond between the concrete and the anchor.
 - 2. Includes anchors using acrylics, epoxy and other similar adhesives.
- B. Anchor Bolt: Any cast-in-place anchorage that is made of a headed (i.e., bolt) material.
- C. Anchor Rod: Any cast-in-place or post-installed anchorage made from unheaded, threaded, rod or deformed bar material.
- D. Concrete Anchor: Generic term for either an anchor bolt or an anchor rod.
- E. Galvanizing: Hot-dip galvanizing per ASTM A123, ASTM A153 or ASTM F2329 with minimum coating of 2.0 OZ of zinc per square foot of metal (average of specimens) unless noted otherwise or dictated by standard.
- F. Hardware: As defined in ASTM A153.
- G. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.
- H. MPII: Manufacturer's printed installation instructions.
- I. Mechanical Anchors:
 - 1. Post-installed anchors developing their strength from attachment other than thru adhesives or chemical bond to concrete.
 - 2. Includes expansion anchors, expansion sleeve, screw anchors, undercut anchors, specialty inserts and other similar types of anchorages.
 - 3. Drop-in anchors and other similar anchors are not allowed.
- J. Post-Installed Anchor: Any adhesive or mechanical anchor installed into previously placed and adequately cured concrete.

1.4 SUBMITTALS

- A. Shop Drawings:
1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 2. Product technical data including:
 - a. Acknowledgement that submitted products meet requirements of referenced standards.
 - b. Manufacturer material data sheet for each anchor.
 - 1) Clearly indicate which products on the data sheet are proposed for use on the Project.
 - c. Manufacturer's printed installation instructions.
 - d. Current ICC-ES report for each post-installed anchor system indicating the following:
 - 1) Certification that anchors meet all requirements indicated in this Specification.
 - 2) Performance data showing that anchor is approved for use in cracked concrete.
 - 3) Seismic design categories for which anchor system has been approved.
 - 4) Required installation procedures.
 - 5) Special inspection requirements for installation.
 - e. Anchorage layout drawings and details:
 - 1) Indicate anchor diameter, embedment, length, anchor type, material and finish.
 - 2) Drawings showing location, configuration, spacing and edge distance.
 - f. Contractor Designed Post-Installed Anchors:
 - 1) Show diameter and embedment depth of each anchor.
 - 2) Indicate compliance with ACI 350 Appendix D.
 - 3) Design tension and shear loads used for anchor design.
 - 4) Engineering design calculations:
 - a) Indicate design load to each anchor.
 - b) When the design load is not indicated on Drawings, include calculations to develop anchor forces based on Design Criteria listed herein.
 - c) Sealed and signed by Contractor's Professional Structural Engineer.
 - d) Calculations will be submitted for information purposes only.
 - 5) Type of post-installed anchor system used.
 - a) Provide manufacturer's ICC-ES report for the following:
 - (1) Mechanical anchorage per ICC-ES AC193.
 - (2) Adhesive anchorage per ICC-ES AC308.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to job site in manufacturer's or distributor's packaging undamaged and complete with installation instructions.

- B. Store above ground on skids or other supports to keep items free of dirt and other foreign debris and to protect against corrosion.
- C. Protect and handle materials in accordance with manufacturer's recommendations to prevent damage or deterioration.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cast-in-place Concrete Anchors:
 - 1. Building, nonbuilding structures, and equipment:
 - a. ASTM F1554, Grade 36 or Grade 55 with weldability supplement S1 for galvanized threaded rods.
 - b. ASTM A307, Grade A for galvanized headed bolts.
 - 2. All other cast-in-place concrete anchors:
 - a. Stainless steel with matching nut and washer.
 - b. Submerged application: ASTM F593, Type 316.
 - c. Non-submerged application: ASTM F593, Type 304 or Type 316.
- B. Post-Installed Mechanical and Adhesive Concrete Anchors:
 - 1. Stainless steel with matching nut and washer.
 - 2. Submerged application: ASTM F593, Type 316.
 - 3. Non-submerged application: ASTM F593, Type 304 or Type 316.
- C. Headed Studs: ASTM A108 with a minimum yield strength of 50,000 PSI and a minimum tensile strength of 60,000 PSI.
- D. Deformed Bar Anchors: ASTM A496 with minimum yield strength of 70,000 PSI and a minimum tensile strength of 80,000 PSI.
- E. Washers:
 - 1. ASTM F436 unless noted otherwise.
 - 2. If stainless steel anchorage is being used for cast-in-place anchorage, furnish washers of the same material and alloy as in the accompanying anchorage.
 - 3. Plate washers: Minimum 1/2 IN thick fabricated ASTM A36 square plates as required.
 - 4. Follow manufacturer's requirements for all post-installed anchorage.
- F. Nuts:
 - 1. ASTM A563 for all cast-in-place anchorage.
 - 2. If stainless steel anchorage is being used for cast-in-place anchorage, nuts shall meet ASTM F594 and be the matching material and alloy as in the accompanying anchorage.
 - 3. Follow manufacturer's requirements if using post-installed anchorage.
- G. Galvanizing Repair Paint:
 - 1. High zinc dust content paint for regalvanizing welds and abrasions.
 - 2. ASTM A780.
 - 3. Zinc content: Minimum 92% in dry film.
 - 4. ZRC "ZRC Cold Galvanizing" or Clearco "High Performance Zinc Spray."
- H. Dissimilar Materials Protection: See Specification Section 09 96 00.

2.2 CONTRACTOR DESIGNED ANCHORAGE

- A. Manufacturers:
 - 1. Post-installed anchor systems for the listed manufacturers will be considered only if a current ICC-ES evaluation report is submitted in accordance with the SUBMITTALS Article in PART 1 of this Specification Section and if the anchor system is approved by the Engineer.
 - a. Hilti.

- b. Dewalt.
 - c. Simpson Strong-Tie.
- 2. Submit request for substitution in accordance with Specification Section 01 25 00.
- B. Design the anchorage when any of the following occur:
 - 1. Design load for concrete anchorage is shown on the Drawings.
 - 2. When specifically required by the Contract Documents.
 - 3. When an anchorage is required but not specified in the Drawings.
 - 4. When anchorage is shown on Drawings other than Structural Drawings.
- C. Anchorage Design Loads:
 - 1. Determine all of the design loads, including wind and seismic loads, per the Building Code.
 - a. Anchorage of equipment and non-structural components: Use the actual dead and operating loads provided by the manufacturer.
- D. When Contract Drawings, other than the Structural Drawings, indicate an anchor diameter or length, the Contractor design shall incorporate these as “minimums.”
- E. Cast-in-Place Concrete Anchors:
 - 1. Provide the material, nominal diameter, embedment length, spacing, edge distance and design capacity to resist the calculated load based on the requirements given in the Building Code including ACI 350, Appendix D.
 - 2. Design assuming cracked concrete.
- F. Post-installed Concrete Anchors:
 - 1. Provide the manufacturer’s system name/type, nominal diameter, embedment depth, spacing, minimum edge distance, cover, and design capacity to resist the specified or calculated load based on requirements given in the Building Code, ACI 350 , Appendix D and current ICC-ES report, for the anchor to be used.
 - 2. Design assuming cracked concrete.

2.3 ENGINEER DESIGNED ANCHORAGE

- A. When the size, length and details of anchorages are shown on Contract Structural Drawings, Contractor design of anchorage is not required unless otherwise indicated.
- B. Manufacturers:
 - 1. Additional newer post-installed anchor systems for the listed manufacturers will be considered only if a current evaluation agency report is submitted in accordance with the SUBMITTALS Article in PART 1 of this Specification Section, the anchor system is certified by ICC-ES for cracked concrete conditions, and if approved by the Engineer.
 - 2. Mechanical Anchors:
 - a. Hilti:
 - 1) Kwik Bolt TZ (ICC-ES ESR-1917).
 - b. Simpson Strong-Tie:
 - 1) Strong-Bolt 2 (ICC-ES ESR-3037).
 - 3. Adhesive Concrete Anchors:
 - a. Hilti:
 - 1) HIT RE 500 V3 (ICC ESR-3814).
 - 2) HIT-HY 200 (ICC-ES ESR-3187).
 - b. Simpson Strong-Tie: SET-XP (ICC-ES ESR-2508).
 - 4. Concrete Screw Anchors:
 - a. Hilti:
 - 1) Kwik HUS-EZ Screw (ICC-ES ESR-3027).
 - b. Simpson Strong-Tie:
 - 1) Titen HD (ICC-ES ESR-2713).
 - 2) Titen HD Rod Hanger (ICC-ES ESR-2713).

5. Submit request for substitution in accordance with Specification Section 01 25 00.
 - a. Substitution request to indicate the proposed anchor has the at least the same tension and shear strength as the specified anchor installed as indicated in the Contract Drawings.
 - b. Calculations to be stamped by a Professional Engineer registered in the State of Iowa.

PART 3 - EXECUTION

3.1 GENERAL

- A. Cast-in-Place Anchorage:
 1. Use where anchor rods or bolts are indicated on the Drawings, unless another anchor type is approved by the Engineer.
 2. Provide concrete anchorage as shown on the Drawings or as required to secure components to concrete.
- B. Adhesive Anchorage:
 1. Use only where specifically indicated on the Drawings or when approved for use by the Engineer.
 2. May be used where subjected to vibration or where buried or submerged.
 3. Do not use in overhead applications or sustained tension loading conditions such as utility hangers.
 4. Contact Engineer for clarification when anchors will not be installed in compliance with manufacturer's printed installation requirements.
- C. Mechanical Anchorage:
 1. Use only where specifically indicated on the Drawings or when approved for use by the Engineer.
 2. Do not use where subjected to vibration.
 3. May be used in overhead applications.
 4. Contact Engineer for clarification when anchors will not be installed in compliance with manufacturer's printed installation requirements.
- D. Do not use powder actuated fasteners and other types of bolts and fasteners not specified herein for structural applications unless approved by the Engineer or specified in Contract Documents.

3.2 PREPARATION

- A. Provide adequate time to allow for proper installation and inspection prior to placing concrete for cast-in-place concrete anchorage.
- B. Prior to installation, inspect and verify areas and conditions under which concrete anchorage is to be installed.
 1. Notify Engineer of conditions detrimental to proper and timely completion of work.
 2. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the Engineer.
- C. Special Inspection is required in accordance with the Building Code for all concrete anchorage.
 1. Notify the Special Inspector that an inspection is required prior to concrete placement (or during post-installed anchorage installation).
 2. See the FIELD QUALITY CONTROL Article in PART 3 of this Specification Section for additional requirements.
- D. Post-installed anchor manufacturer's representative shall demonstrate and observe the proper installation procedures for the post-installed anchors at no additional expense to the Owner.
 1. Follow such procedures to assure acceptable installation.
 2. Adhesive anchors must be installed in concrete aged a minimum of 21 days.

3.3 INSTALLATION

- A. Tie cast-in-place anchorage in position to embedded reinforcing steel using wire.
 - 1. Tack welding of anchorage is prohibited.
 - 2. Coat the projected portion of carbon steel anchors and nut threads with a heavy coat of clean grease after concrete has cured.
 - 3. Anchorage location tolerance shall be in accordance with AISC 303.
 - 4. Provide steel or durable wood templates for all column and equipment anchorage.
 - a. Templates to be placed above top of concrete and not impede proper concrete placement and consolidation.
- B. Unless noted or specified otherwise:
 - 1. Connect aluminum and steel members to concrete and masonry using stainless steel cast-in-place anchorage unless shown otherwise.
 - a. Provide dissimilar materials protection per Specification Section 09 96 00.
 - 2. Provide washers for all anchorage.
 - 3. Where exposed, extend threaded anchorage a maximum of 3/4 IN and a minimum of 1/2 IN above the top of the fully engaged nut.
 - a. If anchorage is cut off to the required maximum height, threads must be dressed to allow nuts to be removed without damage to the nuts.
- C. Do the following after nuts are snug-tightened down:
 - 1. If using post-installed anchorage, follow MPII.
 - 2. Upset threads of anchorage to prevent nuts from backing off.
 - a. Provide double nut or lock nut in lieu of upset threads for items that may require removal in the future.
 - 3. For all other cast-in-place anchorage material, tighten nuts down an additional 1/8 turn to prevent nuts from backing off.
 - 4. If two nuts are used per concrete anchor above the base plate, tighten the top nut an additional 1/8 turn to "lock" the two nuts together.
 - 5. If using post-installed anchorage, follow manufacturer's installation procedures.
- D. Assure that embedded items are protected from damage and are not filled in with concrete.
- E. Secure architectural components such that it will not be aesthetically distorted nor fasteners overstressed from expansion, contraction or installation.
- F. Coat aluminum surfaces in contact with dissimilar materials in accordance with Specification Section 09 96 00.
- G. Repair damaged galvanized surfaces in accordance with ASTM A780.
 - 1. Prepare damaged surfaces by abrasive blasting or power sanding.
 - 2. Apply galvanizing repair paint to minimum 6 mils DFT in accordance with manufacturer's instructions and ASTM A780.
- H. For post-installed anchors, comply with the MPII on the hole diameter and depth required to fully develop the tensile strength of the anchor or reinforcing bar.
 - 1. Use hammer drills to create holes.
 - 2. Properly clean out the hole per the ICC-ES reports utilizing a non-metallic fiber bristle brush and compressed air or as otherwise required to remove all loose material from the hole prior to installing the anchor in the presence of the Special Inspector.

3.4 FIELD QUALITY CONTROL

- A. Special Inspection: See Section 01 45 33.

3.5 CLEANING

- A. After concrete has been placed, remove protection and clean all anchorage of all concrete, dirt, and other foreign matter.

- B. Provide surface acceptable to receive field applied paint coatings when specified in Specification Section 09 96 00.

END OF SECTION

SECTION 03 31 31
CONCRETE MIXING, PLACING, JOINTING, AND CURING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Mixing, placing, jointing, and curing of concrete construction.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 01 45 33 - Special Inspections and Testing Program.
 - 5. Section 03 35 00 - Concrete Finishing and Repair of Surface Defects.
 - 6. Section 07 92 00 - Joint Sealants.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Concrete Institute (ACI):
 - a. CT-13, Concrete Terminology.
 - b. 117, Specification for Tolerances for Concrete Construction and Materials.
 - c. 304R, Guide for Measuring, Mixing, Transporting and Placing Concrete.
 - d. 304.2R, Placing Concrete by Pumping Methods.
 - e. 305R, Guide to Hot Weather Concreting.
 - f. 305.1, Specification for Hot Weather Concreting.
 - g. 306R, Guide to Cold Weather Concreting.
 - h. 306.1, Standard Specification for Cold Weather Concreting.
 - i. 308.1, Specification for Curing Concrete.
 - j. 309R, Guide for Consolidation of Concrete.
 - k. 318, Building Code Requirements for Structural Concrete and Commentary.
 - l. 360R, Guide to Design of Slabs-on-Ground.
 - 2. ASTM International (ASTM):
 - a. A36, Standard Specification for Carbon Structural Steel.
 - b. C94/C94M, Standard Specification for Ready-Mixed Concrete.
 - c. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - d. C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
 - e. D994, Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
 - f. D1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
 - g. D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
 - 3. Corps of Engineers (COE):
 - a. CRD-C572, Specifications for Polyvinylchloride Waterstop.
 - 4. National Ready Mixed Concrete Association (NRMCA):
 - a. Checklist for Certification of Ready Mixed Concrete Production Facilities.
- B. Qualifications:
 - 1. Ready Mixed Concrete Batch Plant: Certified by NRMCA.
 - 2. Waterstop manufacturer's representative shall provide on-site training of waterstop installation, field splicing, welding and inspection procedures prior to construction, and at no additional cost to Owner.

- C. Pre-Concreting Conference:
1. A meeting to review the detailed requirements of the Contractor's proposed concrete design mixes, to determine the procedures for producing proper concrete construction, and to clarify the roles of the parties involved shall be held no later than 30 days after the Notice to Proceed.
 - a. Schedule the meeting to occur no later than five days in advance of the first scheduled date of concrete placement.
 2. All parties involved in the concrete work shall attend the conference, including:
 - a. Contractor's representative.
 - b. Testing laboratory representative/inspectors.
 - c. Concrete subcontractor.
 - d. Reinforcing steel installer.
 - e. Concrete supplier.
 - f. Owner.
 - g. Resident Engineer or Project Representative.
 - h. Design Engineer.
 - i. Building Code Official.
 3. The conference shall be held at a mutually agreed upon time and location.
 4. The agenda shall include but not be limited to the following:
 - a. Scheduling, sequence and notification of concrete placements.
 - b. Contractor's concrete pre-placement plan checklist.
 - c. Delivery time from batch plant, maximum time in truck, and approved exceptions to the limits.
 - d. Review of approved design mix including the limits of water that can be added and who is authorized to add water, if water has been withheld at the plant.
 5. Additional test cylinders for structural elements the Contractor intends to subject to live loads earlier than 28 days.
 6. Duties and authority of testing and inspection agency.
 7. Curing procedures.
 8. Temperature/weather issues.
 9. Test cylinder storage and protection.
 10. Approval and rejection of work.
 11. Mock-up panels as the standard.

1.3 DEFINITIONS

- A. Words and terms used in this Specification Section are defined in ACI CT-13.

1.4 SUBMITTALS

- A. Shop Drawings:
1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - 1) Procedure for adding high-range water reducer at the jobsite.
 - c. Scaled (minimum 1/8 IN/FT) Drawings showing proposed locations of construction joints, control joints, expansion joints (as applicable) and joint profile dimensions for each joint type.
 - d. Manufacturers and types:
 - 1) Joint fillers.
 - 2) Curing agents.
 - 3) Construction joint bonding adhesive.
 - 4) Pressure relief valves.
 - 5) Waterstops.
 2. Certifications: Ready mix concrete plant certification.
 - a. Waterstops: Certificate of training from the waterstop manufacturer for the individuals performing field welds of waterstops.

- B. Informational Submittals:
 - 1. Copies of concrete delivery tickets.
 - 2. Description of proposed curing methods.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Concrete Delivery:
 - 1. Prepare a delivery ticket for each load of ready mixed concrete.
 - 2. Truck operator shall hand ticket to Contractor at the time of delivery.
 - 3. Ticket to show:
 - a. Mix identification.
 - b. Quantity delivered.
 - c. Amount of material in each batch.
 - d. Outdoor temperature in the shade.
 - e. Time at which cement was added.
 - f. Time of delivery.
 - g. Time of discharge.
 - h. Amount of water that may be added at the site without exceeding the specified water-cement ratio.
 - i. Amount of any approved water added at the site.

1.6 PROJECT CONDITIONS

- A. Adjust concrete mix design when material characteristics, job conditions, weather, strength test results or other circumstances warrant.
 - 1. Do not use revised concrete mixes until submitted to and approved by Engineer.

1.7 SEQUENCING AND SCHEDULING

- A. Do not begin concrete production until proposed concrete mix design has been approved by Engineer.
 - 1. Approval of concrete mix design does not relieve Contractor of his responsibility to provide concrete that meets the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Subject to compliance with the Contract Documents, the manufacturers listed in this article are acceptable.
- B. Neoprene Expansion Joint Fillers:
 - 1. Acceptable manufacturers:
 - a. Permaglaze.
 - b. Rubatex.
 - c. Williams Products.
 - 2. Materials:
 - a. Closed cell neoprene.
 - b. ASTM D1056, Type 2, Class A or C.
 - c. Grade: Compression deflection as required to limit deflection to 25% of joint thickness under pressure from concrete pour height.
- C. Asphalt Expansion Joint Fillers:
 - 1. Acceptable manufacturers:
 - a. W.R Meadows.
 - b. J and P Petroleum Products.
 - 2. Materials: ASTM D994.
- D. Fiber Expansion Joint Fillers:
 - 1. Materials: ASTM D1751.

- E. Waterstops, Preformed Strip Type:
 - 1. Acceptable manufacturers:
 - a. Sika Greenstreak Plastics, Inc. (Hydrotite).
 - b. Adeka Ultra Seal USA (MC-2010MN).
 - c. DeNeef (Swellseal 2010).
 - 2. Hydrophilic, non-bentonite composition.
 - 3. Manufactured solely for the purpose of preventing water from traveling through construction joints.
 - 4. Volumetric expansion limited to 3 times maximum.
 - 5. See Drawings for application and other requirements.
- F. Water Swelling Sealant:
 - 1. Required adhesive for use with strip-type waterstop.
 - 2. Compatible with strip-type waterstop.
 - 3. Single component, gun applied.
 - 4. Moisture cured.
 - 5. Minimum 70% volumetric expansion swelling capability.
- G. Curing Products to conform to one or more of the following:
 - 1. Absorbent Covers.
 - 2. Moisture Retaining Covers.
 - a. Moisture Retaining Fabric.
 - 3. Dissipating curing compound:
 - a. Fugitive dye, waterborne, membrane-forming.
 - b. ASTM C309, Type 1D, Class A or B, shall be composed of hydrocarbon resins, and dissipating agents that begin to break down upon exposure to UV light, and traffic, approximately four to six weeks after applications, providing a film that is removable with standard degreasing agents, and mechanized scrubbing actions so as to not impair the later addition and performance of applied finishes.
 - c. Acceptable Products:
 - 1) Dayton Superior Corporation; Day Chem Rez Cure (J-11-WD).
 - 2) Euclid Chemical Company (The); Kurez DR VOX.
 - 3) L&M Construction Chemicals, Inc.; L&M Cure R.
 - 4. Clear, water or solvent-borne, membrane-forming curing and sealing compound:
 - a. ASTM C1315, Type 1, Class A.
 - b. Moisture loss shall be not more than 0.40 KG/M² when applied at 300 SQFT/GAL.
 - c. Manufacturer's certification is required.
 - d. Subject to project requirements, provide one of the following products:
 - e. Products:
 - 1) Euclid Chemical Company; Super Diamond Clear, Luster Seal 300 (exterior), Super Rez-Seal (interior).
 - 2) L&M Construction Chemicals, Inc.; Lumiseal Plus.
 - 3) Meadows, W.R., Inc.; CS-309/30.
 - 4) Euclid Chemical Company; Super Diamond Clear VOX.
 - 5) L&M Construction Chemicals, Inc.; Lumiseal WB Plus.
 - 6) Meadows, W.R., Inc.; Vocomp-30.
- H. Bonding Agent:
 - 1. Acceptable manufacturers:
 - a. L&M Construction Chemicals, Inc.
 - b. Sika.
 - c. Euclid Chemical Co.
 - 2. Materials:
 - a. Latex: ASTM C1059, Type II.
 - b. Epoxy: ASTM C881, Type V.
- I. Pressure Relief Valves:

1. Acceptable manufacturers:
 - a. Neenah Foundry, Model R-5000 Type C.
 - b. Waterman Industries, Model PRF-15.
 2. Materials:
 - a. Cover: Bronze.
 - b. Body and strainer: Cast-iron.
 - c. Seal ring under cover: Neoprene.
 3. Size:
 - a. Diameter: 4 IN.
 - b. Length: Sufficient length to penetrate the granular/ material at least 2 IN.
- J. Screen for Pressure Relief Valve:
1. Material: Stainless steel, Type 304.
 2. Wire gage: 16 GA minimum, 12 GA maximum.
 3. Openings: 3/16 IN SQ.
 4. Size: 12 by 12 IN minimum.

2.2 SOURCE QUALITY CONTROL

- A. The concrete plant shall conform to the Checklist for Certification of Ready Mixed Concrete Production Facilities of the NRMCA.

PART 3 - EXECUTION

3.1 PREPARATION

- A. General:
1. All materials and construction shall conform to the tolerances as specified in ACI 117.
 2. Complete formwork.
 - a. See Specification Section 03 09 00
 3. Remove earth, snow, ice, water, and other extraneous/foreign materials from areas that will receive concrete.
 4. Secure reinforcement in place.
 - a. See Specification Section 03 09 00.
 5. Position expansion joint material, anchors and other embedded items.
 6. Obtain approval of formwork, reinforcement installation and placement prior to placing concrete.
 7. Do not place concrete during rain, sleet, or snow, unless adequate protection is provided and prior Engineer approval is obtained.
 - a. Plan size of crews with due regard for effects of concrete temperature and atmospheric conditions on rate of hardening of concrete as required to obtain good surfaces and avoid unplanned cold joints.
 - b. Do not allow rainwater to increase mixing water nor to damage surface finish.
 8. Remove hardened concrete and foreign materials from inner surfaces of conveying equipment and formwork.
 9. Provide slabs and beams of minimum indicated required depth when sloping structural foundation base slabs and elevated slabs to drains.
 - a. For floor slabs on grade, slope top of subgrade to provide slab of required uniform thickness.
- B. Preparation of Subgrade for Slabs on Ground:
1. Granular subgrade to be wetted without standing water immediately prior to placing concrete.
 2. Obtain approval of granular subgrade compaction density prior to placing slabs on ground.
- C. Edge Forms and Screeds:
1. Set accurately to produce designated elevations and contours of finished surface.
 2. Sufficiently strong to support vibrating screeds or roller pipe screeds, if required.

3. Use strike off templates, or approved vibrating type screeds, to align concrete surfaces to contours of screed strips.

3.2 CONCRETE MIXING

A. General:

1. Provide all concrete from a central plant conforming to Checklist for Certification of Ready Mixed Concrete Production Facilities of the NRMCA.
2. Batch, mix, and transport in accordance with ASTM C94/C94M.

B. Control of Admixtures:

1. Control at the batch plant:
 - a. All admixtures to be introduced at the batch plant in accordance with manufacturer's recommendations.
 - b. Charge admixtures into mixer as solutions.
 - 1) Measure by means of an approved mechanical dispensing device.
 - 2) Liquid considered a part of mixing water.
 - 3) Admixtures that cannot be added in solution may be weighed or measured by volume if so recommended by manufacturer.
 - c. Add separately, when two or more admixtures are used in concrete, to avoid possible interaction that might interfere with efficiency of either admixture, or adversely affect concrete.
 - d. Complete addition of retarding admixtures within one minute after addition of water to cement has been completed, or prior to beginning of last three quarters of required mixing, whichever occurs first.
2. Control of Admixtures in the field:
 - a. Additional quantities of admixtures (with the exception of retarders) may be added in the field provided:
 - 1) Addition of admixtures shall be under the supervision of the ready mix quality control representative.
 - 2) Addition of each admixture to be documented on the delivery ticket.
 - 3) Provide additional mixing per ASTM C94.

C. Tempering and Control of Mixing Water:

1. Mix concrete only in quantities for immediate use.
2. Discard concrete which has set.
3. Discharge concrete from ready mix trucks within time limit stated in ASTM C94.
4. Addition of water at the jobsite:
 - a. See Specification Section 03 09 00 for specified water cement ratio and slump.
 - b. Do not exceed maximum specified water cement ratio or slump.
 - c. Incorporate water by additional mixing equal to at least half of total mixing required.

3.3 PLACING OF CONCRETE

A. General:

1. Place concrete as such a rate that concrete, which is being integrated with fresh concrete, is still workable.
 - a. Select placement equipment and manpower in order to assure timely delivery of concrete into forms to avoid unintended cold joints and placement consolidation issues.
2. Comply with ACI 304R and ACI 304.2R.
3. Do not begin placing concrete during rain, sleet, or snow.
 - a. Protect fresh concrete from ensuing inclement weather.
4. Do not deposit concrete which has partially hardened or has been contaminated by foreign materials.
5. Begin work only when work of other trades affecting concrete is complete.
6. Do not use excess grout or mortar to lubricate lines when pumping concrete.
7. Do not use excess water for workability or any reason when placing concrete by freefall.
8. Deposit concrete continuously to avoid cold joints.

9. Locate construction joints at locations specified or approved by Engineer.
 - a. Plan size of crews with due regard for effects of concrete temperature and atmosphere conditions to avoid unplanned cold joints.
 10. Spreaders:
 - a. Temporary: Remove as soon as concrete placing renders their function unnecessary.
 - b. Embedded:
 - 1) Obtain approval of Engineer for their use.
 - 2) Materials: Concrete or metal.
 - 3) Ends of metal spreaders coated with plastic coating 2 IN from each end.
 11. Deposit concrete as nearly as practicable in its final position to avoid segregation.
 - a. Maximum free fall: 4 FT.
 - b. Place concrete by means of hopper, elephant trunk or tremie pipe extending down to within 4 FT of surface.
 12. Perform the following operations before bleeding water has an opportunity to collect on surface:
 - a. Spread.
 - b. Consolidate.
 - c. Straightedge.
 - d. Darby or bull float.
 13. No water shall be added to the concrete surface to ease finishing operation.
 14. Do not discharge water into forms.
 15. Consider use of form vibrators for certain placement situations.
- B. Cold Weather Concrete Placement:
1. Comply with ACI 306.1.
 2. Do not place concrete on forms or subgrades that are below 32 DEGF or contain frozen material.
 3. Maintain all materials, forms, reinforcement, subgrade and any other items which concrete will come in contact with free of frost, ice or snow at time of concrete placement.
 4. Temperature of concrete when discharged at site: Per ACI 306.1.
 5. Heat subgrade forms, embedments and reinforcement to between 45 and 70 DEGF, when temperature of surrounding air is 40 DEGF or below at time concrete is placed.
 - a. Remove all frost from subgrade, forms and reinforcement before concrete is placed.
 6. Combine water with aggregate in mixer before cement is added, if water or aggregate is heated above 90 DEGF.
 7. Do not mix cement with water or with mixtures of water and aggregate having a temperature greater than 90 DEGF.
 8. Follow ACI 306R for specific requirements dealing with elevated steel troweled slabs that will be exposed to freeze-thaw cycles.
- C. Hot Weather Concrete Placement:
1. Comply with ACI 305.1.
 2. Cool ingredients before mixing or add flake ice or well crushed ice of a size that will melt completely during mixing for all or part of mixing water if high temperature, low slump, flash set, cold joints, or shrinkage cracks are encountered.
 3. Temperature of concrete at point of delivery (i.e., truck discharge) when placed:
 - a. Not to exceed 90 DEGF.
 - b. Not so high as to cause:
 - 1) Shrinkage cracks.
 - 2) Difficulty in placement due to loss of slump.
 - 3) Flash set.
 4. Temperature of forms and reinforcing when placing concrete:
 - a. Not to exceed 90 DEGF.
 - b. May be reduced by spraying with water to cool below 90 DEGF.
 - 1) Leave no standing water to contact concrete being placed.
 5. Prevent plastic shrinkage cracking and/or slab curling due to evaporation.

- D. Consolidating:
1. Consolidate in accordance with ACI 309R except as modified herein.
 2. Consolidate by vibration so that concrete is thoroughly worked around reinforcement, embedded items and into corners of forms.
 - a. Ensure no displacement of reinforcing or other embeds from final position.
 - b. Eliminate:
 - 1) Air or stone pockets.
 - 2) Honeycombing or pitting.
 - 3) Planes of weakness.
 3. Use suitable form vibrators located just below top surface of concrete, where internal vibrators cannot be used in areas of congested reinforcing.
 - a. Size and coordinate external vibrators to specifically match forming system used.
 4. Internal vibrators:
 - a. Minimum frequency of 8000 vibrations per minute.
 - b. Insert and withdraw at points approximately 18 IN apart.
 - 1) Allow sufficient duration at each insertion to consolidate concrete but not sufficient to cause segregation.
 - c. Use in:
 - 1) Beams and girders of framed slabs.
 - 2) Columns and walls.
 - 3) Vibrating concrete around all waterstops.
 - d. Size of vibrators shall be in accordance with ACI 309R, Table 5.1.5.
 5. Obtain consolidation of slabs with internal vibrators, vibrating screeds, roller pipe screeds, or other approved means.
 6. Do not use vibrators to transport concrete within forms.
 7. When placing self-consolidating concrete, the use of form or pencil vibrators is acceptable, provided such methods do not cause aggregate segregation, or otherwise adversely affect the quality of the work.
 8. Provide sufficient spare vibrators on jobsite during all concrete placing operations to assure continuous vibration.
 9. Bring a full surface of mortar against form by vibration supplemented if necessary, by spading to work coarse aggregate back from formed surface, where concrete is to have an as-cast finish.
 10. Prevent construction equipment, construction operations, and personnel from introducing vibrations into freshly placed concrete after the concrete has been placed and consolidated.
- E. Handle concrete from mixer to place of final deposit by methods which will prevent segregation or loss of ingredients and in a manner which will assure that required quality of concrete is maintained.
1. Use truck mixers, agitators, and non-agitating units in accordance with ASTM C94.
 2. Horizontal belt conveyors:
 - a. Mount at a slope which will not cause segregation or loss of ingredients.
 - b. Protect concrete against undue drying or rise in temperature.
 - c. Use an arrangement at discharge end to prevent segregation.
 - d. Do not allow mortar to adhere to return length of belt.
 - e. Discharge conveyor runs into equipment specially designed for spreading concrete.
 3. Metal or metal lined chutes:
 - a. Slope not exceeding 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal.
 - b. Chutes more than 20 FT long and chutes not meeting slope requirements may be used provided they discharge into a hopper before distribution.
 - c. Provide end of each chute with a device to prevent segregation.
 4. Pumping or pneumatic conveying equipment:
 - a. Designed for concrete application and having adequate pumping capacity.
 - b. Control pneumatic placement so segregation is avoided in discharged concrete.

- c. Loss of slump in pumping or pneumatic conveying equipment shall not exceed 1-1/2 IN.
- d. Do not convey concrete through pipe made of aluminum or aluminum alloy.
- e. Provide pumping equipment without Y sections.

3.4 JOINTS AND EMBEDDED ITEMS

A. Construction Joints - General:

1. Locate joints as indicated on Contract Drawings or as shown on approved Shop Drawings.
 - a. Where construction joint spacing shown on Drawings exceeds the joint spacing indicated in Paragraph B. below, submit proposed construction joint location in conformance with this Specification Section.
2. Unplanned construction joints will not be allowed.
 - a. If concrete cannot be completely placed between planned construction joints, then it must be removed.
3. In general, locate joints near middle of spans of slabs, beams and girders unless a beam intersects a girder at this point, in which case, offset joint in girder a distance equal to twice the width of the beam.
4. Locate joints in walls and columns at underside of floors, slabs, beams, or girders, and at tops of foundations or floor slabs, unless shown otherwise.
 - a. At Contractor's option, beam pockets may be formed into concrete walls.
 - b. Size pockets to allow beam reinforcing to be placed as detailed on Drawings.
5. Place beams, girders, column capitals and drop panels at same time as slabs.
6. Place corbels monolithically with their supporting members.
 - a. Locate wall vertical construction joints midway between corbels.
 - b. Where only a single corbel is located, place it also monolithically with wall and locate wall vertical construction joint a minimum of 3 FT from face of corbel.
7. Make joints perpendicular to main reinforcement with all reinforcement continuous across joints.
8. Provide the following joints unless noted otherwise on Drawings:
 - a. Roughen joints: horizontal construction joints.
 - b. Keyed joints: vertical construction joints.
9. Roughen construction joints:
 - a. Clean the previously hardened concrete interface and remove all laitance.
 - b. Intentionally roughen the interface to a full amplitude of 1/4 IN.
10. Keyways:
 - a. Construction joint keyways shall have the following dimensions, unless shown otherwise on Drawings or as directed by Engineer.
 - b. Wall keys:
 - 1) Keyway width, not less than 1/3 and not more than 1/2 the wall thickness measured perpendicular to wall faces.
 - 2) Keyway depth to be not less than 1-1/2 IN.
 - 3) Continuous along length of wall.
 - 4) Place keyway in wall center unless shown otherwise on Drawings.
 - c. Keyways in footings, foundations, base slabs, and structural or elevated slabs:
 - 1) Keyway height not less than 1/3 and not more than 1/2 the footing or slab thickness.
 - 2) Keyway depth not less than 1-1/2 IN.
 - 3) Continuous along footing or slab.
 - 4) Keyway in footing or slab center unless shown otherwise on Drawings.
 - d. Beam keyways:
 - 1) Full width of beam.
 - 2) Keyway height not less than 5-1/2 IN.
 - 3) Keyway depth not less than 1-1/2 IN.
 - 4) Keyway located in initial beam pour, directly above the bottom reinforcing, unless shown otherwise on Drawings.

11. Minimum time before placement of adjoining concrete construction:
 - a. All concrete: 60 HRS, unless otherwise noted.
- B. Construction Joints - Spacing Unless Otherwise Specified:
 1. Structures not intended to contain liquid:
 - a. Wall vertical construction joints:
 - 1) 50 FT maximum centers.
 - 2) At wall intersections, 4 FT minimum from corner.
 - b. Base slab, floor, and roof slab construction joints:
 - 1) Placements to be approximately square and not to exceed 4000SQFT.
 - 2) Maximum side dimension of a slab pour to be 70 FT.
 2. Water retaining structures:
 - a. Wall vertical construction joints:
 - 1) 30 FT maximum centers.
 - 2) At wall intersections, 6 FT minimum from corner.
 - b. Wall horizontal construction joints: 18 FT centers.
 - c. Floor slab, construction joints:
 - 1) Placements to be approximately square and not to exceed 2000 SQFT.
 - 2) Maximum side dimension of a slab pour to be less than:
 - a) Twice the length of the short side.
 - b) 60 FT.
- C. Construction Joints - Bonding:
 1. Obtain bond between concrete pours at construction joints by thoroughly cleaning and removing all laitance from construction joints.
 2. Before new concrete is placed, all construction joints shall be coated with cement grout, or dampened, as outlined below:
 3. Roughen construction joints:
 - a. Roughen the surface of the concrete to expose the coarse aggregate uniformly with 1/4 IN minimum amplitude.
 - 1) Remove laitance, loosened particles of aggregate or damaged concrete at the surface.
 - b. Place 2 IN minimum, 5 IN maximum layer of grout in bottoms of walls with waterstops. Grout shall be placed immediately before placing concrete.
 - c. Place fresh concrete before the grout has attained its initial set.
 - 1) Vibrate grout and first layer of concrete simultaneously to commingle the materials.
- D. Slab On Grade Joints:
 1. Locate construction and control joints in slabs on grade as indicated on Drawings.
 2. Time cutting properly with set of concrete, if saw cut joints are required or permitted.
 - a. Start cutting as soon as concrete has hardened sufficiently to prevent aggregates being dislodged by saw.
 - b. Complete before shrinkage stresses become sufficient to produce cracking.
- E. Expansion Joints:
 1. Do not permit reinforcement or other embedded metal items bonded to concrete (except smooth dowels bonded on only one side of joint) to extend continuously through an expansion joint.
 2. Use neoprene expansion joint fillers, unless noted otherwise on Drawings.
 3. Seal expansion joints as shown on Drawings.
 - a. See Specification Section 07 92 00 for requirements.
- F. Waterstops - General:
 1. Waterstop to be continuous with splices in accordance with manufacturer's instructions and create watertight joints.
 2. Do not mix different types of waterstop materials in the same structure without specific approval from the Engineer unless shown on Drawings.

3. Preformed strip type:
 - a. Locate waterstop at center of wall, unless noted otherwise on Drawings.
 - 1) Maintain at least 3 IN from edge of concrete or as recommended by manufacturer.
 - b. Install in a bed of swelling sealant on smooth surface of hardened concrete by use of nails, adhesive or other means as recommended by manufacturer to prevent movement of waterstop during placement of concrete.
 - c. Roughened joints shall be especially prepared during concrete placement to provide smooth surface for proper water stop installation.
 - d. Use in joints against existing concrete where indicated on Drawings.
- G. Pressure Relief Valves and Screens:
 1. Provide and install 4 IN ID pressure relief valves in locations shown on the Drawings.
 2. Place valves in true vertical position (90 DEG from the true horizontal plane).
 3. Place screens immediately upon granular material and under pressure relief valves as shown on Contract Drawings.
 - a. Leave no space between valves, screen, and granular material.
- H. Other Embedded Items:
 1. Place sleeves, inserts, anchors, and embedded items required for adjoining work or for its support, prior to initiating concreting.
 - a. Give Contractor whose work is related or integral to concrete, or supported by it, ample notice and opportunity to furnish and install items before placing concrete.
 2. Do not route electrical conduit, drains, or pipes in concrete slabs, walls, columns, foundations, beams or other structural members unless approved by Engineer.
- I. Placing Embedded Items:
 1. Support against displacement.
 2. Fill voids in sleeves, inserts and anchor slots temporarily with readily removable material to prevent entry of concrete into voids.
 3. Provide adequate means for anchoring waterstop in concrete.
 - a. Provide means to prevent waterstops in the forms from being folded over by the concrete as it is placed.

3.5 FINISHING

- A. See Specification Section 03 35 00.
- B. Coordinate mixing and placing with finishing.

3.6 INSTALLATION OF GROUT

- A. Grout Schedule:
 1. Sand cement grout:
 - a. Construction joint bedding (base of wall pours with comparable compressive strength to wall).
 - b. General use.
 - c. As noted on Drawings.
 2. Non-shrinking non-metallic grout:
 - a. Filling form tie holes.
 - b. Under column and beam base plates.
 - c. Other uses indicated on the Drawings.
 3. Epoxy grout:
 - a. Patching cavities in concrete.
 - b. Grouting of dowels and anchor bolts into existing concrete.
 - c. Grouting of rotating or oscillating equipment base plates where driving motor is 500 HP and above.
 - d. As noted on the Drawings.
- B. Grout Installation:
 1. Sand cement grout:

- a. Fill wetted keyways between precast concrete hollow core slabs with sand cement grout.
- b. Consolidate grout by rodding or by other means to assure complete filling of keyways.
- c. Cure grout by one of methods specified.
2. Non-shrink non-metallic grout:
 - a. Clean concrete surface to receive grout.
 - b. Saturate concrete with water for 24 HRS prior to grouting.
 - c. Mix in a mechanical mixer.
 - d. Use no more water than necessary to produce flowable grout.
 - e. Place in accordance with manufacturer's instructions.
 - f. Provide under beam, column, and equipment base plates, in joints between precast concrete and cast slabs, and in other locations indicated on the Drawings.
 - g. Completely fill all spaces and cavities below the top of base plates.
 - h. Provide forms where base plates and bed plates do not confine grout.
 - i. Where exposed to view, finish grout edges smooth.
 - j. Except where a slope is indicated on the Drawings, finish edges flush at the base plate, bed plate, member or piece of equipment.
 - k. Coat exposed edges of grout with cure or seal compound recommended by the grout manufacturer.
3. Epoxy grout:
 - a. Mix and place in accordance with manufacturer's instructions.
 - b. Apply only to clean, dry, sound surface.
 - c. Completely fill all cavities and spaces around dowels and anchors without voids.
 - d. Grout base and bed plates as specified for non-shrinking, non-metallic grout.
 - e. Obtain manufacturer's field technical assistance as required to assure proper placement.

3.7 CURING AND PROTECTION

- A. Protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury immediately after placement, and maintain with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement, hardening, and compressive strength gain.
 1. Follow recommendations of ACI 308.1 except as modified herein.
 2. Do not impose loads by foot traffic, wheeled traffic, and other loads until concrete has sufficiently cured to carry imposed loads without adversely affecting the concrete. In no event shall concrete be subject to loading or traffic during initial 48 HRS of curing, unless otherwise approved by Engineer.
- B. For surfaces of non-water bearing structures, apply one of the following curing procedures immediately after completion of placement and finishing (surfaces not in contact with forms).
 1. Ponding or continuous sprinkling. Take care to avoid eroding the surface of freshly placed concrete.
 2. Application of wet Absorbent Covers:
 - a. Minimum lap: 12 IN.
 - b. Provide continuous uniform supply of moisture, such as sprinklers or soaker hoses as required to keep concrete surface continuously wet.
 - c. Monitor Absorbent Covers as required to prevent cover materials or concrete surface from drying out.
 3. Continuous application of steam (not exceeding 150 DEGF) or mist spray.
 4. Application of Moisture Retaining Cover sheet materials.
 - a. Place as soon as possible after final finishing and without marring the surface.
 - b. Minimum lap: 12 IN.
 - c. Seal all edges to make water-tight.
 - d. Place Moisture Retaining Cover in intimate contact with the concrete surface, without wrinkles and weighted to hold in place.
 - e. Hold cover and edges in place as required to prevent wind from displacing the cover.
 - f. Moisture Retaining Fabric:

- 1) Install in accordance with manufacturer's written recommendations.
 - 2) Saturate concrete surface and fabric side of cover immediately prior to placing.
 - g. Monitor continuously during the curing period:
 - 1) Repair any holes, tears or displaced cover.
 - 2) Rewet as required to keep concrete moist under cover.
 5. Application of other moisture retaining covering as approved by Engineer.
 6. Water used for curing shall be within 20 DEGF of the concrete temperature.
 7. Application of a curing compound.
 - a. Apply curing compound in accordance with manufacturer's recommendations immediately after any water sheen, which may develop after finishing, has disappeared from concrete surface.
 - b. Do not use on any surface against which additional concrete or other material is to be bonded unless it is proven that curing compound will not prevent bond.
 - c. Where a vertical surface is cured with a curing compound, the vertical surface shall be covered with a minimum of two coats of the curing compound.
 - 1) Apply the first coat of curing compound to a vertical surface immediately after form removal.
 - 2) The vertical concrete surface at the time of receiving the first coat shall be damp with no free water on the surface.
 - 3) Allow the preceding coat to completely dry prior to applying the next coat.
 - 4) A vertical surface: Any surface steeper than 1 vertical to 4 horizontal.
 8. Surfaces In Contact with Forms:
 - a. Formed surfaces: Cure formed concrete surfaces utilizing final curing methods per ACI 308.1, including underside of beams, supported slabs, and other similar surfaces,
 - 1) See Section 03 09 00.
 - b. Minimize moisture loss from and temperature gain of concrete placed in forms exposed to heating by sun by keeping forms wet and cool until they can be safely removed.
 - c. Make provisions to keep concrete wall moist while stripping forms and until curing measures are in place.
 - d. After form removal, cure concrete until end of time prescribed.
 - e. Use one of the methods listed above.
 - f. Forms left in place shall not be used as a method of curing in hot weather.
 - g. The term "hot weather", where used in these specifications, is defined in ACI 305.1.
 - h. In hot weather, remove forms from vertical surfaces as soon as concrete has gained sufficient strength so that the formwork is no longer required to support the concrete.
- C. For Surfaces of Water Bearing Structures:
1. Protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury immediately after placement, and maintain with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement, hardening, and compressive strength gain.
 - a. Follow recommendations of ACI 308.1 except as modified herein.
 - b. Use Evaporation Retardant to reduce surface moisture evaporation of slabs during concrete placement. Comply with all the manufacturer's instructions of use as required to obtain the intended results.
 2. Apply one of the following moist curing procedures immediately after completion of placement and finishing, for concrete surfaces not in contact with forms.
 - a. Ponding or continuous sprinkling.
 - b. Application of absorptive mats or fabric kept continuously wet and in intimate contact with concrete.
 - c. Surfaces shall be covered with a double layer of absorptive mats or fabric, wetted before placing, and overlapped at least 6 IN.
 - d. Application of sand kept continuously wet.
 - e. Continuous application of steam (not exceeding 150 DEGF) or mist spray.

- f. Ponding and sprinkling in conjunction with application of waterproof sheet materials, conforming to ASTM C171 and only with a program as approved by the Engineer that will keep the surface continuously wet.
 - g. Ponding and sprinkling in conjunction with application of other moisture retaining covering as approved and only with a program as approved by the Engineer that will keep the surface continuously wet.
3. After seven full days of moist curing, application of a curing compound conforming to ASTM C309 may be substituted for moist curing.
 - 1) Apply curing compound in accordance with manufacturer's recommendations immediately after any water sheen which may develop during moist curing has disappeared from concrete surface.
 - 2) Do not use on any surface against which additional concrete or other material is to be bonded unless it is proven that curing compound will not prevent bond.
 - 3) Where a surface is cured with a curing compound, the surface shall be covered with a minimum of two coats of the curing compound, 30 MILS thick each coat.
 - a) Apply the first coat of curing compound immediately after form removal or discontinued moist curing and before the surface displays water loss. Apply in one direction only, covering uniformly to a minimum thickness of 30 MILS.
 - b) The concrete surface at the time of receiving the first coat shall be damp with no free water on the surface.
 - c) Allow the preceding coat to completely dry prior to applying the next coat.
 - d) Apply second coat in direction perpendicular to the first coat application direction, covering uniformly to a minimum thickness of 30 MILS.
 - 4) Curing compounds used in water treatment plant construction shall be non-toxic and taste and odor free and be NSF approved.
 - a) Alternately, all tank surfaces shall be cleaned to remove non-NSF approved curing compound without damaging the concrete finish.
 4. Curing Concrete In Contact with Forms:
 - a. Minimize moisture loss of concrete placed in forms by keeping forms wet and cool until they can be safely removed.
 - b. Moist cure the top surface of concrete placed in forms as specified.
 - c. After form removal, cure concrete until end of time prescribed.
 - 1) Use one of methods listed above.
 - 2) When approved by the Engineer, placement of the second pour at joints may occur prior to the end of the curing period.
 - d. Forms left in place shall not be used as a method of curing in hot weather.
 - e. The term "hot weather", where used in these specifications, is defined in ACI 305R.
 - f. In hot weather, remove forms from vertical surfaces as soon as concrete has gained sufficient strength so that the formwork is no longer required to support the concrete and commence moist curing as specified.

D. Curing Period:

1. Continue curing for at least seven days for all concrete except Type III, high early strength concrete for which period shall be at least three days.
 - a. If one of curing procedures indicated above is used initially, it may be replaced by one of other procedures indicated any time after concrete is two days old, provided concrete is not permitted to become surface dry during transition.

E. Cold Weather:

1. Follow recommendations of ACI 306.1.
2. Maintain temperature of concrete per ACI 306.1 for a minimum of 72 HRs after concrete is placed, when outdoor temperature is 40 DEGF, or less.
 - a. Maximum temperature rate of decrease: Per ACI 306.1.
3. Use heating, covering, insulating, or housing of the concrete work to maintain required temperature without injury due to concentration of heat.

4. Do not use combustion heaters unless precautions are taken to prevent exposure of concrete to exhaust gases which contain carbon dioxide.
 5. Interior slabs in areas intended to be heated shall be adequately protected so that frost does not develop in the supporting subgrade.
- F. Hot Weather:
1. Follow recommendations of ACI 305.1 and ACI 308.1.
 2. Make provision for cooling forms, reinforcement and concrete, windbreaks, shading, fog spraying, sprinkling, ponding, or wet covering with a light colored material.
 3. Provide protective measures as quickly as concrete hardening and finishing operations will allow.
 4. Maximum temperature rate of decrease: Per ACI 305.1.
- G. Rate of Temperature Change:
1. Keep changes in temperature of air immediately adjacent to concrete as uniform as possible, during and immediately following curing period.
- H. Protection from Mechanical Injury:
1. Protect concrete from damaging mechanical disturbances, such as load stresses, heavy shock, and excessive vibration.
 2. Protect finished concrete surfaces from damage by construction equipment, materials, or methods, and by rain or running water.
 3. Do not load self-supporting structures in such a way as to overstress concrete.

3.8 FIELD QUALITY CONTROL

- A. Special Inspections per Building Code: See Section 01 45 33.
- B. Inspections, Non-Code Required.
1. Joints:
 - a. Inspect joints for proper joint type, dimensions, reinforcing, dowel alignment, surface preparation and location.
 - b. Frequency: Prior to each concrete pour.
 2. Waterstops:
 - a. Visually inspect waterstops for proper location, continuity, installation to prevent displacement, cleanliness and damage to waterstop.
 - b. Frequency: Prior to each concrete pour.

END OF SECTION

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SECTION 03 35 00
CONCRETE FINISHING AND REPAIR OF SURFACE DEFECTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Concrete finishing and repair of surface defects.
 - 2. Resurfacing Mortar.

- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 03 09 00 - Concrete.
 - 5. Section 03 31 31 - Concrete Mixing, Placing, Jointing and Curing.
 - 6. Section 09 96 00 - High Performance Industrial Coatings.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Concrete Institute (ACI):
 - a. CT-13, Concrete Terminology.
 - b. 117, Specification for Tolerances for Concrete Construction and Materials.
 - c. 303R, Guide to Cast-in-Place Architectural Concrete Practice.
 - d. 308, Standard Practice for Curing Concrete.
 - 2. ASTM International (ASTM):
 - a. C109, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube Specimens).
 - b. C150, Standard Specification for Portland Cement.
 - c. C157, Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
 - d. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - e. C666, Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.
 - f. C779, Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.
 - g. C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
 - h. D4258, Standard Practice for Surface Cleaning Concrete for Coating.
 - i. D4259, Standard Practice for Abrading Concrete.
 - j. E1155, Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers.
 - k. E1486, Standard Test Method for Determining Floor Tolerances Using Waviness, Wheel Path and Levelness Criteria.
 - 3. International Concrete Repair Institute (ICRI):
 - a. 310.1R, Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion.
 - b. 310.2R, Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.
 - 4. National Council Highway Research Program (NCHRP):
 - a. 244, Concrete Sealers for the Protection of Bridge Structures.
 - 5. The Society for Protective Coatings/NACE International (SSPC/NACE):
 - a. SP 13/NACE No. 6, Surface Preparation of Concrete.

1.3 DEFINITIONS

- A. Vertical Surface Defects:
 - 1. Any void in the face of the concrete deeper than 1/8 IN, such as:
 - a. Tie holes.
 - b. Air pockets (bug holes).
 - c. Honeycombs.
 - d. Rock holes.
 - 2. Scabbing:
 - a. Scabbing is defect in which parts of the form face, including release agent, adhere to concrete.
 - 3. Foreign material embedded in face of concrete.
 - 4. Fins 1/16 IN or more in height.
- B. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.
- C. Other words and terms used in this Specification Section are defined in ACI CT-13.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - 3. Certifications:
 - a. Certification of aggregate gradation.
 - b. Certification of manufacturer experience qualifications and performance history.
- B. Informational Submittals:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's recommendations and requirements for materials used.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Bonding Agents:
 - a. BASF Master Builders Solutions.
 - b. Euclid Chemical Co.
 - c. Laticrete - L&M Construction Chemicals.
 - 2. Patching Mortar:
 - a. BASF Master Builders Solutions.
 - b. Euclid Chemical Co.
 - c. Laticrete - L&M Construction Chemicals.
 - d. Sika Corporation.
- B. Submit request for substitution in accordance with Specification Section 01 25 00.

2.2 MATERIALS

- A. Patching Mortar: Trowelable cementitious repair mortar for vertical, overhead, and horizontal repairs.
 - 1. Portland cement-based, rapid set repair mortar for interior or exterior use.
 - 2. Compressive Strength, ASTM C109:
 - a. Minimum 3000 PSI at 7 days.
 - b. Minimum 5000 PSI at 28 days.
 - 3. Freeze Thaw Durability, ASTM C666: 96.75% at 300 Cycles.
 - 4. Shrinkage, ASTM C157: 0.069%.
 - 5. Euclid Chemical Speed Crete Red Line.
- B. Bonding Agents:
 - 1. For use only on concrete surfaces not receiving liquid water repellent coating:
 - a. High solids acrylic latex base liquid for interior or exterior application as a bonding agent to improve adhesion and mechanical properties of concrete patching mortars.
 - 1) BASF Master Builders MasterEmaco A 660.
 - 2) Euclid Chemical Co. Flex-Con.
 - 3) Laticrete L&M Everbond.
 - 2. For use only on concrete surface receiving liquid water repellent:
 - a. Non-acrylic base liquid for interior or exterior application as a bonding agent to improve adhesion and mechanical properties of concrete patching mortars.
- C. Cement:
 - 1. ASTM C150, Type II Portland for areas exposed to sewage.
 - 2. ASTM C150, Type I Portland elsewhere.
- D. Aggregate:
 - 1. Sand: Maximum size #30 mesh sieve.
 - 2. For exposed aggregate finish surfaces: Same as surrounding wall.
- E. Water: Potable.
- F. Non-shrink Grout: See Specification Section 03 09 00.

2.3 MIXES

- A. Bonding Grout: One (1) part cement to one (1) part aggregate.
- B. Patching Mortar:
 - 1. One (1) part cement to two and one-half (2-1/2) parts aggregate by damp loose volume.
 - a. Substitute white Portland cement for a part of gray Portland cement to produce color matching surrounding concrete.

PART 3 - EXECUTION

3.1 PREPARATION

- A. For methods of curing, see Specification Section 03 09 00.
- B. Surface Preparation:
 - 1. Clean surfaces in accordance with ASTM D4258 to remove dust, dirt, form oil, grease, or other contaminants prior to abrasive blasting, chipping, grinding or wire brushing.
 - 2. Prepare surfaces in accordance with ASTM D4259 and SSPC SP 13/NACE No. 6 to completely open defects down to sound concrete and remove laitance.
 - a. Provide concrete surface profile (CSP) in accordance with ICRI 310.2:
 - 1) Areas to receive Repair Mortar:
 - a) Areas larger than 1 SF or deeper than 1/4 IN Abrasive blast, scarify or needle scale to CSP No. 6-8.

- b. If additional chipping or wire brushing is necessary, make edges perpendicular to surface or slightly undercut.
 - c. No feathered edges will be permitted.
 - d. Rinse surface with clean water to remove all dust, dirt, debris, loosened concrete, laitance, and other contaminants.
- C. Preparation of Bonding Grout Mixture:
- 1. Mix cement and aggregate.
 - 2. Mix bonding agent and water together in separate container in accordance with manufacturer's instructions.
 - 3. Add bonding agent/water mixture to cement/aggregate mixture.
 - 4. Mix to consistency of thick cream.
 - 5. Bonding agent itself may be used as bonding grout if approved by manufacturer and Engineer.
- D. Preparation of Patching Mortar Mixture:
- 1. Mix specified patching mortar per manufacturer's published recommendations.
 - 2. For repairs exceeding 2 IN in depth, mix with clean, pre-dampened 3/8 IN pea gravel in accordance with the manufacturer's recommendations.

3.2 INSTALLATION AND APPLICATION

- A. Do not repair surface defects or apply wall or floor finishes when temperature is or is expected to be below 50 DEGF.
- 1. If necessary, enclose and heat area to between 50 and 70 DEGF during repair of surface defects and curing of patching material.
 - a. Use only clean fuel, indirect fired heating apparatus.
 - b. Exhaust combustion byproducts outside of work area.
- B. Repairing Surface Defects:
- 1. This method is to be used on vertical concrete surfaces as indicated in the Concrete Finishes for Vertical Wall Surfaces paragraph of this Specification Section and similar concrete surfaces not otherwise specified to receive another finish or coating.
 - a. For surfaces indicated to receive finish or coating other than those specified herein; refer to the applicable Specification Section for surface preparation requirements:
 - 1) High Performance Industrial Coatings: See Specification Section 09 96 00.
 - 2. Fill and repair surface defects and tie-holes using patching mortar mix specified in the MATERIALS Article in PART 2.
 - a. Prime exposed reinforcing steel, embeds, or other steel surfaces with primer as recommended by patching mortar manufacturer.
 - b. Scrub bond coat:
 - 1) Wet substrate to a saturated surface dry (SSD) condition.
 - 2) Mix patching mortar to a scrub coat or slurry consistency per manufacturer's published recommendations and apply to entire area.
 - c. As an alternate to the scrub bond coat, concrete may be primed with manufacturer's recommended epoxy primer.
 - d. Patching Mortar Application:
 - 1) Mix and apply Patching Mortar per manufacturer's recommendations within the open time of the product scrub coat or any bonding agents.
 - 2) Finish to level of surrounding concrete surface utilizing techniques recommended by manufacturer.
 - 3. Consolidate patching mortar into place and strike off so as to leave patch slightly higher than surrounding surface.
 - 4. Leave undisturbed until mortar has stiffened before finishing level with surrounding surface.
 - a. Do not use steel tools in finishing a patch in a formed wall which will be exposed to view.
 - 5. Cure patching mortar in accordance with ACI 308.

- C. Concrete Finishes for Vertical Wall Surfaces:
1. General:
 - a. Give concrete surfaces finish as specified below after removal of formwork and repair of surface defects.
 - b. Finish numbers not listed are "Not Used".
 2. Finish #1 - As cast rough form finish:
 - a. Selected forming materials are not required.
 - b. Prepare surface in accordance with the PREPARATION Article in PART 3 of this Specification Section.
 - c. Repair the following surface defects using patching mortar specified in PART 2:
 - 1) Tie holes.
 - 2) Honeycombs deeper than 1/4 IN.
 - 3) Air pockets deeper than 1/4 IN.
 - 4) Rock holes deeper than 1/4 IN.
 - d. Chip or rub off fins exceeding 1/4 IN in height.
 - e. Provide at unexposed surfaces such as:
 - 1) Foundations.
 - 2) Below-grade walls not to be waterproofed.
 - 3) Concealed surface of concrete back-up wythe in cavity wall construction.
 3. Finish #2 - As cast form finish:
 - a. Form facing material shall produce a smooth, hard, uniform texture.
 - b. Prepare surface in accordance with the PREPARATION Article in PART 3 of this Specification Section.
 - 1) Chip or rub off fins exceeding 1/8 IN in height.
 - 2) Abrasive blast surfaces in accordance with ASTM D4259 and SSPC SP 13/NACE No. 6 to completely open defects down to sound concrete and remove laitance.
 - a) Provide ICRI 310.2 Concrete Surface Profile (CSP) No. 3, minimum across the entire surface.
 - (1) For contiguous repair areas larger than 1 SF or deeper than 1/4 IN Abrasive blast, scarify or needle scale to CSP No. 6-8.
 - b) If additional chipping or wire brushing is necessary, make edges perpendicular to surface or slightly undercut.
 - c) No feather edges will be permitted.
 - 3) Rinse surface with clean water and allow surface water to evaporate prior to repairing surface defects.
 - 4) Repair the following surface defects using patching mortar specified in PART 2:
 - a) Tie holes.
 - b) Honeycombs deeper than 1/4 IN or larger than 1/4 IN DIA.
 - c) Air pockets deeper than 1/4 IN or larger than 1/4 IN DIA.
 - d) Rock holes deeper than 1/4 IN or larger than 1/4 IN DIA.
 - e) Scabbing.
 - 5) Brush blast repaired areas to match adjacent surface texture.
 - c. Provide this finish for:
 - 1) Underside of horizontal elements adjacent to the finished surface.
 - 2) Exposed surfaces not specified to receive another finish.
- D. Related Unformed Surfaces (Except Slabs):
1. Strike smooth and level tops of walls or buttresses, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces after concrete is placed.
 2. Float surface to a texture consistent with that of formed surfaces.
 - a. If more than one (1) finish occurs immediately adjacent to unformed surface, provide surface with most stringent formed surface requirement.
 3. Continue treatment uniformly across unformed surfaces.

- E. Concrete Finishes for Horizontal Slab Surfaces:
1. General:
 - a. Tamp concrete to force coarse aggregate down from surface.
 - b. Screed with straightedge, eliminate high and low places, bring surface to required finish elevations; slope uniformly to drains.
 - c. Dusting of surface with dry cement or sand during finishing processes not permitted.
 2. Unspecified slab finish:
 - a. When type of finish is not indicated, use following finishes as applicable:
 - 1) Floors: Troweled finish.
 - 2) Exterior slabs, sidewalks, platforms, steps and landings, and ramps, not covered by other finish materials: Broom or belt finish.
 - 3) All slabs to receive a floated finish before final finishing.
 3. Scratched slab finish: After concrete has been placed, consolidated, struck off, and leveled to a Class B tolerance, roughen surface with stiff brushes or rakes before final set.
 4. Floated finish:
 - a. After concrete has been placed, consolidated, struck off, and leveled to a Class B tolerance, do no further work until ready for floating.
 - b. Begin floating when water sheen has disappeared and surface has stiffened sufficiently to permit operations.
 - 1) Use wood or cork float.
 - c. During or after first floating, check planeness of entire surface with a 10 FT straightedge applied at not less than two (2) different angles.
 5. Cut down all high spots and fill all low spots to produce a surface with Class B tolerance throughout.
 - a. Refloat slab immediately to a uniform texture.
 6. Troweled finish:
 - a. Float finish surface to true, even plane.
 - b. Power trowel, and finally hand trowel.
 - c. First troweling after power troweling shall produce a smooth surface which is relatively free of defects, but which may still show some trowel marks.
 - d. Perform additional trowelings by hand after surface has hardened sufficiently.
 - e. Final trowel when a ringing sound is produced as trowel is moved over surface.
 - f. Thoroughly consolidate surface by hand troweling.
 - g. Finish in accordance with the FIELD QUALITY CONTROL Article in PART 3 of this Specification Section.
 - 1) Leave finished surface essentially free of trowel marks, uniform in texture and appearance.
 - h. On surfaces intended to support floor coverings, remove any defects that would show through floor covering.
 7. Broom or belt finish: Immediately after concrete has received a float finish as specified, give it a transverse scored texture by drawing a broom or burlap belt across surface.
 8. Underside of concrete slab finish:
 - a. Match finish as specified for adjacent vertical surfaces.
 - b. If more than one (1) finish occurs immediately adjacent to underside of slab surface, provide surface with most stringent formed surface requirement.

3.3 FIELD QUALITY CONTROL

- A. Tolerances:
1. Horizontal surfaces, including but not limited to, top of footings, top of walls, concrete fill in tankage, channels and similar applications:
 - a. Gap between a 10 FT straightedge placed anywhere and the finished surface shall not exceed:
 - 1) Class A tolerance: 1/4 IN.
 - 2) Class B tolerance: 3/8 IN.
 - 3) Class C tolerance: 1/2 IN.

- b. Accumulated deviation from intended true plane of finished surface shall not exceed 1/2 IN.
- B. Unacceptable finishes shall be replaced or, if approved in writing by Engineer, may be corrected provided strength and appearance are not adversely affected.
 - 1. High spots to be removed by grinding and/or low spots filled with a patching compound or other remedial measures to match adjacent surfaces.

3.4 PROTECTION

- A. All horizontal slab surfaces receiving chemical sealer shall be kept free of traffic and loads for minimum of 72 HRS following installation of sealer.

END OF SECTION

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SECTION 03 64 23
CRACK REPAIR AND INJECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Repair of cracks wider than 0.010 IN in new and existing concrete construction.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 03 09 00 - Concrete.
 - 5. Section 03 35 00 - Concrete Finishing and Repair of Surface Defects.
- C. Unit Prices:
 - 1. Measurement:
 - a. Length of cracks for payment in existing concrete construction to be measured from start to end of each crack as marked and approved by Owner's Representative.
 - b. Crack lengths extending beyond the approved length will not be measured for payment.
 - 2. Payment:
 - a. Contract bid price for crack repair to be based on the total lineal footage of crack repair indicated on the Bid Form.
 - b. Bid price to include all costs for material, labor, equipment and accessories required for repairing the length of cracks indicated on the Bid Form.
 - c. Adjustment to bid price for the actual length of cracks repaired to be made in accordance with unit prices on the Bid Form or Proposal.
 - 1) No price adjustment will be made for individual crack repairs but will be made on the total lineal length of cracks repaired.
 - d. No payment will be made for the following:
 - 1) Crack repair in new concrete construction.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Concrete Institute (ACI):
 - a. 117, Specification for Tolerances for Concrete Construction and Materials.
 - b. 503.7, Specification for Crack Repair by Epoxy Injection.
 - c. CT-13, Concrete Terminology.
 - 2. ASTM International (ASTM):
 - a. C881, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
 - b. C882, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
 - c. D638, Standard Test Method for Tensile Properties of Plastics.
 - d. D695, Standard Test Method for Compressive Properties of Rigid Plastics.
 - e. D790, Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- B. Qualifications (General):
 - 1. The following qualification requirements are applicable to all types of crack repair contained within this Specification Section:
 - a. Contractor shall have a minimum of five (5) years current experience repairing cracks in concrete in facilities of similar size and environmental exposures.

- b. Installer or Applicator of products associated with repair of cracks in concrete shall have a minimum of five (5) years of experience in the installation or application of similar repair products.
 - 1) Successful completion of a minimum of three (3) projects of similar size and complexity within the past five (5) years.
 - c. Installer or Applicator of products associated with repair of cracks in concrete shall be certified or approved, in writing, by the product manufacturer to install the products.
 - 1) As an alternative, the installer or applicator may be certified or approved on-site during initial installations per the requirements of Paragraph 1.2.D of this Specification Section.
- C. Qualifications (Epoxy Resin Adhesive Injection):
- 1. The following qualification requirements are in addition to the general qualifications required for the project and are specific to epoxy resin adhesive injection to restore structural integrity of existing concrete:
 - a. Manufacturer's Representative:
 - 1) Capable of instructing successful methods for restoring concrete structures utilizing epoxy resin adhesive injection process.
 - 2) Current theories on nature and causes of cracking in concrete.
 - 3) Methods for repairing damaged concrete structure.
 - 4) Technical aspects of correct material selection and use.
 - 5) Operation, maintenance, and troubleshooting of application equipment.
 - b. Injection Applicator:
 - 1) Licensed and certified by manufacturer of epoxy resin adhesive.
 - 2) Minimum of five (5) years of experience in successful epoxy resin adhesive injection for at least 10,000 LF of crack repair.
 - c. Injection Pump Operating Technician:
 - 1) At least one (1) year of experience consisting of minimum of 3,000 lineal feet of crack injection.
- D. The crack repair product manufacturer's representative shall be on-site during the first product installation.
- 1. Project Special Inspector shall be present while the manufacturer's representative is on-site training the contractor and installers.
 - 2. Manufacturer's representative shall:
 - a. Review preparation and installation by the Contractor.
 - b. Certify the contractor's installers and installation methods to be used for each repair product used on the Project.
 - c. Submit certification.
 - d. Provide above services at no additional cost to the Owner.
- E. Pre-Installation Meeting:
- 1. Schedule and convene a pre-installation meeting at the Project site a minimum of one (1) week prior to commencing crack repair work. At a minimum, the following parties shall be in attendance:
 - a. Contractor.
 - b. Installer or Applicator.
 - c. Manufacturer's representative.
 - d. Engineer.
 - e. Special Inspector.
 - 2. Review the requirements for application, including surface preparation specified under other sections, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details, installation procedures, testing and inspection procedures, protection, repair, clean up, and procedures to be used for protecting adjacent concrete.

1.3 DEFINITIONS

- A. Active Crack – Crack in concrete with plane surfaces that are in a state of movement relative to each other.
- B. Crack Depth – The distance that the crack extends from the injection surface into the concrete to the point where the crack is less than 0.002 IN in width.
- C. Effective Pressure – The fluid grout pressure at the point of entry at the injection port. This shall be calculated as the gauge pressure minus head losses in the injection system.
- D. Flushing – Removing debris for the crack section by means of air or liquid under pressure.
- E. Gauge Pressure – The actual fluid grout pressure reading on the pump gauge.
- F. Gravity Feed – Filling and sealing of horizontally positioned cracks using low viscosity resins by pouring and spreading onto surface or placing into purposely formed reservoirs.
- G. Passive Crack – Crack in concrete with plane surfaces that are not moving relative to each other.
- H. Pot Life – The period of time during which the polyurethane or epoxy resin remains pumpable.
- I. Refusal Criteria – Zero flow of grout at the proposed effective pressure for a duration of 5 minutes.
- J. Resin (or resin adhesive) – The crack filling material that is injected or introduced into a crack for the purpose of re-bonding the separated edges to allow the transfer of tensile stress across the crack and/or to achieve water-tightness.
- K. Sealant – The crack filling material that has adhesive and cohesive properties that forms a seal to prevent the ingress of liquid or gases into the concrete.
- L. Structural Crack Repair – Crack repair that is required to restore the structural capacity of the cracked concrete member. Structural crack repair restores the ability for tensile and compressive forces to be transmitted across the crack through the resin adhesive placed in the crack.
- M. Other words and terms used in this Specification Section are defined in ACI CT-13 or ACI 503.7.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - a. Crack repair work plan shall be submitted three (3) weeks prior to the commencement of work and shall include, at a minimum, the following information:
 - 1) Basis of material selection.
 - 2) Proposed effective pressure for crack injection.
 - 3) Surface finishing.
 - 4) Location and size of injection ports.
 - 5) Surface preparation of the concrete prior to surface sealing.
 - 6) Method of storing and handling resins, cleaning solvents, and waste materials.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturers and types:
 - 1) Resin adhesive.
 - 2) Sealant.
 - 3) Surface seal.
 - d. Installation instructions for repairing core holes taken at epoxy resin injection locations.

3. Certifications:
 - a. Written certification or approval of each installer or applicator of crack repair products from the manufacturer acknowledging that each installer or applicator working on the Project is knowledgeable in the installation or application of each product to be used.
 - 1) In lieu of written certification or approval, provide certification that manufacturer's representative performed on-site training of each installer or applicator per the requirements of this Specification Section.
 - b. References for three (3) crack repair projects of similar size and complexity that were completed by the installer or applicator within the past five (5) years.
 - c. Certification from the material supplier stating that material is suitable for the intended use on this Project.
 - d. Certification of calibration for each pressure gauge to be used on Project.
 4. Test reports:
 - a. Submit test report data for core hole testing at epoxy resin injection locations. Information included in the test report data shall include, at a minimum, the following:
 - 1) Location of crack where core hole was obtained.
 - 2) Results of visual examination.
 - 3) Results of bond strength/compression test.
 - 4) Epoxy Resin Adhesive Two Component Ratio Test.
 - 5) Injection Pressure Test.
 - 6) Acceptance or rejection of core hole testing.
- B. Informational Submittals:
1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 2. Technical data for metering, mixing, and injection equipment.
 3. At conclusion of project, submit record documents that accurately depict actual locations of repaired cracks and type of crack injection materials used at each location.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's recommendations and requirements for materials used.
- B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Store tightly sealed materials off of the ground and away from moisture, direct sunlight, extreme heat, and freezing temperatures.
- D. Store in unopened packaging in a clean, dry environment protected from sunlight in a temperature ranging from 50 DEGF to 90 DEGF.

1.6 PROJECT CONDITIONS

- A. Environmental requirements:
 1. Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting performance of concrete crack repair products.
 2. Ensure that substrate surface and ambient air temperature are between 40 DEGF and 90 DEGF at least 24 HRS after application.
 3. Pre-condition components to 70 DEGF for 24 HRS prior to installation.
 4. Allow surfaces to attain temperature and conditions specified before proceeding with application.

1.7 SEQUENCING AND SCHEDULING

- A. Do not begin injection of concrete cracks until proposed crack repair methods have been approved by Engineer.
 1. Approval of crack repair methods does not relieve Contractor of his responsibility to provide crack repairs that meets the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the manufacturers listed in the applicable Articles below are acceptable.
 - 1. Epoxy Resin Adhesive:
 - a. BASF Corporation.
 - b. Sika Corporation.
 - c. Euclid Chemical Company.
 - 2. Surface Seal:
 - a. BASF Corporation.
 - b. Sika Corporation.
 - c. Euclid Chemical Company.
 - 3. Polyurethane Sealant:
 - a. BASF Corporation.
 - b. Sika Corporation.
 - c. Euclid Chemical Company.
 - 4. Epoxy Penetrating Sealant:
 - a. BASF Corporation.
 - b. Sika Corporation.
 - c. Euclid Chemical Company.
- B. All materials used for crack injection shall be supplied by one manufacturer to ensure complete compatibility of materials.
- C. Submit request for substitution in accordance with Specification Section 01 25 00.

2.2 MATERIALS

- A. Epoxy Resin Adhesive:
 - 1. Two-part epoxy adhesive containing 100% solids, meeting the following minimum characteristics:
 - a. Adhesive shall conform to the requirements of ASTM C881, Type IV, Grade 1 and have a viscosity that will allow it to achieve and maintain the penetration requirements specified in ACI 503.7.
 - b. Bond Strength: 2,000 PSI per ASTM C882.
 - c. Tensile Strength: 7,000 PSI per ASTM D638.
 - d. Elongation: 1.5% at 7 days at 70 DEGF per ASTM D638.
 - e. Flexural Strength: 8,000 PSI per ASTM D790.
 - f. Compressive Strength: 10,000 PSI per ASTM D695.
 - 2. Acceptable Products:
 - a. MasterInject 1380 by BASF Corporation.
 - b. Sikadur 35, Hi-Mod LV by Sika Corporation.
 - c. Dural 452 LV by Euclid Chemical Company.
- B. Surface Seal:
 - 1. Material shall seal the crack faces and have sufficient strength and adhesion to contain the injection adhesive during the injection process and while the injection adhesive cures.
 - a. Capable of removal after injection and not leave a residue or damage the surface of the concrete.
 - 2. Acceptable Products:
 - a. MasterEmaco ADH 1420 by BASF Corporation.
 - b. Sikadur 31, Hi-Mod Gel by Sika Corporation.
 - c. Dural Fast Set Gel by Euclid Chemical Company.
- C. Polyurethane Sealant:
 - 1. Low viscosity, expanding, hydrophobic polyurethane chemical grout that when used alone, or in conjunction with an accelerator, forms a flexible gasket to plug cracks in concrete.

2. Polyurethane sealant and accelerator, if required, shall be provided by the same manufacturer to ensure complete compatibility of materials.
 3. Acceptable Products:
 - a. MasterInject 1230 IUG by BASF Corporation.
 - b. SikaFix HH LV by Sika Corporation.
 - c. Dural Aqua-Dam LV by Euclid Chemical Company.
- D. Epoxy Penetrating Sealant:
1. Super low-viscosity, two-component epoxy penetrating sealer containing 100 PCT solids.
 2. Acceptable Products:
 - a. MasterInject 1000 by BASF Corporation.
 - b. Sikadur 55 SLV by Sika Corporation.
 - c. Dural 335 by Euclid Chemical Company.

2.3 EQUIPMENT

- A. Gauges.
1. Calibrated gauges are required for use with pump and injection hose. Additional gauges shall be available on site to replace gauges that malfunction.
- B. Pump.
1. Pump equipment used for pressure injection shall be suitable for the intended use and compatible with the injection resin.
 2. Portable, positive displacement type pump with interlock to provide in-line mixing and metering system for two component injection resin.
 - a. Where the volume of crack repair is less than one (1) quart for 1000 SQFT of gross repair area, or where excessive grout pressure developed by pump unit might further damage structure, premixed material and hand cartridge pumps may be used if acceptable to the Engineer.
 3. Electric or air powered with interlocks providing positive ratio control of proportions for the two components at nozzle.
 4. Primary injection pump for each material of different mix ratio, including a standby backup pump of similar ratio.
 5. Capable of immediate compensation for changes in resins.
 6. Do not use batch mix pumps.
 7. Provide pressure hoses and injection nozzle of such design as to allow proper mixing of two adhesive components of epoxy resin adhesive.
- C. Discharge Pressure Control.
1. Automatic pressure controls capable of discharging mixed resin adhesive at pressures up to 200 PSI, plus or minus 5%, and able to maintain pressure.
- D. Automatic Shutoff Control.
1. Provide sensors on both components for epoxy resin adhesive reservoirs for stopping machine automatically when only one component is being pumped to mixing head.
- E. Proportioning Ratio Tolerance.
1. Maintain resin adhesive manufacturer's prescribed mix ratio within a tolerance of plus or minus 5% by volume at discharge pressure up to 160 PSI.
- F. Ratio/Pressure Check Device:
1. Two independent valved nozzles capable of controlling flow rate and pressure by opening or closing valve to restrict material flow.
 2. Pressure gauge capable of sensing pressure behind each valve.

PART 3 - EXECUTION

3.1 GENERAL

- A. All cracks in new and existing concrete construction greater than 0.010 IN wide shall be repaired in accordance with this Specification Section.
 - 1. Cracks requiring repair, as identified by the Engineer, shall be numbered, physically marked as to the crack's extent, and measured for recording purposes.
- B. All cracks to be repaired shall be inspected and movement of the cracks shall be monitored using a crack width monitor for a period of 24 HRS to determine if the crack is active or passive. If the crack is active and requires structural repair, continue monitoring the crack width for an additional 24 HRS to determine when the crack is at its widest, as measured at the surface of the concrete member.
- C. Repair of passive cracks and cracks requiring structural repair in walls shall be as follows:
 - 1. Crack widths up to 1/8 IN shall be pressure injected using Epoxy Resin Adhesive.
- D. Repair of passive cracks and cracks requiring structural repair in slabs shall be as follows:
 - 1. Cracks widths up to 1/8 IN may be pressure injected using Epoxy Resin Adhesive or gravity fed using Epoxy Penetrating Sealant.
- E. Repair of active cracks shall be as follows:
 - 1. Crack widths up to 1/8 IN shall be pressure injected using Polyurethane Sealant.
- F. Repair of active cracks requiring structural repair shall be as follows:
 - 1. Crack widths up to 1/8 IN shall be pressure injected using Epoxy Resin Adhesive.
 - 2. Inject crack when it is at its widest when measured at the concrete surface within at 24 HR cycle.
- G. Crack widths greater than 1/8 IN shall be further investigated by the Engineer.

3.2 PREPARATION

- A. Remove any loose matter, dirt, dust, laitance, oil, grease, salt, and other contaminants from the crack surfaces.
- B. Clean cracks in accordance with the crack repair product manufacturer's instructions.
- C. Clean surfaces adjacent to cracks for a distance of 1 IN on each side of the crack to remove any loose matter, dirt, dust, laitance, oil, grease, salt, and other contaminants that may be detrimental to bond of surface seal.
- D. Do not use acids and corrosives for cleaning unless neutralized prior to performing crack repair.

3.3 APPLICATION

- A. Pressure Injection.
 - 1. Drilling and installing injection ports:
 - a. Injection holes shall be drilled, on each side of the crack, at a 45 DEG angle to the surface of the concrete.
 - b. Holes shall be located such that they intersect the crack section at approximately the midpoint of the crack depth and shall extend through the crack section.
 - c. Size of holes shall accommodate the injection ports.
 - d. Spacing between injection port holes shall not exceed the depth of the crack, 8 IN, or the thickness of concrete member. Injection port holes shall be alternated from one side of the crack to the other.
 - 1) Space injection ports closer together to allow adjustment of injection pressure to obtain minimum loss of resin to soil at locations where:
 - a) Cracks extend entirely through wall.
 - b) Backfill of walls on one side.
 - c) Difficult to excavate behind wall to seal both crack surfaces.

- e. Prior to installation of the injection ports, each hole shall be individually cleaned of all deleterious material by an air-water blast to completely remove all drill cuttings from the hole.
 - f. Install and seal around each injection port with surface seal material in accordance with manufacturer's instructions.
 - 1) Inserted end of injection port shall not extend beyond the point at which the drilled hole intersects the crack.
2. Cleaning and flushing:
- a. After the injection ports have been inserted and sealed, flush crack with an air-water mixture or an alternating water and air flush to remove all deleterious material prior to the injection of resin.
 - 1) Flushing material shall be injected through the injection port and continued until it exudes from the adjacent injection port and the crack is thoroughly cleaned.
 - b. A final flush shall be made with air only to remove all of the free water.
3. Surface sealing:
- a. Apply surface seal in accordance with manufacturer's instructions to all accessible crack faces prior to pressure injecting.
 - b. Seal surfaces of crack to prevent escape of injection resin.
4. Injection:
- a. Follow the instructions of the manufacturer and their representatives for all mixing and injection procedures.
 - b. Injection of resin shall proceed from the injection port at the lowest elevation of the crack and continue upwards along the crack on an injection port to injection port basis without interruption to the highest elevation of the crack.
 - c. Injection nozzle shall not be moved to the adjacent injection port until resin appears at the next higher adjacent injection port or refusal criteria is developed.
 - d. Each injection port shall be sealed immediately after completion of injection at that injection port.
- B. Gravity Feed.
- 1. Apply Epoxy Penetrating Sealant in accordance with manufacturer's instructions.

3.4 CLEANING

- A. After pressure injection of cracks is complete, remove surface seal material and re-finish concrete in area of pressure injection to match finish of existing concrete.
- 1. See Specification Section 03 35 00 for additional finishing requirements.
 - 2. Surface finishing shall not proceed until the curing period, as specified by the material manufacturer, has elapsed.
- B. All excess materials shall be cleaned and disposed of in accordance with the manufacturer's instructions.

3.5 FIELD QUALITY CONTROL

- A. Monitor each pressure injection location. Observe and record the following information:
- 1. Volume of resin used within each 10 FT of crack length.
 - 2. Pump gauge pressure at each 10 minute increment.
 - 3. Records shall indicate crack location and number along with injection port spacing and confirmation of resin appearing or refusal at each injection port.
- B. Epoxy Resin Adhesive Two Component Ratio Tests.
- 1. Disconnect mixing head and pump two adhesive components simultaneously through ratio check device.
 - 2. Adjust discharge pressure to 160 PSI for both adhesive components.
 - 3. Simultaneously discharge both adhesive components into separate calibrated containers.
 - 4. Compare amounts simultaneously discharged into calibrated containers during same time period to determine mix ratio.

5. Complete test at 160 PSI discharge pressure and repeat procedure for 0 PSI discharge pressure.
 6. Run ratio test for each injection unit at beginning and end of each injection work day, and when injection work is stopped for more than 1 HR.
 7. Document and maintain complete accurate records of ratios and pressure checks.
 8. Perform test in the presence of the Special Inspector.
- C. Injection Pressure Test.
1. Disconnect mixing head of injection equipment and connect two adhesive component delivery lines to pressure check device.
 2. Pressure Check Device:
 - a. Two independent valved nozzles capable of controlling flow rate and pressure by opening or closing of valve.
 - b. Pressure gauge capable of sensing pressure buildup behind each valve.
 3. Close valves on pressure check device and operate equipment until gauge pressure on each line reads 160 PSI.
 4. Stop pumps and observe pressure; do not allow pressure gauge to drop below 150 PSI within 3 minutes.
 5. Run pressure test for each injection equipment unit:
 - a. Beginning and end of each injection work day.
 - b. When injection work is stopped for more than 45 minutes.
 6. Check tolerance to verify equipment capable of meeting specified ratio tolerance.
 7. Perform test in the presence of the Special Inspector.
- D. Crack Injection Tests (Structural Crack Repairs Only):
1. Crack injection testing shall be completed on all structural crack repairs.
 - a. Testing is not required for non-structural crack repairs.
 2. Initial Cores:
 - a. 4 IN DIA for full crack depth taken from Engineer-selected locations.
 - b. Take three cores in first 100 LF of crack repaired and one core sample for each 500 LF thereafter.
 3. Provide suitable containers for storage, curing, and transportation of test specimens.
 4. Methods of Testing Cores:
 - a. Penetration:
 - 1) Visual examination.
 - b. Bond Strength/Compression Test:
 - 1) Concrete failure prior to adhesive failure.
 5. Test Requirements:
 - a. Penetration:
 - 1) Minimum of 90% of crack shall be full of epoxy adhesive.
 - b. Bond Strength/Compression Test:
 - 1) Concrete failure before adhesive failure, or 6,500 PSI with no failure of either concrete or adhesive.
 6. Perform test in the presence of the Special Inspector.
 7. Evaluation and Acceptance of Tests:
 - a. If initial cores pass tests as specified, epoxy resin adhesive injection Work at area represented by cores will be accepted.
 - b. If initial cores fail either by lack of penetration or bond strength, crack repair Work shall not proceed further until areas represented by cores are reinjected and retested for acceptance.
 - c. Obtain verifying core samples, number and location as selected by Engineer, after rework of areas represented by failed initial cores is complete.

8. Core Hole Repair:
 - a. Correct Work as result of testing upon notification from Engineer.
 - b. Refill initial and verifying core holes with an epoxy grout tamped and rodded in-place to form a dense fill.
 - 1) See Specification Section 03 09 00 for epoxy grout.
 - c. Finish surface to blend with adjacent concrete.

END OF SECTION



DIVISION 05

METALS



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SECTION 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Custom fabricated metal items and certain manufactured units not otherwise indicated to be supplied under work of other Specification Sections.
 2. Design of all temporary bracing not indicated on Drawings.
 3. Design of systems and components, including but not limited to:
 - a. Stairs.
 - b. Landings.
 - c. Modular framing system.
- B. Related Sections include but are not necessarily limited to:
1. SUDAS Division 1.
 2. Division 01 - General Requirements.
 3. Section 01 04 00 - Special Provisions.
 4. Section 03 09 00 - Concrete.
 5. Section 03 15 19 - Anchorage to Concrete.
 6. Section 05 52 02 - Aluminum Railings.
 7. Section 09 96 00 - High Performance Industrial Coatings.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. Aluminum Association (AA):
 - a. ADM 1, Aluminum Design Manual.
 2. American Association of State Highway and Transportation Officials (AASHTO):
 - a. HB, Standard Specifications for Highway Bridges.
 3. American Institute of Steel Construction (AISC):
 - a. 325, Manual of Steel Construction.
 - b. 360, Specifications for Structural Steel Buildings (referred to herein as AISC Specification).
 4. The American Ladder Institute (ALI):
 - a. A14.3, Ladders - Fixed - Safety Requirements.
 5. American Society of Civil Engineers (ASCE):
 - a. 7, Minimum Design Loads for Buildings and Other Structures.
 6. ASTM International (ASTM):
 - a. A6, Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
 - b. A36, Standard Specification for Carbon Structural Steel.
 - c. A47, Standard Specification for Ferritic Malleable Iron Castings.
 - d. A48, Standard Specification for Gray Iron Castings.
 - e. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - f. A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished.
 - g. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - h. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - i. A197, Standard Specification for Cupola Malleable Iron.
 - j. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

- k. A276, Standard Specification for Stainless Steel Bars and Shapes.
 - l. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - m. A312, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
 - n. A380, Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.
 - o. A500, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - p. A501, Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
 - q. A536, Standard Specification for Ductile Iron Castings.
 - r. A554, Standard Specification for Welded Stainless Steel Mechanical Tubing.
 - s. A572, Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
 - t. A563, Standard Specification for Carbon and Alloy Steel Nuts.
 - u. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - v. A668, Standard Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use.
 - w. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - x. A786, Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
 - y. A992, Standard Specification for Steel for Structural Shapes.
 - z. A1064, Standard Specification for Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
 - aa. A1011, 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.
 - bb. B26, Standard Specification for Aluminum-Alloy Sand Castings.
 - cc. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - dd. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - ee. B308, Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.
 - ff. B429, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
 - gg. B632, Standard Specification for Aluminum-Alloy Rolled Tread Plate.
 - hh. F436, Standard Specification for Hardened Steel Washers Inch and Metric Dimensions.
 - ii. F467, Standard Specification for Nonferrous Nuts for General Use.
 - jj. F468, Standard Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use.
 - kk. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - ll. F835, Standard Specification for Alloy Steel Socket Button and Flat Countersunk Head Cap Screws.
 - mm. F879, Standard Specification for Stainless Steel Socket Button and Flat Countersunk Head Cap Screws.
 - nn. F1789, Standard Terminology for F16 Mechanical Fasteners.
 - oo. F3125, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 KSI (830 MPa) and 150 KSI (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.
7. American Welding Society (AWS):
- a. A5.1/A5.1M, Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding.
 - b. D1.1, Structural Welding Code - Steel.

- c. D1.2, Structural Welding Code - Aluminum.
 - d. D1.6/D1.6M, Structural Welding Code - Stainless Steel.
 - 8. National Association of Architectural Metal Manufacturers (NAAMM):
 - a. AMP 510, Metal Stairs Manual.
 - b. AMP 555, Code of Standard Practice for the Architectural Metal Industry (Including Miscellaneous Iron).
 - c. MBG 531, Metal Bar Grating Manual.
 - 9. NACE International (NACE).
 - 10. Nickel Development Institute (NiDI):
 - a. Publication 11 007, Guidelines for the welded fabrication of nickel-containing stainless steels for corrosion resistant services.
 - 11. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.
 - 12. Building Code:
 - a. International Code Council (ICC):
 - 1) International Building Code and associated standards, 2018 Edition including all amendments, referred to herein as Building Code.
 - b. A117.1, Accessible and Usable Buildings and Facilities.
- B. Qualifications:
- 1. Qualify welding procedures and welding operators in accordance with AWS.
 - 2. Fabricator shall have minimum of 10 years' experience in fabrication of metal items specified.
 - 3. Engineer for contractor-designed systems and components: Professional Structural Engineer licensed in the State of Iowa.
 - 4. NACE certified inspector shall have minimum of two (2) years' experience performing inspections as indicated.
 - a. Have a current Level III coating inspector certification.

1.3 DEFINITIONS

- A. Fasteners: As defined in ASTM F1789.
- B. Galvanizing: Hot-dip galvanizing per ASTM A123/A123M or ASTM A153/A153M with minimum coating of 2.0 OZ of zinc per square foot of metal (average of specimens) unless noted otherwise or dictated by standard.
- C. Hardware: As defined in ASTM A153/A153M.
- D. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Qualifications:
 - a. NACE inspector qualifications.
 - 3. Fabrication and/or Layout Drawings and details:
 - a. Submit Drawings for all fabrications and assemblies.
 - 1) Include Erection Drawings, Plans, Sections, details and connection details.
 - b. Identify materials of construction, shop coatings and third party accessories.
 - 4. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.

- c. Provide manufacturer's standard allowable load tables for the following:
 - 1) Grating and checkered plate.
 - 2) Castings, trench covers and accessories.
 - 3) Modular framing systems.
- 5. Contractor designed systems and components:
 - a. Certification that manufactured units meet all design loads specified.
 - b. Shop Drawings and Engineering Design Calculations:
 - 1) Indicate design live loads.
 - 2) Sealed by a licensed Professional Engineer, registered in the State of Iowa.
 - 3) Engineer will review for general compliance with Contract Documents.
 - c. Contractor designed systems and components include the following:
 - 1) Metal Stairs and associated landings.
 - 2) Aluminum checkered plate.
- B. Informational Submittals:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Certification of welders and welding processes.
 - a. Indicate compliance with AWS.
 - 3. NACE certification of surface preparation.
 - 4. NACE certification of paint application.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and handle fabrications to avoid damage.
- B. Store above ground on skids or other supports to keep items free of dirt and other foreign debris and to protect against corrosion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Abrasive stair nosings (embedded in concrete stairs):
 - a. American Safety Tread.
 - b. Balco.
 - 2. Headed studs and deformed bar anchors:
 - a. Nelson Stud Welding Div., TRW Inc.
 - b. Stud Welding Products, Inc.
 - 3. Mechanical anchor bolts:
 - a. See Section 03 15 19.
 - 4. Epoxy adhesive anchor bolts:
 - a. See Section 03 15 19.
 - 5. Concrete screw anchors:
 - a. See Section 03 15 19.
 - 6. Castings, trench covers and accessories:
 - a. Neenah Foundry Co.
 - b. Deeter Foundry Co.
 - c. Barry Craft Construction Casting Co.
 - d. McKinley Iron Works.
 - 7. Aluminum ladders:
 - a. Any manufacturer capable of meeting the requirements of this Specification Section.
 - 8. Galvanizing repair paint:
 - a. Clearco Products Co., Inc.
 - b. ZRC Products.

9. Modular framing system:
 - a. Unistrut Building Systems.
 - b. B-Line Systems.
 - c. Kindorf.
 - d. Superstrut.

B. Submit request for substitution in accordance with Specification Section 01 25 00.

2.2 MATERIALS

A. Steel:

1. Structural:
 - a. W-shapes and WT-shapes: ASTM A992, Grade 50.
 - b. All other plates and rolled sections: ASTM A36.
2. Pipe: ASTM A53, Types E or S, Grade B or ASTM A501.
3. Structural tubing:
 - a. ASTM A500, Grade B (46 KSI minimum yield).
4. Bolts, high strength:
 - a. ASTM F3125, Grade A325.
5. Nuts, high strength:
 - a. ASTM A563.
6. Washers (hardened):
 - a. ASTM F436.
 - b. Provide two (2) washers with all bolts.
7. Bolts and nuts (unfinished):
 - a. ASTM A307, Grade A.
8. Welding electrodes: AWS D1.1, E70 Series.
9. Steel forgings: ASTM A668.

B. Iron:

1. Ductile iron: ASTM A536.
2. Gray cast iron: ASTM A48 (minimum 30,000 PSI tensile strength).
3. Malleable iron: ASTM A47, ASTM A197.

C. Stainless Steel:

1. Stainless steel in welded applications: Low carbon 'L' type.
2. Minimum yield strength of 30,000 PSI and minimum tensile strength of 75,000 PSI.
 - a. Bars, shapes: ASTM A276, Type 304.
 - b. Tubing and pipe: ASTM A269, ASTM A312 or ASTM A554, Type 304 or 316.
 - c. Strip, plate and flat bars: ASTM A666, Type 304 or 316.
 - d. Bolts and nuts: ASTM F593, Type 304 or 316.
3. Minimum yield strength of 25,000 PSI and minimum tensile strength of 70,000 PSI.
 - a. Strip, plate and flat bar for welded connections, ASTM A666, Type 304L or 316L.
4. Welding electrodes: In accordance with AWS for metal alloy being welded.

D. Aluminum:

1. Alloy 6061-T6, 32,000 PSI tensile yield strength minimum.
 - a. ASTM B221 and ASTM B308 for shapes including beams, channels, angles, tees and zees.
2. Alloy 6063-T5 or T6, 15,000 PSI tensile yield strength minimum.
 - a. ASTM B221 and ASTM B429 for bars, rods, wires, pipes and tubes.
3. ASTM B26 for castings.
4. ASTM F468, alloy 2024 T4 for bolts.
5. ASTM F467, alloy 2024 T4 for nuts.
6. Electrodes for welding aluminum: AWS D1.2, filler alloy 4043 or 5356.

E. Washers: Same material and alloy as found in accompanying bolts and nuts.

F. Embedded Anchor Bolts: See Specification Section 03 15 19.

- G. Mechanical Anchor Bolts and Adhesive Anchor Bolts: See Specification Section 03 15 19.
- H. Headed Studs: ASTM A108 with a minimum yield strength of 50,000 PSI and a minimum tensile strength of 60,000 PSI.
- I. Deformed Bar Anchors: ASTM A1064 with a minimum yield strength of 70,000 PSI and a minimum tensile strength of 80,000 PSI.
- J. Iron and Steel Hardware: Galvanized in accordance with ASTM A153/A153M when required to be galvanized.
- K. Galvanizing Repair Paint:
 - 1. High zinc dust content paint for re-galvanizing welds and abrasions.
 - 2. ASTM A780.
 - 3. Zinc content: Minimum 92% in dry film.
 - 4. ZRC "ZRC Cold Galvanizing" or Clearco "High Performance Zinc Spray."
- L. Dissimilar Materials Protection: See Specification Section 09 96 00.

2.3 MANUFACTURED UNITS

- A. Abrasive Stair Nosings:
 - 1. One piece cast aluminum with wing anchors.
 - 2. Diamond abrasive pattern.
 - 3. Babcock Davis "BSTCA-C3W."
 - 4. Length:
 - a. Concrete stairs and landings:
 - 1) 4 IN less than overall stair width.
 - 2) Where tread mounted railing post occurs, hold nosing back 4 IN clear from railing centerline.
 - b. Concrete landings at metal stairs: 4 IN less than clear width between stringers.
- B. Metal Stairs:
 - 1. Treads: Serrated Grating as specified.
 - a. Provide integral corrugated non-slip nosing.
 - 2. Risers:
 - a. Grating treads:
 - 1) Solid plate welded to trailing edge of tread or landing.
 - 2) Minimum 3/16 IN thick by 4 IN high.
 - b. Checkered plate treads: Solid checkered plate riser integral with tread.
 - 3. Landings:
 - a. Serrated Grating as specified.
 - b. Provide integral corrugated non-slip nosing at edge acting as stair tread/nosing.
 - 4. Design live load for landing platform and supporting structure:
 - a. 100 PSF, uniform load.
 - b. 300 LBS concentrated load on 4 IN square area.
 - c. All components to be adequate for the uniform load or the concentrated load, whichever requires the stronger component.
 - d. Maximum deflection: 1/300 of span under a superimposed live load of 100 PSF.
 - 5. Design, fabricate, and install in compliance with NAAMM and applicable codes.
 - a. NAAMM AMP 510: Industrial Class.
 - 6. Handrails and guardrails: Refer to Specification Section 05 52 02.
 - 7. Material:
 - a. Aluminum.
- C. Aluminum Checkered Plate:
 - 1. Conform to ASTM B632.
 - a. Diamond pattern: Use one (1) pattern throughout Project.
 - b. Material: Type 6061-T6.

2. Design live load:
 - a. 100 PSF, uniform load.
 - b. 300 LBS concentrated load on 4 IN square area.
 - c. All components to be adequate for the uniform load or the concentrated load, whichever requires the stronger component.
 - d. Maximum deflection: 1/300 of span under a superimposed live load of 50 PSF.
 3. Reinforce as necessary with aluminum angles.
 4. Plate sections:
 - a. Maximum 3 FT wide.
 - b. Minimum 1/4 IN thick.
 - c. Maximum 100 LBS per section if required to be removable.
 5. Provide joints at center of all openings unless shown otherwise.
 - a. Reinforce joints and openings with additional angles to provide required load carrying capacity.
 6. Unless shown otherwise, frame for openings with aluminum checkered plate cover:
 - a. Aluminum support angles:
 - 1) 3 by 2 by 1/4 IN minimum size with long leg vertical.
 - 2) 5/8 IN DIA adhesive anchor bolts spaced at maximum of 24 IN OC along each side with not less than two (2) anchor bolts per side.
 - b. Aluminum concrete insert seats:
 - 1) 2 by 2 by 1/4 IN minimum size.
 - 2) Auto-welded studs or strap anchors at 18 IN OC with not less than two (2) studs or anchored per side.
 - c. Drill and tap frame to receive 3/8 IN DIA fasteners at not more than 24 IN OC with not less than two (2) fasteners per side.
 - 1) Fasteners: Stainless steel flat countersunk cap screws: ASTM F879.
- D. Aluminum Grating:
1. NAAMM MBG 531.
 2. Bearing bars: Rectangular, 1-1/2 by 3/16 IN at 1-3/16 IN OC spacing OR I-bar, 1-1/2 IN deep with minimum 1/16 IN thick bar and minimum 1/4 IN flange width at 1-3/16 IN OC spacing (unless noted otherwise on Drawings).
 3. Cross bars:
 - a. Welded, swaged or pressure locked to bearing bars:
 - b. Maximum 4 IN/OC spacing.
 4. Top edges of bars: Serrated.
 5. Finish: Mill, standard.
 6. Clips and bolts: Stainless steel.
 7. Seat angles: Aluminum or stainless steel
- E. Modular Framing System:
1. Materials:
 - a. Aluminum: ASTM B221 or ASTM B209.
 2. Channels and inserts:
 - a. Aluminum: Minimum 0.080 IN.
 - b. Channels to have one (1) side with a continuous slot with in-turned lips.
 - 1) Width: 1-5/8 IN.
 - 2) Depth and configuration as necessary for loading conditions.
 3. Fittings: Same material as system major components.
 4. Fasteners:
 - a. Nuts: Toothed groves in top of nuts to engage the in-turned lips of channel.
 - b. Bolts: Hex-head cap screws.
 - c. Same material as system major components.

5. End caps:
 - a. At each exposed end of each piece mounted on walls, or guardrails, or suspended from framing 7 FT or less above the floor or platform.
 - 1) Plastic for all exposed ends 7 FT or more above floor or platform.
 - 2) Plastic or metallic for all other exposed ends.
6. Schedule:
 - a. Interior areas: Aluminum.
 - b. Exterior areas: Aluminum.
7. Provide dissimilar materials protection in accordance with Specification Section 09 96 00.

2.4 FABRICATION

- A. Verify field conditions and dimensions prior to fabrication.
- B. Form materials to shapes indicated with straight lines, true angles, and smooth curves.
 1. Grind smooth all rough welds and sharp edges.
 - a. Round all corners to approximately 1/32 - 1/16 IN nominal radius.
- C. Provide drilled or punched holes with smooth edges.
 1. Punch or drill for field connections and for attachment of work by other trades.
- D. Weld Shop Connections:
 1. Welds to be continuous fillet type unless indicated otherwise.
 2. Full penetration butt weld at bends in stair stringers and ladder side rails.
 3. Weld structural steel in accordance with AWS D1.1 using Series E70 electrodes conforming to AWS A5.1/A5.1M.
 4. Weld aluminum in accordance with AWS D1.2.
 5. Weld stainless steel in accordance with AWS D1.6 and NiDI 11 007.
 - a. Treat all welded areas in accordance with ASTM A380.
 6. All headed studs to be welded using automatically timed stud welding equipment.
 7. Grind smooth welds that will be exposed.
- E. Passivate stainless steel items and stainless steel welds after they have been ground smooth.
 1. ASTM A380.
- F. Conceal fastenings where practicable.
- G. Fabricate work in shop in as large assemblies as is practicable.
- H. Tolerances:
 1. Rolling:
 - a. ASTM A6.
 - b. When material received from the mill does not satisfy ASTM A6 tolerances for camber, profile, flatness, or sweep, the Contractor is permitted to perform corrective work by the use of controlled heating and mechanical straightening, subject to the limitations of the AISC Specification.
 2. Fabrication tolerance:
 - a. Member length:
 - 1) Both ends finished for contact bearing: 1/32 IN.
 - 2) Framed members:
 - a) 30 FT or less: 1/16 IN.
 - b) Over 30 FT: 1/8 IN.
 - b. Member straightness:
 - 1) Compression members: 1/1000 of axial length between points laterally supported.
 - 2) Non-compression members: ASTM A6 tolerance for wide flange shapes.
 - c. Specified member camber (except compression members):
 - 1) 50 FT or less: Minus 0/plus 1/2 IN.
 - 2) Over 50 FT: Minus 0/plus 1/2 IN (plus 1/8 IN per 10 FT over 50 FT).
 - 3) Members received from mill with 75% of specified camber require no further cambering.

- 4) Beams/trusses without specified camber shall be fabricated so after erection, camber is upward.
 - 5) Camber shall be measured in fabrication shop in unstressed condition.
 - d. At bolted splices, depth deviation shall be taken up by filler plates.
 - 1) At welded joints, adjust weld profile to conform to variation in depth.
 - 2) Slope weld surface per AWS requirements.
 - e. Finished members shall be free from twists, bends and open joints.
 - 1) Sharp kinks, bends and deviation from above tolerances are cause for rejection of material.
- I. Fabricate grating, checkered plate, stairs, ladders and accessories using aluminum unless shown otherwise on Drawings.
- 1. Finish:
 - a. Mill, unless noted otherwise.
 - b. Coat surfaces in contact with dissimilar materials.
 - 1) See Specification Section 09 96 00.
- J. Fabricate grating in accordance with NAAMM MBG 531.
- 1. Maximum tolerance for difference in depth between grating depth and seat or support angle depth: 1/8 IN.
 - 2. Distance between edge of grating and face of embedded seat angle or face of wall, or other structural member: 1/4 IN.
 - a. Tolerance: NAAMM MBG 531.
 - 3. Removable sections: Not wider than 3 FT and not heavier than 100 LBS.
 - 4. Ends and perimeter edges: Banded, with alternate bearing bars welded to band.
 - a. Provide full depth banding unless noted otherwise.
 - b. Banding at trenches and sumps to be 1/4 IN less than grating depth to allow for drainage.
 - 5. Openings through grating: Reinforced to provide required load carrying capacity and banded with 4 IN high toe plate.
 - 6. Provide joints at openings between individual grating sections.
 - 7. Fabricate grating so that bearing bars and cross bars in adjacent sections are aligned.
- K. Fabricate checkered plate and miscellaneous metals in accordance with NAAMM AMP 555.
- 1. Workmanship: Class 2 unless noted otherwise.
- L. See Specification Section 09 96 00 for preparation and painting of ferrous metals and other surfaces.

2.5 SOURCE QUALITY CONTROL

- A. Surface Preparation:
- 1. Refer to Specification Section 09 96 00 for surface preparation requirements.
 - 2. All miscellaneous metal fabrication item surfaces shall be inspected and approved by NACE certified coatings inspector prior to application of shop-applied coatings.
 - a. Inspection shall be performed to determine depth of blast profile and cleanliness of surface.
 - b. Fabricator shall reblast and or re-clean surfaces as required until acceptable.
- B. Shop Applied Coating Application:
- 1. Refer to Specification Section 09 96 00 for coating requirements.
 - 2. After surface has been accepted in writing by NACE certified coatings inspector, fabricator may proceed with application of coatings.
 - 3. Application of coatings shall be observed and certified by NACE certified coatings inspector.
- C. Shop Inspection and Testing:
- 1. Owner will employ and pay for the services of a qualified independent testing agency to inspect and test all structural steel work for compliance with Contract Documents.

2. Contractor responsible for testing to qualify shop and field welders and as needed for Contractor's own quality control to ensure compliance with Contract Documents.
 3. Independent testing agency shall have a minimum of five (5) years performing similar work and shall be subject to Owner's approval.
- D. Responsibilities of Testing Agency:
1. Inspect shop and field welding in accordance with AWS Code including the following non-destructive testing:
 - a. Visually inspect all welds.
 - b. In addition to visual inspection, test 50% of full penetration welds and 20% of fillet welds with liquid dye penetrant or mag particle.
 - c. Test 20% of liquid dye penetrant tested full penetration welds with ultrasonic or radiographic testing.
 2. Inspect high-strength bolting in accordance with the RCSC Specification for Structural Joints Using High-Strength Bolts, Section 9.
 - a. Verify direct tension indicator gaps, if applicable.
 3. Inspect structural steel which has been erected.
 4. Inspect stud welding in accordance with AWS Code.
 5. Prepare and submit inspection and test reports to Engineer.
 - a. Assist Engineer to determine corrective measures necessary for defective work.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Provide items to be built into other construction in time to allow their installation.
 1. If such items are not provided in time for installation, cut in and install.
- B. Prior to installation, inspect and verify condition of substrate.
- C. Correct surface defects or conditions which may interfere with or prevent a satisfactory installation.
 1. Field welding aluminum is not permitted unless approved in writing by Engineer.

3.2 INSTALLATION

- A. Set metal work level, true to line, plumb.
 1. Shim and grout as necessary.
- B. Contractor is Solely Responsible for Safety:
 1. Construction means and methods and sequencing of work is the prerogative of the Contractor.
 2. Take into consideration that full structural capacity of many structural members is not realized until structural assembly is complete e.g., until slabs, decks, and diagonal bracing or rigid connections are installed.
 3. Partially complete structural members shall not be loaded without an investigation by the Contractor.
 4. Until all elements of the permanent structure and lateral bracing system are complete, temporary bracing for the partially complete structure will be required.
- C. Adequate temporary bracing to provide safety, stability and to resist all loads to which the partially complete structure may be subjected, including construction activities and operation of equipment is the responsibility of the Contractor.
 1. Plumb, align, and set structural steel members to specified tolerances.
 2. Use temporary guys, braces, shoring, connections, etc., necessary to maintain the structural framing plumb and in proper alignment until permanent connections are made, the succeeding work is in place, and temporary work is no longer necessary.

3. Use temporary guys, bracing, shoring, and other work to prevent injury or damage to adjacent work or construction from stresses due to erection procedures and operation of erection equipment, construction loads, and wind.
 4. Contractor shall be responsible for the design of the temporary bracing system and must consider the sequence and schedule of placement of such elements and effects of loads imposed on the structural steel members by partially or completely installed work, including work of all other trades.
 - a. If not obvious from experience or from the Drawings, confer with the Engineer to identify those structural steel elements that must be complete before the temporary bracing system is removed.
 5. Remove and dispose of all temporary work and facilities off-site.
- D. Examine work-in-place on which specified work is in any way dependent to ensure that conditions are satisfactory for the installation of the work.
1. Report defects in work-in-place which may influence satisfactory completion of the work.
 2. Absence of such notification will be construed as acceptance of work-in-place.
- E. Field Measurement:
1. Take field measurements as necessary to verify or supplement dimensions indicated on the Drawings.
 2. Contractor responsible for the accurate fit of the work.
- F. Check the elevations of all finished footings or foundations and the location and alignment of all anchor bolts before starting erection.
1. Use surveyor's level.
 2. Notify Engineer of any errors or deviations found by such checking.
- G. Framing member location tolerances after erection shall not exceed the frame tolerances listed in the FIELD QUALITY CONTROL Article in PART 3 of this Specification Section.
- H. Erect plumb and level; introduce temporary bracing required to support erection loads.
- I. Use light drifting necessary to draw holes together.
1. Drifting to match unfair holes is not allowed.
- J. Welding:
1. Conform to AWS D1.1 and requirements of the FABRICATION Article in PART 2 of this Specification Section.
 2. When joining two (2) sections of steel of different ASTM designations, welding techniques shall be in accordance with a qualified AWS D1.1 procedure.
- K. Shore existing members when unbolting of common connections is required.
1. Use new bolts for rebolting connections.
- L. Clean stored material of all foreign matter accumulated prior to the completion of erection.
- M. Bolt Field Connections: Where practicable, conceal fastenings.
- N. Field Welding:
1. Follow AWS procedures.
 2. Grind welds smooth where field welding is required.
- O. Field cutting grating or checkered plate to correct fabrication errors is not acceptable.
1. Replace entire section.
- P. Remove all burrs and radius all sharp edges and corners of miscellaneous plates, angles, framing system elements, etc.
- Q. Unless noted or specified otherwise:
1. Connect steel members to steel members with 3/4 IN DIA ASTM F3125, Grade A325 high strength bolts.
 2. Connect aluminum to aluminum with 3/4 IN DIA stainless bolts.

3. Connect aluminum to structural steel using 3/4 IN DIA stainless steel bolts.
 - a. Provide dissimilar metals protection.
 4. Connect aluminum and steel members to concrete and masonry using stainless steel mechanical anchor bolts or adhesive anchor bolts unless shown otherwise.
 - a. Provide dissimilar materials protection.
 5. Provide washers for all bolted connections.
 6. Where exposed, bolts shall extend a maximum of 3/4 IN and a minimum of 1/2 IN above the top of installed nut.
 - a. If bolts are cut off to required maximum height, threads must be dressed to allow nuts to be removed without damage to the bolt or the nuts.
- R. Install and tighten ASTM F3125, Grade A325 high-strength bolts in accordance with the AISC 325, Allowable Stress Design (ASD).
1. Provide hardened washers for all Grade A325 bolts.
 - a. Provide the hardened washer under the element (nut or bolt head) turned in tightening.
- S. After bolts are tightened, upset threads of ASTM A307 bolts or anchor bolts to prevent nuts from backing off.
- T. Secure metal to wood with lag screws of adequate size with appropriate washers.
- U. Do not field splice fabricated items unless said items exceed standard shipping length or change of direction requires splicing.
1. Provide full penetration welded splices where continuity is required.
- V. Provide each fabricated item complete with attachment devices as indicated or required to install.
- W. Anchor such that work will not be distorted nor fasteners overstressed from expansion and contraction.
- X. Set beam and column base plates accurately on non-shrink grout as indicated on Drawings.
1. See Division 03 Specification Sections for non-shrink grout and anchorage.
 2. Set and anchor each base plate to proper line and elevation.
 - a. Use metal wedges, shims, or setting nuts for leveling and plumbing columns and beams.
 - 1) Wedges, shims and setting nuts to be of same metal as base plate they support.
 - 2) Tighten nuts on anchor bolts.
 - b. Fill space between bearing surface and bottom of base plate with non-shrink grout.
 - 1) Fill space until voids are completely filled and base plates are fully bedded on wedges, shims, and grout.
 - c. Do not remove wedges or shims.
 - 1) Where they protrude, cut off flush with edge of base plate.
 - d. Fill sleeves around anchor bolts solid with non-shrink grout.
- Y. Tie anchor bolts in position to embedded reinforcing steel using wire.
1. Tack welding prohibited.
 - a. Coat projecting bolt threads and nuts with heavy coat of clean grease.
 2. Anchor bolt location tolerance:
 - a. Per Section 03 15 19.
- Z. Provide abrasive stair nosings in each tread and landing of all concrete stairs and at each concrete stair landing having metal stair structure attaching to the concrete landing.
1. Center stair nosings in stair width.
- AA. Accurately locate and place frames for openings before casting into floor slab so top of plate is flush with surface of finished floor.
1. Keep screw holes clean and ready to receive screws.
- BB. Attach grating to end and intermediate supports with grating saddle clips and bolts.
1. Maximum spacing: 2 FT OC with minimum of two (2) per side.

2. Attach individual units of aluminum grating together with clips at 2 FT OC maximum with a minimum of two (2) clips per side.

CC. Coat aluminum surfaces in contact with dissimilar materials in accordance with Specification Section 09 96 00.

3.3 FIELD QUALITY CONTROL

- A. Tolerances (unless otherwise noted on the Drawings):
1. Frame placement, after assembly and before welding or tightening.
 - a. Deviation from plumb, level and alignment: 1 IN 500, maximum.
 - b. Displacement of centerlines of columns: 1/2 IN maximum, each side of centerline location shown on Drawings.
 - c. Displacement of centerlines of columns: 1/2 IN maximum, each side of centerline location shown on Drawings.
- B. OWNER Pays for Field Inspection and Testing:
1. Owner will employ and pay for services of an independent testing agency to inspect and test structural steel shop and field work for compliance with this Specification Section.
 2. Contractor provides sufficient notification and access so inspection and testing can be accomplished.
 3. Contractor pays for retesting of failed tests and for additional testing required when defects are discovered.

3.4 CLEANING

- A. After fabrication, erection, installation or application, clean all miscellaneous metal fabrication surfaces of all dirt, weld slag and other foreign matter.
- B. All stainless steel products in addition to Paragraph A. above:
1. Remove all heat tint, rusting, discoloration by passivation, ASTM A380, or other acceptable means as listed in NiDI 11 007 as approved by the Engineer.
- C. Provide surface acceptable to receive field applied paint coatings specified in Specification Section 09 96 00.

END OF SECTION

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SECTION 05 52 02
ALUMINUM RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Aluminum handrail, stair rail and guardrail.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 03 15 19 - Anchorage to Concrete.
 - 5. Section 05 50 00 - Metal Fabrications.
 - 6. Section 09 96 00 - High Performance Industrial Coatings.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Aluminum Association (AA):
 - a. ADM 1, Aluminum Design Manual.
 - 2. American Society of Mechanical Engineers (ASME):
 - a. Section IX, Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators.
 - 3. ASTM International (ASTM):
 - a. B108, Standard Specification for Aluminum-Alloy Permanent Mold Castings.
 - b. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - c. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - d. B247, Standard Specification for Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings, and Rolled Ring Forgings.
 - e. B308, Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.
 - f. B429, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
 - 4. American Welding Society (AWS):
 - a. C5.5, Recommended Practices for Gas Tungsten Arc Welding.
 - b. D1.2, Structural Welding Code - Aluminum.
 - 5. National Association of Architectural Metal Manufacturers (NAAMM):
 - a. AMP 521, Pipe Railing Systems Manual.
 - 6. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.
 - 7. Building Code:
 - a. International Code Council (ICC):
 - 1) International Building Code and associated standards, 2018 Edition including all amendments, referred to herein as Building Code.
- B. Qualifications:
 - 1. Qualify welding procedures and welding operators in accordance with AWS and ASME Section IX.
 - 2. Contractor's Railing Design Engineer: Professional Structural Engineer licensed in the State of Iowa.

1.3 DEFINITIONS

- A. Guardrail: A system of building components located near the open sides of elevated walking surfaces for the purpose of minimizing the possibility of an accidental fall from the walking surface to the lower level.
- B. Handrail: A railing provided for grasping with the hand for support.
- C. Railing: A generic term referring to guardrail, handrail and/or stair rails.
- D. Stair Rail: A guardrail, installed at the open side of stairways with either a handrail mounted to the inside face of the guardrail, or where allowed by applicable codes, with the top rail mounted at handrail height and serving the function of a handrail.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Fabrication and/or layout Drawings:
 - a. Drawings showing:
 - 1) Profile, location, sections and fabrication details including all welding information of each railing.
 - 2) Type and details of anchorage.
 - 3) Location and type of expansion joints.
 - 4) Materials of construction, shop coatings and all third-party accessories.
 - b. Drawings shall be sealed by the Contractor's Railing Design Engineer to certify conformance with the design criteria stipulated in the Contract Documents.
 - 3. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation details.
 - 4. Certification that railings have been designed and fabricated to meet the loading requirements specified.
 - 5. Calculations for all proposed deviations from the Specification.
 - a. Calculations shall be performed, sealed, signed and dated by the Contractor's Railing Design Engineer.
 - b. Calculations shall be specific to this Project and shall include all assumptions, references and design interpretations used to achieve the results obtained by the Engineer.
 - c. Reduction in load criteria is not acceptable as reason for deviation from sizes indicated in the Specification.
- B. Informational Submittals:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Certification of welders and welding procedures indicating compliance with AWS requirements.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver and handle railings to preclude damage.
- B. Store railings on skids, keep free of dirt and other foreign matter which will damage railings or finish and protect against corrosion.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Mechanically fastened component railing systems.
 - a. J. G. Braun.
 - b. Hollaender Railing Systems.
 - c. Moultrie Manufacturing Company (Wesrail).
 - d. Tuttle Railing Systems.
- B. Submit request for substitution in accordance with Specification Section 01 25 00.

2.2 MATERIALS

- A. Aluminum:
 - 1. Alloy 6061-T6, 32,000 PSI tensile yield strength minimum.
 - a. ASTM B209 for sheets and plates.
 - b. ASTM B221 and ASTM B308 for shapes - beams, channels, angles, tees, and zees.
 - c. ASTM B247 for forgings.
 - 2. Alloy 6063-T5 or T6, 15,000 PSI tensile yield strength minimum.
 - a. ASTM B221 and ASTM B429 for bars, rods, wires, pipes and tubes.
 - 3. Alternate aluminum alloys may be acceptable, provided that they have sufficient strength and resistance to corrosion.
- B. Cast Fittings: Aluminum, ASTM B108.
- C. Shims: Aluminum of same alloy as component being shimmed.
- D. Fasteners: See Specification Section 05 50 00.
- E. Post-installed Anchors: See Specification Section 03 15 19.

2.3 FABRICATION

- A. General:
 - 1. Verify field conditions and dimensions prior to fabrication.
 - 2. For fabrication of items which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.
 - a. Remove blemishes by grinding and buffing or by welding and grinding, prior to cleaning, treating and application of surface finishes.
 - 3. Form exposed work with smooth, short radius bends, accurate angles and straight edges.
 - a. Ease exposed edges to a radius of approximately 1/32 IN.
 - b. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
 - c. Drill or punch holes with smooth edges.
 - 4. Form exposed connections with flush, smooth, hairline joints, using stainless steel or aluminum splice locks to splice sections together or by welding.
 - a. Ease the edges of top rail splices and expansion joints and remove all burrs left from cutting.
 - 5. Provide for anchorage of type indicated on Drawings or as required by field conditions.
 - a. Drill or punch holes with smooth edges.
 - 6. Design railings and anchorage system in accordance with NAAMM AMP 521 to resist loading as required by Building Code.
 - a. Maximum allowable stresses per AA ADM 1.
- B. Custom fabricate railings to dimensions and profiles indicated.
 - 1. Guardrails:
 - a. Rails and vertical posts: Minimum 1-1/2 IN nominal diameter pipe.

- 1) Internally reinforce vertical posts as necessary to meet loading requirements.
 - b. Vertical pickets: Minimum 1/2 IN pipe or solid round bar.
 2. Handrail: 1-1/4 IN nominal diameter pipe.
 3. Where details are not indicated, space intermediate rails to requirements of the Building Code or OSHA Standards, whichever requires the more restrictive design.
 4. Space vertical posts as required by loading requirements but not more than 4 FT OC.
 - a. Avoid locating vertical posts at changes in direction of railing.
 - b. Hold vertical post back from corner and provide radiused corners.
 5. Space handrail brackets as required by loading requirements but not more than 5 FT OC.
 6. Base plates:
 - a. For mounting to top of deck surface:
 - 1) 6 x 6 IN square plate unless detailed otherwise by the design engineer.
 - 2) Predrilled to accept four (4) anchors.
 - b. For mounting to flange of metal structure:
 - 1) 3/8 x 3 x 8 IN plate.
 - 2) Predrilled to accept two (2) fasteners.
 7. Bracket for mounting to metal structural member:
 - a. Manufacturer's standard cast or extruded aluminum fitting as necessary to meet loading requirements.
 - b. Railing shall be secured by stainless steel socket-head set screws.
 - 1) Tek screws or sheet metal screws are not acceptable.
 8. Provide toeboards on walkway side of all elevated walkways, platforms and stair landings, and where indicated on the Drawings or required by OSHA Standards.
 - a. 4 IN high extruded toeboard with stiffener ribs and angled toe.
 - 1) Similar to Wagner, Model "IR94102."
 9. Guardrail gates:
 - a. Constructed of same material and sizes as the guardrail system.
 - b. Width of gate as shown on Drawings.
 - c. Hinges:
 - 1) Cast aluminum.
 - 2) Self-closing.
 - a) Stainless steel torsion spring.
 - 3) Similar to Wagner, Model "IR100."
 - d. Gate latch and stop:
 - 1) Cast aluminum.
 - 2) Spring-loaded pin latch.
 - a) Stainless steel spring.
 - e. Similar to Wagner, Model "IR101."
- C. Railing Fabrication:
1. All railings are to be mechanically fastened component system.
 2. Railing system shall be an engineered system designed specifically for use as guardrail system.
 - a. Fittings shall be internally connected, flush-fitting aluminum or stainless steel.
 - b. Fasteners shall be 302 series stainless steel Allen head set screws.
 - 1) Rivets, adhesive or headed screws are not acceptable.
 3. Fit exposed ends of guardrails and handrails with solid terminations.
 - a. Return ends of handrail to wall, but do not attach to wall.
 - b. Where guardrail terminates at a wall, provide a vertical post or end-loop 4 IN off the wall to center of vertical member.
 4. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly of units at project site.
- D. Finish: Mill Finish.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prior to installation, inspect and verify condition of substrate.
- B. Correct surface defects or conditions which may interfere with or prevent a satisfactory installation.
 - 1. Field welding aluminum is not permitted unless approved in writing by Engineer.

3.2 INSTALLATION

- A. Install handrails and guardrails to meet loading requirements of OSHA and the Building Code.
- B. Install products in accordance with manufacturer's instructions.
- C. Set work accurately in location, alignment and elevation; plumb, level and true.
 - 1. Measure from established lines and items which are to be built into concrete, masonry or similar construction.
- D. Align railings prior to securing in place to assure proper matching at butting and expansion joints and correct alignment throughout their length.
 - 1. Provide shims as required.
- E. Install weeps to drain water from hollow sections of railing at exterior and high humidity conditions.
 - 1. Drill 1/4 IN weep hole in railings closed at bottom:
 - a. 1 IN above walkway surface at bottom of posts set in concrete.
 - b. 1 IN above solid aluminum rod at posts having base plate.
 - c. At low point of intermediate rails.
 - 2. Do not drill weep holes:
 - a. In bottom of base plate.
- F. Install proper sized expansion joints based on temperature at time of installation and differential coefficient of expansion of materials in all railings as recommended by manufacturer.
 - 1. Joints to be designed to allow expansion and contraction of railing and still meet design loads required.
 - a. Top rail splices and expansion joints shall be located within 8 IN of post or other support.
 - b. Where railings span building expansion joints; provide a railing expansion joint in the span crossing the building expansion joint.
 - 2. Provide expansion joints in any continuous run exceeding 20 FT in length.
 - a. Space expansion joints at not more than 40 FT OC.
 - 3. Provide minimum 0.10 IN of expansion joint for each 20 FT length of top rail for each 25 DEGF differential between installation temperature and maximum design temperature.
 - a. Maximum expansion joint width at time of installation shall not exceed 3/8 IN.
 - 1) Provide additional expansion joints as required to limit expansion joint width.
 - 4. Provide slip-joint with internal sleeve.
 - a. Extend slip joint min 2 IN beyond joint at maximum design width.
 - b. Fasten internal sleeve securely to one side:
 - 1) Provide Allen-head set screw located in bottom of rail.
 - 2) Rivets or exposed screw heads are not acceptable.
 - 5. Lubricate expansion joint splice bar for smooth movement of railing sections.
- G. Attach handrails to walls or guardrail with brackets designed for condition:
 - 1. Provide brackets which provide a minimum 2-1/4 IN clearance between handrail and nearest obstruction.
 - a. Handrails shall not project more than 4-1/2 IN into required stairway width.
- H. Anchor railings to concrete with stainless steel post-installed anchors unless noted otherwise in the Contract Documents.

1. Where exposed, bolts shall extend minimum 1/2 IN and maximum 3/4 IN above the top nut.
 - a. If bolts are cut off to required height, threads must be dressed to allow nuts to be removed without damage to the bolt or the nut.
 - b. Bevel the top of the bolt after cutting to provide a smooth surface.
- I. Anchor railings to metal structure with stainless steel bolts, nuts and washers.
- J. Install toeboards to fit tight to the walking surface.
 1. Attach to railing vertical post with manufacturer's standard mounting clamp:
 - a. Adjustable.
 - b. Designed to engage in extruded slot on back of toeboard.
 2. Provide splice bars, corner splices and brackets:
 - a. Manufacturer's standard items as required for a complete installation.
 3. Notch toeboards at base plates or other obstructions.
 4. Bottom of toeboard shall not exceed 1/4 IN above walking surface.
- K. Coat aluminum in contact with dissimilar metal or concrete in accordance with Specification Section 09 96 00.
- L. Install guardrail gate plumb and level in location shown on Drawings.
 1. Center gate in opening.
 2. Top of gate to match top of guardrail.
 3. Fasten hinges to gate and jamb post:
 - a. Minimum three (3) stainless steel countersunk machine screws per leaf.
 - b. Drill and tap into railing and gate vertical posts.
 4. Provide not less than two (2) hinges per gate.
 5. Install gate latch and stop on strike side of opening.
 - a. Fasten to gate with stainless steel countersunk machine screws.
 - b. Drill and tap into gate vertical post.
 - c. Drill hole in railing vertical post to receive latch pin.
 6. Adjust to provide smooth operation:
 - a. Self-closing and self-latching.

END OF SECTION



DIVISION 06

WOOD, PLASTICS, AND COMPOSITES



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SECTION 06 82 00
FIBERGLASS REINFORCED PLASTIC FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Effluent Channel Cover.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 05 50 00 - Metal Fabrications.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American National Standards Institute (ANSI):
 - a. A14.3, Safety Requirements for Fixed Ladders and Workplace Surfaces Package.
 - 2. ASTM International (ASTM):
 - a. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 3. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.

1.3 DEFINITIONS

- A. Skid-Resistant:
 - 1. Manufacturer's standard integral, non-skid surface.
 - 2. Abrasive coated or non-skid tape is not acceptable.
- B. FRP: Fiberglass Reinforced Plastic.

1.4 SYSTEM DESCRIPTION

- A. All fiberglass reinforced plastic support systems shall be designed by a registered Professional Structural Engineer licensed in the State of Iowa.

1.5 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Shop Drawings:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturer's recommendations on reinforcing field cut openings.
 - 2. Fabrication and/or Layout Drawings.
 - a. Plan showing profile, location, section and details of each item including anchorage or support system(s).
 - b. Locations and type of expansion joints.
 - c. Materials of construction including shop applied coatings.
 - d. Listing of all accessory items being provided indicating material, finish, etc.
 - 3. Certifications:
 - a. Certification of Structural Engineer's qualifications.
 - b. Certification that all components and systems have been designed and fabricated to meet the loading requirements specified.

4. Manufacturer's full line of colors available for each component.
- C. Contract Closeout Information:
1. Operation and Maintenance Data:
 - a. See Specification Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
- D. Informational Submittals:
1. Complete design calculations of all supporting structure and fastening conditions.
 - a. Design calculations to be for information only.
 - b. Engineer will not review or take any action on submittal.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and handle each item to preclude damage.
- B. Store all items on Skids Above Ground.
1. Keep free of dirt and other foreign matter which will damage items or finish and protect from corrosion and UV exposure.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Effluent Channel Covers:
1. Enduro Composites (AXS-3 Cover System).
 2. Or approved equal.

2.2 MATERIALS

- A. Fiberglass Reinforced Plastic (FRP):
1. Vinyl ester with fiberglass reinforcing.
 - a. Type V.
 2. Fire retardant.
 - a. Flame spread: ASTM E84, 25 or less.
 3. Color: Coordinate with Owner.
- B. Fasteners, Clips, Saddles, and Miscellaneous Components:
1. Fiberglass.
 2. Stainless steel.
- C. Adhesive: Recommended by manufacturer.
- D. Skid-resistant Surfacing: Manufacturer's standard integral, non-skid surface.

2.3 FABRICATION

- A. General:
1. Contractor to verify field conditions and dimensions prior to fabrication.
 2. Preassemble items in shop to greatest extent possible.
 3. All components shall be treated with UV inhibitor.
 4. Drill or punch holes with smooth edges.
- B. Effluent Channel Cover:
1. Description of Work: Scope shall include materials for fiberglass reinforced plastic covers, which may include, but not limited to deck panels; structural supports, flashing, fasteners and anchors; gaskets and sealant located at the Secondary Effluent Channel.
 2. Design Criteria:
 - a. Design loads shall comply with local codes with combined loads determined by Allowable Stress Method.
 - 1) Dead + Live Load (LL) or Snow Load: Self Weight + 40 PSF LL.
 - 2) Wind Uplift Load: 60 PSF.

- 3) Concentrated Loads: 300 LBS.
 - b. Cover supplier shall manufacture and fabricate all FRP components in its own facility, which shall have current ISO 9001 certification and shall be located in the USA.
 - c. Cover manufacturer shall be solely responsible for the design and satisfactory performance of the cover system herein. No division of responsibility between manufacturer of FRP components and design is implied or allowed.
3. Design Limits
- a. Dead + Live Load (LL) or Snow Load: Deflection Limit = L/180; Factor of Safety = 2.0.
 - b. Wind Uplift less Dead Load: Deflection Limit = L/60; Factor of Safety = 1.88.
 - c. Concentrated Load: 300 LB load distributed over 2 FT-6 IN x 2 FT-6 IN area at mid-span of cover panel with deflection not to exceed 5/8 IN or L/180.
 - d. Each cover panel shall be removable vertically without having to remove adjacent panels or cutting of panels or cutting of components. Individual panel units shall weigh no more than 135 LBS. Panels shall be fastened to structural supports and locking channel utilizing bolts with a locked-in-place channel nut.
 - e. Slip resistance of decking panels shall have (min average) Dynamic Coefficient of Friction of 0.50 per ANSI A137.1/A326.3 Dynamic Coefficient of Friction Test.
 - f. Top of cover system shall be flat with change in vertical level of walking surfaces no greater than 1/4 IN.
4. Materials:
- a. All FRP structural components including decking panels and structural supports shall be manufactured by pultrusion process.
 - b. Color: Coordinate with Owner.
 - c. Glass fiber reinforcements shall be minimum of 50% of the material weight.
 - d. Materials shall be fire retardant with flame spread rating of 25 or less per ASTM E84 test.
 - e. Materials shall exhibit these physical minimum properties:
 - 1) Tensile Strength (ASTM D638): 30,000 PSI.
 - 2) Compressive Strength (ASTM D695): 30,000 PSI.
 - 3) Flexural Strength (ASTM D790): 30,000 PSI.
 - 4) Stiffness: 45,000,000 LB/IN².
 - f. Deck Panels:
 - 1) FRP deck panels shall have a minimum thickness of 3/16 IN.
 - 2) Resin type for FRP cover decking shall be vinyl ester.
 - 3) Cover panels, end-to-end joint flashing and side-joint locking channels shall have a non-skid surface with integral, multi-directional, slip-resistant walking surface.
 - 4) Structural framing shall be FRP with vinyl ester resin. Metal connections to FRP beams shall be 304SS or 316SS.
 - 5) Flashing and trim shall be FRP or 316SS.
 - 6) Hardware
 - a) Fasteners, anchors, hinges, and other accessories located on underside of cover shall be 316SS.
 - b) Perimeter flashing fasteners, concrete anchors, or other hardware not exposed to inside of cover shall be 304SS.
 - c) Fasteners to attach cover decking shall be 316SS and extend to no more than 1/4 IN above panels. Fasteners shall be removable and reusable.
 - 7) Gaskets shall be installed and sealants applied by contractor per Manufacturer's guidelines.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.

- B. Set work accurately in location, alignment and elevation, plumb, level, and true.
 - 1. Measure from established lines and levels.
 - 2. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry or similar construction.
 - 3. Tolerances:
 - a. Maximum variation from plumb in vertical line: 1/8 IN in 3 FT.
 - b. Maximum variation from level of horizontal line: 1/4 IN in 20 FT.
 - c. Maximum variation from plan location: 1/4 IN in 20 FT.
- C. File cut ends of all fiberglass to a 1/32 IN radius.
- D. Seal cut ends of all items with catalyzed resin as recommended by manufacturer.
 - 1. Provide same resin used in fabrication of item as a minimum.

3.2 FIELD QUALITY CONTROL

- A. Manufacturer shall provide qualified field supervisor to visit the jobsite after completion of work.
 - 1. Manufacturer shall provide the following Field Quality Control:
 - a. Inspect equipment covered by these Specification requirements.
 - b. Supervise adjustments and installation checks.
 - c. Perform operational checks.
 - d. Provide Owner with a written statement that manufacturer's equipment has been installed properly and is ready for operation by Owner's personnel.
 - e. Provide manufacturer's technical representative's time for on-site training of the Owner's personnel on operation and maintenance of covers in accordance with Specification Section 01 79 23 - Instruction of Operations and Maintenance Personnel.

END OF SECTION

SECTION 06 85 14
FLOCCULATION BAFFLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. A Flocculation Baffle is designed to improve the performance of the final clarifiers (FC) by:
 - a. Eliminating density currents and flow entrainment from settling zone of the settling tank into the inlet zone.
 - b. Distributing the flow evenly across the full width of the clarifier.
 - c. Creating a flocculation chamber at the front end of the tank.
 - d. Improving the flow patterns by providing good vertical flow distribution through deflection of incoming flow upward through its curved parts.
 - e. Reducing the energy of incoming flow through its perforated surface and eliminating the need for energy dissipating inlet.
 2. Flocculation Baffle Assemblies for Final Clarifier No. 1 through No. 12 (55-FC-CM-1 through 55-FC-CM-12).
- B. Related Sections include but are not necessarily limited to:
1. SUDAS Division 1.
 2. Division 01 - General Requirements.
 3. Section 01 04 00 - Special Provisions.
 4. Division 05 - Metals.
 5. Section 46 43 22 - Final Clarifier Solids Collection Equipment - Circular Tank Suction Header Type.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. ASTM International (ASTM):
 - a. D256, Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
 - b. D570, Standard Test Method for Water Absorption of Plastics.
 - c. D638, Standard Test Method for Tensile Properties of Plastics.
 - d. D790, Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 - e. D3039, Standard Test Method for Tensile Properties of Polymer Matrix Composite Materials.

1.3 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Shop Drawings:
1. Detailed Drawings showing equipment fabrication, dimensions, and method of attachment including number, locations and size of bolts.
 2. Hydraulic Analysis Report:
 - a. Hydraulic analysis confirming flocculation baffle design concept, and its surface curvature. It should also identify sizes and locations of proposed openings. The analysis should include computational fluid dynamic (CFD) analysis and desktop hydraulic analysis to demonstrate the effectiveness of the baffles in improving performance and determine hydrodynamic forces on the baffles and verify it will meet the intent of this specification.

3. The hydraulic analysis should also include capacity and performance analyses of the final clarifiers with and without any new flocculation baffles, under different loading and operating conditions. The capacity and performance analyses should clearly confirm the optimal sludge withdrawal rate to avoid blanket scouring at normal and peak flows. A clear comparison between performance expectations with and without the new baffles should be provided. The capacity analysis should determine the maximum flow that can be treated without exceeding the maximum allowable effluent suspended solids of 30 mg/L. The performance analysis will determine the effluent suspended solids concentration under different operating conditions. The following ranges of operating conditions should be used in developing the capacity and performance analysis. A minimum of three (3) values per range should be considered:
 - a. MLSS range: 3000 – 5000 mg/L.
 - b. Return activated sludge (RAS) rate range: 30 – 100%.
 - c. Sludge volume index (SVI) range: 60 – 150 mL/g.
 - d. Annual average flow rate: 56 MGD, RAS flow rate: 23 MGD and one secondary clarifier out of service.
 - e. Maximum month flow rate: 104 MGD, RAS flow rate: 42 MGD and one secondary clarifier out of service.
 4. Anchor sizing, details and complete structural design for the Flocculation Baffle, including supports, attachments, and all required features to provide a complete system. Structural design shall include verification that existing centerwell can accommodate the baffle loads.
 - a. Structural design of baffles to be sealed by an Engineer licensed in the State of Iowa.
 5. Manufacturer’s recommended baffle dimensions and installation details.
 6. Manufacturer’s recommended baffle dimensions, location for each application, and installation instructions.
 7. Acknowledgement that products submitted meet the requirement of standards referenced.
 8. Final field testing summary report.
- C. Quality Control Submittals:
1. Manufacturer’s statement of coordination with the clarifier sludge removal mechanism supplier.
 2. Manufacturer’s Certificate of Compliance.
 3. Shipping, storage, protection, and handling instructions.
 4. Manufacturer’s written/printed installation instructions.
 5. Five (5) projects referenced (at a minimum) to show successful performance of the proposed baffles within the last five (5) years.
 6. Certified test reports of the physical and mechanical properties of the product including:
 - a. Sample ASTM D3039 testing for proposed materials.
 - b. Additional tests as follows:

TEST	METHOD
Tensile Strength	ASTM D638
Flexural Strength	ASTM D790
Flexural Modulus	ASTM D790
Notched Izod	ASTM D256
Water Absorption	ASTM D570

1.4 WARRANTY

- A. Manufacturer shall provide a 5-year product warranty for the Flocculation Baffles to be free of defects in materials and workmanship.
- B. The Installer shall provide a 5-year installation warranty for the Flocculation Baffles to be free of defects related to installation such as defects in the fasteners (panel to clarifier) and clips (from panels to panel).

- C. Both product and installation warranties will begin after installation (date of substantial completion).

1.5 COORDINATION

- A. Contractor shall coordinate the Flocculation Baffles with the final clarifier equipment.
 - 1. Specification Section 46 43 22.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Flocculation Baffles shall be the products of one of the following suppliers:

- 1. Bafco Systems Inc.
2009 Mackenzie Way, Suite 100
Cranberry Township, PA 16066
Tel: 1-888-611-4426
Attn: Don Goodwin
Email: sales@bafco-systems.com
- 2. Creative Pultrusions Inc.
214 Industrial Lane
Alum Bank, PA 15521
Tel: 814.839.4186 x 266
Attn: Todd Kagarise
Email: tkagarise@pultrude.com
- 3. Midwestern Fabricators
1235 South Pioneer Rd.
Salt Lake City, Utah 84104
Tel: 801-708-7254
Attn: Jeff Bevan
Email: jeff@mwf-frp.com

- B. No like, equivalent, or "or-equal" item or substitution is permitted.

2.2 FLOCCULATION BAFFLES

- A. Flocculation Baffles to be attached to the flocculation center well.
- B. Flocculation baffles should not extend more than 4 FT below the flocculation center well.
- C. Baffle Openings:
 - 1. Minimum height: 4 IN.
 - 2. Maximum height: 16 IN.
- D. A method of interconnecting adjacent panels shall be provided such that the entire assembly forms a structure capable of supporting its own weight. The baffle should be designed to withstand drag force caused by water moving through its perforated structure.
- E. The dimensions for the Flocculation Baffle Assemblies shall be:
 - 1. Final Clarifier No. 1 through No. 12 (55-FC-CM-1 through 55-FC-CM-12):
 - a. Panel Width to be determined by FRP fabricator (minimum of 20 IN).
 - b. Panel Height to be determined by FRP fabricator (minimum 40 IN).
 - c. Spacing between panels not less than 1 IN.
 - d. Minimum clearance between bottom of the panels and top of the clarifier truss is 3 IN.

2.3 COMPONENTS

A. Flocculation Baffles:

1. Each baffle panel shall be molded of fiberglass-reinforced plastic. The resins and fiberglass reinforcing material shall be consistent with the environmental conditions and structural requirements.
2. Baffle panel material shall have the following properties:

TEST	METHOD	MINIMUM VALUE
Tensile Strength	ASTM D638	20,000 PSI
Flexural Strength	ASTM D790	30,000 PSI
Flexural Modulus	ASTM D790	1.4 x 10 ⁶ PSI
Notched Izod	ASTM D256	24 FT-LBS/IN
Water Absorption	ASTM D570	0.6%

3. The resin shall be an isophthalic polyester resin with corrosion-resistant properties:
 - a. 33-402 resin or equivalent.
 - b. Suitable for use in submerged waste treatment applications.
 - c. The resin shall not contain fillers except as required for viscosity control.
 - 1) For viscosity control, a thixotropic agent up to 5% by weight may be added to the resin.
 - d. The resin shall be treated to provide UV suppression.
4. Glass reinforcement:
 - a. Chemically bonded surfacing mat and chopped strand roving.
 - b. 357-211 PLN CTC chopped strand roving or equivalent.
 - c. The glass content of the finished laminate shall not be less than 30% by weight.
 - d. The nominal thickness of each baffle panel shall be 1/2 ± 1/16 IN thick (minimum) with resin rich surfaces and edges to prevent migration of moisture and fiber “blooming.”
5. All surfaces of the panels shall be molded smooth and no glass fibers shall be exposed. Laminations shall be dense and free of voids, dry spots, cracks, or crazes. All factory-trimmed edges shall be “hot coated” with resin to prevent wicking.
6. All panels shall be painted with UV resistant paint.
7. All hooks, attachment clips or fasteners shall be 316 stainless steel.

B. Flocculation Baffle Anchorage and Support Beam:

1. 316 stainless steel hardware shall be used at the connection of the panels to the flocculation center well.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Field verify existing dimensions and install the baffle in accordance with the Contract Drawings, approved Shop Drawings, and manufacturer’s recommendations.
- B. Field cutting of baffle panels will be allowed to complete the structure and accommodate in-tank obstructions per the manufacturer’s recommendations.
- C. All field cut or drilled edges shall be coated per the manufacturer’s recommendations to prevent fiber blooming or fraying.

- D. All of the hooks, clips or fasteners required for installation shall be supplied by the baffle manufacturer.
- E. All hardware used shall be 316 stainless steel.

END OF SECTION

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DIVISION 07

THERMAL AND MOISTURE PROTECTION



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SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Sealing all joints which will permit penetration of dust, air or moisture.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Concrete Institute (ACI):
 - a. 302.1R, Guide for Concrete Floor and Slab Construction.
 - 2. ASTM International (ASTM):
 - a. C920, Standard Specification for Elastomeric Joint Sealants.
 - b. C1521, Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.
 - 3. Underwriters Laboratories, Inc. (UL).
- B. Qualifications: Sealant applicator shall have minimum five years of experience using products specified on projects with similar scope.
- C. Mock-Ups:
 - 1. Before sealant work is started, a mock-up of each type of joint shall be sealed where directed by the Engineer.
 - a. The approved mock-ups shall show the workmanship, bond, and color of sealant materials as specified or selected for the work and shall be the minimum standard of quality on the entire project.
 - b. Each sample shall cure for a minimum of seven days at which time the sealant manufacturer's authorized factory representative shall perform adhesion tests on each sample joint.
 - 1) Perform adhesion tests per ASTM C1521.
 - 2) If mock-up is not acceptable or if adhesion test fails, provide additional mock-up and adhesion testing as required until acceptable to Engineer.

1.3 DEFINITIONS

- A. Corrosive Areas Include: For the purposes of this Section, the entire project site is considered to be corrosive.
- B. Defect(ive): Failure of watertightness or airtightness.
- C. Finish sealant: Sealant material per this specification applied over face of compressible sealant or expanding foam sealant specified, to provide a finished, colored sealant joint.
- D. Installer or Applicator:
 - 1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 2. Installer and applicator are synonymous.
- E. "Seal," "sealing" and "sealant": Joint sealant work.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Manufacturer's recommendations for joint cleaner, primer, backer rod, tooling and bond breaker.
 - 3. Certification from sealant manufacturer stating product being used is recommended for and is best suited for joint in which it is being applied.
 - 4. Certification of applicator qualification.
- B. Test Results:
 - 1. Provide adhesion test results for each sealant sample including adhesion results compared to adhesion requirements.
 - 2. Manufacturer's authorized factory representative recommended remedial measures for all failing tests.
- C. Samples:
 - 1. Cured sample of each color for Engineer's color selection.
 - 2. Color chart not acceptable.
- D. Informational Submittals:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver material in manufacturer's original unopened containers with labels intact: Labels shall indicate contents and expiration date on material.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Compressible sealant:
 - a. Schul International Company, LLC.
 - b. Emseal by Sika.
 - c. Norton.
 - d. Sandell Moisture Protection Systems.
 - 2. Expanding foam sealant:
 - a. M-D Building Products, Inc.
 - b. DAP Products, Inc.
 - c. FAI International, Inc.
 - d. Power Fasteners.
 - 3. Polyether sealants:
 - a. BASF Corporation.
 - b. Chem Link.
 - c. Tremco Commercial Sealants & Waterproofing.
 - 4. Polysulfide rubber sealant:
 - a. Pecora Corporation.
 - b. BASF Corporation.
 - c. PolySpec by ITW Polymers Sealants.
 - 5. Polyurethane sealants:
 - a. Pecora Corporation.

- b. Sika.
- c. BASF Corporation.
- d. Tremco Commercial Sealants & Waterproofing.
- 6. Backer rod, compressible filler, primer, joint cleaners, bond breaker:
 - a. As recommended by sealant manufacturer.

B. Submit request for substitution in accordance with Specification Section 01 25 00.

2.2 MATERIALS

A. Sealants - General:

- 1. Provide colors matching materials being sealed.
- 2. Where compound is not exposed to view in finished work, provide manufacturer's color which has best performance.
- 3. Non-sagging sealant for vertical and overhead horizontal joints.
- 4. Sealants for horizontal joints: Self-leveling pedestrian/traffic grade.
- 5. Joint cleaner, primer, bond breaker: As recommended by sealant manufacturer.
- 6. Sealant backer rod and/or compressible filler:
 - a. Closed cell polyethylene, polyethylene jacketed polyurethane foam, or other flexible, nonabsorbent, non-bituminous material recommended by sealant manufacturer to:
 - 1) Control joint depth.
 - 2) Break bond of sealant at bottom of joint.
 - 3) Provide proper shape of sealant bead.
 - 4) Serve as expansion joint filler.

B. Expanding Foam Sealant:

- 1. One or two component fire rated moisture cured expanding urethane.
- 2. Shall not contain formaldehyde.
- 3. Density: Minimum 1.5 PCF.
- 4. Closed cell content: Minimum 70%.
- 5. R-value: Minimum 5.0/IN.
- 6. Flame spread: Less than 25.
- 7. Smoke developed: Less than 25.

C. Polyether Sealant:

- 1. Silyl-terminated polyether polymer.
- 2. ASTM C920, Type S, Grade NS, Class 50, Use NT, M, A, and O.
 - a. BASF MasterSeal 150.
 - b. Chem Link DuraLink.
 - c. Tremco Dymonic FC.

D. Polysulfide Rubber Sealant:

- 1. One or two components.
- 2. Meet ASTM C920.
 - a. Pecora Synthacalk GC2+.
 - b. PolySpec THIOKOL 2235.

E. Polyurethane Sealant:

- 1. One or two components.
- 2. Paintable.
- 3. Meet ASTM C920 Type S or Type M, Grade NS or P, Class 25, Use NT, T, M, A and O.
 - a. Pecora Dynatrol-IXL, Dynatrol II, Urexpan NR-200, NR-201.
 - b. Sika Chemical Corporation Sikaflex-1a, Sikaflex-2C NS/SL.
 - c. BASF MasterSeal NP-1, NP-II, SL-1 SL-2.
 - d. Tremco Dymonic or Dymeric, Vulkem 116,227,45,245.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before use of any sealant, investigate its compatibility with joint surfaces, fillers and other materials in joint system.
- B. Use only compatible materials.
- C. Where required by manufacturer, prime joint surfaces.
 - 1. Limit application to surfaces to receive sealant.
 - 2. Mask off adjacent surfaces.
- D. Provide joint depth for joints receiving polyurea joint filler in accordance with manufacturer's recommendations.

3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions and UL requirements.
- B. Clean all joints.
- C. Make all joints water and airtight.
- D. At changes in direction of joints, joint intersections and where sealant joints interface with other construction, install continuous sealant as necessary to ensure a weather-tight seal.
- E. Make depth of sealing compounds, except expanding foam and polyurea sealant, not more than one-half width of joint, but in no case less than 1/4 IN nor more than 1/2 IN unless recommended otherwise by the manufacturer.
- F. Provide correctly sized backer rod, compressible filler or compressible sealant in all joints to depth recommended by manufacturer:
 - 1. Take care to not puncture backer rod and compressible filler.
 - 2. Provide joint backer rod as recommended by the manufacturer for polyurea joint filler.
- G. Apply bond breaker where required.
- H. Tool sealants using sufficient pressure to fill all voids.
- I. Upon completion, leave sealant with smooth, even, neat finish.
- J. Where piping, conduit, ductwork, etc., penetrate wall, seal each side of wall opening.
- K. Install compressible sealant to position at indicated depth.
 - 1. Size so that width of material is twice joint width.
 - 2. Take care to avoid contamination of sides of joint.
 - 3. Protect side walls of joint (to depth of finish sealant).
 - 4. Install with adhesive faces in contact with joint sides.
 - 5. Install finish sealant where indicated.
- L. Install expanding foam sealant to minimum 4 IN depth or thickness of wall being penetrated if less than 4 IN or as indicated on Drawings.
 - 1. Provide adequate backing material as necessary.
 - 2. Hold material back from exposed face of wall as necessary to allow for installation of backer rod and finish sealant.
 - a. Allow expanding foam sealant to completely cure prior to installing backer rod and finish sealant.
 - 3. Trim off excess material flush with surface of the wall if not providing finished sealant.

3.3 SEALANT WORK

- A. General:
 - 1. Work includes but is not limited to: Sealing all joints which will permit penetration of dust, air, or moisture.

- 2. Refer to SCHEDULE for materials to be used.
- B. Concrete Joints:
 - 1. Flooring joints.
 - 2. Isolation joints.
 - 3. Joints between paving or sidewalks and building.
 - 4. Construction, control and expansion joints.
- C. Masonry:
 - 1. Masonry control joints.
 - 2. Brick expansion joints.
 - 3. Between masonry and other materials.
- D. Penetrations of walls, floors and decks.
- E. Other joints where sealant, expanding foam sealant or compressible sealant is indicated.

3.4 FIELD QUALITY CONTROL

- A. Adhesion Testing:
 - 1. Perform adhesion tests in accordance with ASTM C1521 per the following criteria:
 - a. Water bearing structures: One test per every 1000 LF of joint sealed.
 - b. Exterior precast concrete wall panels: One test per every 2000 LF of joint sealed.
 - c. Chemical containment areas: One test per every 1000 LF of joint sealed.
 - d. Building expansion joints: One test per every 500 LF of joint sealed.
 - e. All other type of joints except butt glazing joints: One test per every 3000 LF of joint sealed.
 - f. Manufacturer's authorized factory representative shall recommend, in writing, remedial measures for all failing tests.

3.5 SCHEDULE

- A. Furnish sealant as indicated for the following areas:
 - 1. Exterior areas:
 - a. Above grade: Polyether.
 - b. Below grade: Polyurethane.
 - 2. Immersion:
 - a. Prolonged contact with or immersion in:
 - 1) Non-potable water, wastewater or sewage: Polysulfide.
 - 3. Exterior wall penetrations: Expanding urethane foam, with finish sealant.
 - a. Finish sealant:
 - 1) Exterior side:
 - a) Above grade: Polyether.
 - b) Below grade: Polyurethane.
 - 2) Interior side:
 - a) Corrosive area:
 - (1) Wet exposure: Polysulfide.
 - (2) Dry exposure: Polyurethane.

END OF SECTION

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DIVISION 10

SPECIALTIES



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SECTION 10 14 00
IDENTIFICATION DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Tag, tape, and stenciling systems for equipment, piping, valves, pumps, ductwork and similar items.
 - 2. Hazard and safety signs.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Society of Mechanical Engineers (ASME):
 - a. A13.1, Scheme for the Identification of Piping Systems.
 - 2. The International Society of Automation (ISA).
 - 3. National Electrical Manufacturers Association/American National Standards Institute (NEMA/ANSI):
 - a. Z535.1, Safety Color Code.
 - b. Z535.2, Environmental and Facility Safety Signs.
 - c. Z535.3, Criteria for Safety Symbols.
 - d. Z535.4, Product Safety Signs and Labels.
 - 4. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - b. 704, Standard System for the Identification of Hazards of Materials for Emergency Response.
 - 5. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR 1910.145, Specification for Accident Prevention Signs and Tags.

1.3 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Shop Drawings:
 - 1. Product technical data including:
 - a. Catalog information for all identification systems.
 - b. Acknowledgement that products submitted meet requirements of standards referenced.
 - 2. Identification register, listing all items in PART 3 of this Specification Section to be identified, type of identification system to be used, lettering, location, and color.
 - 3. Schedule of Hazard and Safety Signage indicating text and graphics.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. W.H. Brady Co.
 - 2. Panduit.

3. Seton.
4. National Band and Tag Co.
5. Carlton Industries, Inc.
6. Or approved equal.

B. Submit request for substitution in accordance with Specification Section 01 25 00.

2.2 MANUFACTURED UNITS

A. Type A2 - Rectangle Metal Tags:

1. Materials: Stainless steel.
2. Size:
 - a. 3-1/2 IN x 1-1/2 IN minimum.
 - b. Thickness: 0.036 IN (20 GA) minimum.
3. Fabrication:
 - a. 3/16 IN minimum mounting hole.
 - b. Legend: Stamped and filled with black coloring.
4. Color: Natural.

B. Type A3 - Metal Tape Tags:

1. Materials: Aluminum or stainless steel.
2. Size:
 - a. Width 1/2 IN minimum.
 - b. Length as required by text.
3. Fabrication:
 - a. 3/16 IN minimum mounting hole.
 - b. Legend: Embossed.
4. Color: Natural.

C. Type B1- Square Nonmetallic Tags:

1. Materials: Fiberglass reinforced plastic.
2. Size:
 - a. Surface: 2 x 2 IN minimum.
 - b. Thickness: 100 MILS.
3. Fabrication:
 - a. 3/16 IN mounting hole with metal eyelet.
 - b. Legend: Preprinted and permanently embedded and fade resistant.
4. Color:
 - a. Background: Manufacturer standard or as specified.
 - b. Lettering: Black.

D. Type B2 - Nonmetallic Signs:

1. Materials: Fiberglass reinforced or durable plastic.
2. Size:
 - a. Surface: As required by text.
 - b. Thickness: 60 MILS minimum.
3. Fabrication:
 - a. Rounded corners.
 - b. Drilled holes in corners with grommets.
 - c. Legend: Preprinted, permanently embedded and fade resistant for a 10 year minimum outdoor durability.
4. Color:
 - a. Background: Black.
 - b. Lettering: White.
5. Standards for OSHA signs: NEMA/ANSI Z535.1, NEMA/ANSI Z535.2, NEMA/ANSI Z535.3, NEMA/ANSI Z535.4, OSHA 29 CFR 1910.145.

E. Type C - Laminated Name Plates:

1. Materials: Phenolic or DR (high impact) acrylic.

2. Size:
 - a. Surface: As required by text.
 - b. Thickness: 1/16 IN.
 3. Fabrication:
 - a. Outdoor rated and UV resistant when installed outdoors.
 - b. Two layers laminated.
 - c. Legend: Engraved through top lamination into bottom lamination.
 - d. Two drilled side holes, for screw mounting.
 4. Color: Black top surface, white core, unless otherwise indicated.
- F. Type D - Self-Adhesive Tape Tags and Signs:
1. Materials: Vinyl tape or vinyl cloth.
 2. Size:
 - a. Surface: As required by text.
 - b. Thickness: 5 MILS minimum.
 3. Fabrication:
 - a. Indoor/Outdoor grade.
 - b. Weather and UV resistant inks.
 - c. Permanent adhesive.
 - d. Legend: Preprinted.
 - e. Wire markers to be self-laminating.
 4. Provide arrow marker labels that wraps around entire pipe on each end of label with arrow markers pointing in flow direction.
 - a. If flow is in both directions, use double headed arrow markers on each end of label.
 5. All colors: Coordinate background and text/arrow colors with Owner and Engineer.
 6. Standards for OSHA signs: NEMA/ANSI Z535.1, NEMA/ANSI Z535.2, NEMA/ANSI Z535.3, NEMA/ANSI Z535.4, OSHA 29 CFR 1910.145.
- G. Type E - Heat Shrinkable Tape Tags:
1. Materials: Polyolefin.
 2. Size: As required by text.
 3. Fabrication:
 - a. Legend: Preprinted.
 4. Color: White background, black printing.
- H. Type F - Underground Warning Tape:
1. Materials: Polyethylene.
 2. Size:
 - a. 6 IN wide (minimum).
 - b. Thickness: 3.5 MILS.
 3. Fabrication:
 - a. Legend: Preprinted and permanently imbedded.
 - b. Message continuous printed.
 - c. Tensile strength: 1750 PSI.
 4. Color: As specified.
- I. Type G - Stenciling System:
1. Materials:
 - a. Exterior type stenciling enamel.
 - b. Either brushing grade or pressurized spray can form and grade.
 2. Size: As required.
 3. Fabrication:
 - a. Legend: As required.
 4. Color: Black or white for best contrast.

- J. Underground Tracer Wire:
 - 1. Materials:
 - a. Wire:
 - 1) 12 GA AWG.
 - 2) Solid.
 - b. Wire nuts: Waterproof type.
 - c. Split bolts: Brass.

2.3 ACCESSORIES

- A. Fasteners:
 - 1. Bead chain: Stainless steel.
 - 2. Plastic strap: Nylon, urethane or polypropylene.
 - 3. Screws: Self-tapping, stainless steel.
 - 4. Adhesive, solvent activated.

2.4 MAINTENANCE MATERIALS

- A. Where stenciled markers are provided, clean and retain stencils after completion and include in extra stock, along with required stock of paints and applicators.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

- A. Install identification devices at specified locations.
- B. All identification devices to be printed by mechanical process, hand printing is not acceptable.
- C. Attach tags to equipment with sufficient surface or body area with solvent activated adhesive applied to back of each tag.
- D. Attach tags with 1/8 IN round or flat head screws to equipment without sufficient surface or body area, or porous surfaces.
 - 1. Where attachment with screws should not or cannot penetrate substrate, attach with plastic strap.
- E. Single items of equipment enclosed in a housing or compartment to be tagged on outside of housing.
 - 1. Several items of equipment mounted in housing to be individually tagged inside the compartment.
- F. Tracer Wire:
 - 1. Attach to pipe at a maximum of 10 FT intervals with tape or tie-wraps.
 - 2. Continuous pass from each valve box and above grade at each structure.
 - 3. Coil enough wire at each valve box to extend wire a foot above the ground surface.
 - 4. 1,000 FT maximum spacing between valve boxes.
 - 5. If split bolts are used for splicing, wrap with electrical tape.
 - 6. If wire nuts are used for splicing, knot wire at each splice point leaving 6 IN of wire for splicing.
 - 7. Use continuous strand of wire between valve box where possible.
 - a. Continuous length shall be no shorter than 100 FT.

3.2 SCHEDULES

- A. Hazard and Safety Signage:
 - 1. Permit Required Confined Space signage:
 - a. Tag Type: Type B2 - Nonmetallic Signs.
 - b. Fastener: Screw or adhesive.
 - c. Size: 10 IN x 14 IN.

- d. Location: Field located as directed by Engineer and Owner.
 - 1) Allowance: Provide 10 signs.
 - e. Legend:
 - 1) OSHA Danger sign.
 - 2) Description of hazard: "PERMIT REQUIRED CONFINED SPACE DO NOT ENTER".
2. Miscellaneous OSHA hazard signage:
- a. Tag Type: Type B2 - Nonmetallic Signs.
 - b. Fastener: Screw or adhesive.
 - c. Size: 10 IN x 14 IN.
 - d. Location: Field located as directed by Engineer and Owner.
 - 1) Allowance: Provide 10 OSHA Danger, Caution, Safety Instruction, or Biohazard signs as directed by Engineer and Owner.
 - e. Legend:
 - 1) Description of hazard shall be determined by Engineer and Owner.
 - 2) Provide international graphic symbology where indicated.
3. Hazardous Material Identification Signage:
- a. Tag Type: Type B2 - Nonmetallic Signs.
 - b. Fastener: Screw or adhesive.
 - c. Size (NFPA Diamond): Per NFPA 704, 10 IN minimum.
 - d. Size (Hazardous Material name, with concentration % where applicable): 2 IN minimum letters, directly below corresponding NFPA Diamond.
 - e. Location: On the doors entering into the rooms with Hazardous Material and on the tanks or storage containers of Hazardous Materials, as indicated on the Drawings.
 - f. Location: Field located as directed by Engineer and Owner.
 - 1) Allowance: Provide five NFPA 704 Diamond signs.
 - 2) Allowance: Provide five for Hazardous Material Name.
 - g. Legend:
 - 1) NFPA 704 Diamond hazard numbers: As directed by Engineer and Owner appropriate for the Hazardous Material.
 - 2) Hazardous Material name: As directed by Engineer and Owner.
- B. Process Systems:
1. General:
- a. Provide arrows and markers on piping.
 - 1) At 20 FT maximum centers along continuous lines.
 - 2) At changes in direction (route) or obstructions.
 - 3) At valves, risers, "T" joints, machinery or equipment.
 - 4) Where pipes pass through floors, walls, ceilings, cladding assemblies and like obstructions provide markers on both sides.
 - b. Position markers on both sides of pipe with arrow markers pointing in flow direction.
 - 1) If flow is in both directions use double headed arrow markers.
 - c. Apply tapes and stenciling in uniform manner parallel to piping.
2. Trenches with piping:
- a. Tag type: Type F - Underground Warning Tape.
 - b. Location: Halfway between top of piping and finished grade.
 - c. Letter height: 1-1/4 IN minimum.
 - d. Natural gas or digester gas:
 - 1) Color: Yellow with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION."
 - b) Second line: "BURIED GAS LINE BELOW."
 - e. Potable water:
 - 1) Color: Blue with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION."

- b) Second line: "BURIED WATER LINE BELOW."
 - f. Storm and sanitary sewer lines:
 - 1) Color: Green with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION."
 - b) Second line: "BURIED SEWER LINE BELOW."
 - g. (Non-potable) water piping, except 3 IN and smaller irrigation pipe:
 - 1) Color: Green with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION."
 - b) Second line: "BURIED NONPOTABLE WATER LINE BELOW."
 - h. Chemical feed piping (e.g., chlorine solution, polymer solution, caustic solution, etc.):
 - 1) Color: Yellow with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION."
 - b) Second line: "BURIED CHEMICAL LINE BELOW"
 - i. Other piping (e.g., compressed air, irrigation, refrigerant, heating water, etc.):
 - 1) Color: Yellow with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION."
 - b) Second line: "BURIED PIPE LINE BELOW"
- 3. Yard valves, buried, with valve box and concrete pad:
 - a. Tag type: Type A2 - Rectangle Metal Tags.
 - b. Fastener: 3/16 IN x 7/8 IN plastic screw anchor with 1 IN #6 stainless steel pan head screw.
 - c. Legend:
 - 1) Letter height: 1/4 IN minimum.
 - 2) Valve designation as indicated on the Drawings (e.g., "V-xxx").
- 4. Valves and slide gates:
 - a. Tag type:
 - a) All locations: Type A2
 - b. Fastener:
 - 1) Stainless steel chain.
 - c. Color: Coordinate with Owner and Engineer.
 - d. Legend:
 - 1) Letter height: 3/8 IN minimum.
 - 2) Valve designation as indicated on the Drawings (e.g., "V-xxx").
- 5. Process equipment (e.g., pumps, pump motors, blowers, air compressors, bar screens, clarifier drive mechanism, launder drain valves, etc.):
 - a. Tag type:
 - 1) Type B2 - Nonmetallic Signs.
 - b. Fastener:
 - 1) Screws.
 - c. Legend:
 - 1) Letter height: 1/2 IN minimum.
 - 2) Equipment full name and abbreviation as indicated on the Drawings (e.g., "Primary Sludge Pump P-xxx"). Coordinate with Owner and Engineer.
- 6. Piping systems:
 - a. All pipe systems shall be labeled.
 - b. Tag type:
 - 1) Outdoor location: Type G - Stenciling System.
 - 2) Indoor locations: Type D - Self-Adhesive Tape Tags and Signs.
 - c. Fastener: Self.
 - d. Color: Coordinate with Owner and Engineer.

- e. Legend:
 - 1) Letter height: Manufacturers standard for the pipe diameter.
 - 2) Use piping system name and abbreviation designation as coordinated with Owner (e.g., POTABLE WATER – W1).
 - a) Coordinate all labels with Owner prior to installing labels.
- 7. Process tanks (over 1000 GAL) and basins, (e.g., chemical storage, clarifiers, trickling filters, digesters, etc.):
 - a. Tag type:
 - 1) Type B2 - Nonmetallic Signs.
 - 2) Type G - Stenciling System.
 - b. Fastener:
 - 1) Screw.
 - 2) Self.
 - c. Location as directed by Owner.
 - d. Legend:
 - 1) Letter height: 4 IN minimum.
 - 2) Equipment designation as indicated on the Drawings (e.g., “Clarifier CL-xxx”).
- 8. Tanks (less than 1000 GAL) (e.g., break tanks, chemical tanks, hydro-pneumatic tanks, air receivers, etc.):
 - a. Tag type:
 - 1) Type D - Self-Adhesive Tape Tags and Signs.
 - 2) Type G - Stenciling System.
 - b. Fastener: Self.
 - c. Legend:
 - 1) Letter height: 2 IN minimum.
 - 2) Equipment designation as indicated on the Drawings (e.g., “Polymer Storage Tank Txxx”)
- 9. Equipment that starts automatically:
 - a. Tag type:
 - 1) Type B2 - Nonmetallic Signs.
 - b. Fastener:
 - 1) Type B2 - Screw or adhesive.
 - c. Size: Minimum 5 IN x 7 IN.
 - d. Location: Equipment name.
 - e. Legend:
 - 1) OSHA Warning Sign.
 - 2) Description of Warning: “THIS MACHINE STARTS AUTOMATICALLY”.

C. Instrumentation Systems:

- 1. Instrumentation Equipment (e.g., flow control valves, primary elements, etc.):
 - a. Tag type:
 - 1) Outdoor locations: Type B1 - Square Nonmetallic Tags.
 - 2) Indoor noncorrosive:
 - a) Type A2 - Rectangle Metal Tags.
 - b) Type B1 - Square Nonmetallic Tags.
 - 3) Indoor corrosive:
 - a) Stainless steel Type A2 - Rectangle Metal Tags.
 - b) Type B1 - Square Nonmetallic Tags.
 - b. Fastener:
 - 1) Stainless steel chain.
 - c. Legend:
 - 1) Letter height: 1/4 IN minimum.
 - 2) Equipment full name and abbreviation as indicated on the Drawings (e.g., “Flow Indicating Transmitter FIT-xxx”). Coordinate with Owner and Engineer.
- 2. Enclosure for instrumentation and control equipment, (e.g., PLC control panels, etc.):
 - a. Tag type: Type C - Phenolic Name Plates.

- b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/2 IN minimum.
 - 2) Equipment name (e.g., "PLC CONTROL PANEL PCP-xxx").
 - 3. Components inside equipment enclosure, (e.g., PLC's, control relays, contactors, and timers):
 - a. Tag type: Type D - Self-Adhesive Tape Tags.
 - b. Fastener: Self.
 - c. Legend:
 - 1) Letter height: 3/16 IN minimum.
 - 2) Description or function of component (e.g., "PLC-xxx" or "CR-xxx").
 - 4. Through enclosure door mounted components (e.g., selector switches, controller digital displays, etc.):
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/4 IN minimum.
 - 2) Component ISA tag number as indicated on the Drawings (e.g., "HS-xxx").
- D. HVAC Systems:
- 1. General:
 - a. Provide arrows and markers on ducts.
 - 1) At 20 FT maximum centers along continuous lines.
 - 2) At changes in direction (route) or obstructions.
 - 3) At dampers, risers, branches, machinery or equipment.
 - 4) Where ducts pass through floors, walls, ceilings, cladding assemblies and like obstructions provide markers on both sides.
 - b. Position markers on both sides of duct with arrow markers pointing in flow direction.
 - 1) If flow is in both directions use double headed arrow markers.
 - c. Apply tapes and stenciling in uniform manner parallel to ducts.
 - 2. HVAC Equipment (e.g., unit heaters, exhaust fans, air handlers, etc.):
 - a. Tag type:
 - 1) Type B2 - Nonmetallic Signs.
 - 2) Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1 IN minimum.
 - 2) Equipment full name and abbreviation as indicated on the Drawings (e.g., "Exhaust Fan EF-xxx"). Coordinate with Owner and Engineer.
 - 3. Ductwork:
 - a. Tag type:
 - 1) Type D - Self-Adhesive Tape Tags and Signs.
 - b. Fastener: Self.
 - c. Legend:
 - 1) Letter height: 1 IN minimum.
 - 2) Coordinate description of ductwork with Owner and Engineer.
 - 3) Arrows: Single arrow.
 - 4. Enclosure for instrumentation and control equipment, (e.g., fan control panels, etc.):
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/2 IN minimum.
 - 2) Equipment full name and abbreviation as indicated on the Drawings (e.g., "FAN CONTROL PANEL FCP-xxx"). Coordinate with Owner and Engineer.
 - 5. Wall mounted thermostats:
 - a. Tag type: Type C - Phenolic Name Plates .

- b. Fastener: Self.
 - c. Legend:
 - 1) Letter height: 3/8 IN minimum.
 - 2) Equipment full name and abbreviation as indicated on the Drawings (e.g., "UH-xxx" or AHU-xxx"). Coordinate with Owner and Engineer.
6. Components inside equipment enclosure, (e.g., controller's, control relays, contactors, and timers):
- a. Tag type: Type D - Self-Adhesive Tape Tags and Signs.
 - b. Fastener: Self.
 - c. Legend:
 - 1) Letter height: 3/16 IN minimum.
 - 2) Description or function of component (e.g., "CR-xxx").
7. Through enclosure door mounted equipment (e.g., selector switches, controller digital displays, etc.):
- a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/4 IN minimum.
 - 2) Component tag number as indicated on the Drawings (e.g., "HS-xxx"). Coordinate with Owner and Engineer.
- E. Electrical Systems:
1. Trenches with ductbanks, direct-buried conduit, or direct-buried wire and cable.
- a. Tag type: Type F - Underground Warning Tape.
 - b. Letter height: 1-1/4 IN minimum.
 - c. Location:
 - 1) Where trench is 12 IN or more below finished grade: In trench 6 IN below finished grade.
 - 2) Where trench is less than 12 IN below finished grade: In trench 3 IN below finished grade.
 - d. Electrical power (e.g., low and medium voltage):
 - 1) Color: Red with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION".
 - b) Second line: "BURIED ELECTRIC LINE BELOW".
 - e. Communications (e.g., telephone, instrumentation, LAN, SCADA):
 - 1) Color: Orange with black letters.
 - 2) Legend:
 - a) First line: "CAUTION CAUTION CAUTION".
 - b) Second line: "BURIED COMMUNICATION LINE BELOW".
2. Switchgear, switchboards and motor control centers:
- a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Main equipment legend:
 - 1) Letter height:
 - a) First line: 1 IN minimum.
 - b) Subsequent lines: 3/8 IN minimum.
 - 2) First line: Equipment name (e.g., "MAIN SWITCHBOARD MSBxxx").
 - 3) Second line:
 - a) Source of power (e.g., "FED FROM MCCxxx LOCATED IN ROOM xxx").
 - b) Include the building name or number if the source is in another building.
 - 4) Third line: System voltage and phase (e.g., "480/277 V, 3PH").
 - 5) Fourth line: Date installed (e.g., "INSTALLED JULY 20xx").
 - d. Main and feeder device legend:
 - 1) Letter height: 3/8 IN minimum.

- 2) Description of load (e.g., "MAIN DISCONNECT", "PUMP P_{xxx}" or "PANELBOARD HP_{xxx}").
3. Panelboards and transformers:
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height:
 - a) First line: 3/8 IN minimum.
 - b) Subsequent lines: 3/16 IN minimum.
 - 2) First line: Equipment name (e.g., "PANELBOARD LP_{xxx}" or "TRANSFORMER T_{xxx}").
 - 3) Second line (panelboards only): System voltage and phase (e.g., "208/120V, 3PH").
 - 4) Third line:
 - a) Source of power (e.g., "FED FROM MCC_{xxx} LOCATED IN ROOM _{xxx}").
 - b) Include the building name or number if the source is in another building.
 - 5) Fourth line: Date installed (e.g., "INSTALLED JULY 20_{xx}").
4. Transfer switches:
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height:
 - a) First line: 3/8 IN minimum.
 - b) Subsequent lines: 3/16 IN minimum.
 - 2) First line: Equipment name (e.g., "AUTOMATIC TRANSFER SWITCH ATS_{xxx}").
 - 3) Second line: Normal source of power (e.g., "NORMAL SOURCE FED FROM MCC_{xxx}").
 - 4) Third line: Emergency source of power (e.g., "EMERGENCY SOURCE FED FROM SGEN_{xxx}").
 - 5) Fourth line: Date installed (e.g., "INSTALLED JULY 20_{xx}").
5. Safety switches, separately mounted circuit breakers and motor starters, VFD's, etc.:
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 3/8 IN minimum.
 - 2) First line: Description of load equipment is connected to (e.g., "PUMP P_{xxx}").
 - 3) Second line:
 - a) Source of power (e.g., "FED FROM MCC_{xxx} LOCATED IN ROOM _{xxx}").
 - b) The source of power room number is only required when there are multiple electrical rooms, if the source is in another building, the building name or number shall be used.
6. Enclosure for instrumentation and control equipment, (e.g., lighting control panels, etc.):
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/2 IN minimum.
 - 2) Equipment name (e.g., "LIGHTING CONTROL PANEL LCP_{xxx}").
7. Components inside equipment enclosures (e.g., circuit breakers, fuses, control power transformers, control relays, contactors, timers, etc.):
 - a. Tag type: Type D - Self-Adhesive Tape Tags and Signs.
 - b. Fastener: Self.
 - c. Legend:
 - 1) Letter height: 3/16 IN minimum.
 - 2) Description or function of component (e.g., "M-_{xxx}", "CR-_{xxx}" or "TR-_{xxx}").

8. Through enclosure door mounted equipment (e.g., selector switches, controller digital displays, etc.):
 - a. Tag type: Type C - Phenolic Name Plates.
 - b. Fastener: Screws.
 - c. Legend:
 - 1) Letter height: 1/4 IN minimum.
 - 2) Component tag number as indicated on the Drawings (e.g., "HS-xxx"). Coordinate with Owner and Engineer.
9. Conductors in control panels and in pull or junction boxes where multiple circuits exist.
 - a. Tag type: Type D - Self-Adhesive Tape Tags.
 - b. Fastener: Self.
 - c. Tag conductor at both ends.
 - d. Legend:
 - 1) Letter height: 1/8 IN minimum.
 - 2) Circuit number or wire number as scheduled on the Drawings or as furnished with the equipment.
10. Conductors in handholes and manholes.
 - a. Tag type: Type A3 - Metal Tape Tags.
 - b. Fastener: Nylon strap.
 - c. Tag conductor at both ends.
 - d. Legend:
 - 1) Letter height: 1/8 IN minimum.
 - 2) Circuit number or wire number as scheduled on the Drawings.
11. Grounding conductors associated with grounding electrode system in accordance with the following:
 - a. Tag type: Type D - Self-Adhesive Tape Tags.
 - b. Fastener: Self.
 - c. Legend:
 - 1) Letter height: 1/8 IN minimum.
 - 2) Function of conductor (e.g., "MAIN BONDING JUMPER", "TO GROUND RING", "TO MAIN WATER PIPE").
12. Flash protection for switchboards, panelboards, industrial control panels and motor control centers:
 - a. Tag type: Type D - Self-Adhesive Tape Signs.
 - b. Fastener: Self.
 - c. Legend: Per NFPA 70.
13. Entrances to electrical rooms:
 - a. Tag type: Type B2 - Nonmetallic Signs.
 - b. Fastener: Screw or adhesive.
 - c. Size: 5 IN x 7 IN.
 - d. Location: Each door to room.
 - e. Legend:
 - 1) OSHA Danger Sign.
 - 2) Description of Danger: "HIGH VOLTAGE, AUTHORIZED PERSONNEL ONLY".
14. Equipment where more than one voltage source is present:
 - a. Tag type:
 - 1) Type B2 - Nonmetallic Signs.
 - b. Fastener:
 - 1) Screw or adhesive.
 - 2) Self.
 - c. Size: 1-3/4 IN x 2-1/2 IN.
 - d. Location: Exterior face of enclosure or cubical.
 - e. Legend:
 - 1) OSHA Danger Sign.

2) Description of Danger: "MULTIPLE VOLTAGE SOURCES".

3.3 HAZARD AND SAFETY SIGNS

- A. Provide 10 Hazard and Safety Signs.
 - 1. Type B2 - Nonmetallic Signs.
 - 2. Legend:
 - a. Inscription(s) as directed by Owner and Engineer.

END OF SECTION

SECTION 10 14 23
SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Stainless steel back plate and numbers.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 10 14 00 - Identification Devices.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - b. A276, Standard Specification for Stainless Steel Bars and Shapes.
 - c. F879, Standard Specification for Stainless Steel Socket Button and Flat Countersunk Head Cap Screws.
 - 2. American Welding Society (AWS):
 - a. A5.1/A5.1M, Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding.
 - b. D1.6/D1.6M, Structural Welding Code - Stainless Steel.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - 2. Schedule of all signs indicating text and graphics.
 - 3. Layout Drawings of all signage showing size, letter style, text, border, finish, and installation detail.
 - a. Provide Drawings for stainless steel numbers.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Stainless steel letters:
 - a. A R K Ramos Manufacturing Co., Inc.
 - b. ASI Signage Innovations.
 - c. Leeds Architectural Letters.
 - d. Metal Arts.
 - e. Metallic Arts.
 - f. The Southwell Co.

2.2 MATERIALS

- A. Stainless Steel Letters:
 - 1. For machine cut letters, provide stainless steel of appropriate alloy and hardness.

2.3 FABRICATION

- A. Stainless Steel Letters:
 - 1. General:
 - a. Machine cut or laser cut stainless steel.
 - b. Match existing Final Clarifier signage at project site.
 - c. Finish: Mill.
 - d. Mounting:
 - 1) Provide stainless steel mounting studs.
 - e. Text: As indicated in the SCHEDULES Article in PART 3.
 - 2. Back plate:
 - a. Stainless steel: 12-gauge thickness.
 - b. Radius corners to match existing signage.
 - c. Size:
 - 1) Height: 24 IN.
 - 2) Width: 24 IN.
 - 3. Letters:
 - a. Typeface: Match existing facility signage.
 - b. Size:
 - 1) Height: 10 IN.
 - 2) Stroke: 2 IN approximate.
 - c. Depth: 1/4 IN.
 - 4. Provide true angles, crisp corners and straight edges with no burrs or pitting in the surface.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Stainless Steel Letters:
 - 1. Install letters where indicated on Drawings.
 - 2. Mount to aluminum guardrail with stainless steel through bolts in accordance with manufacturer's instructions.
 - 3. Provide nylon washer separation between dissimilar materials.

3.2 SCHEDULES

- A. Stainless Steel Signage:
 - 1. Final Clarifier Number:
 - a. Quantity: 12 total.
 - b. Clarifier Number: 55-1 through 55-12.

END OF SECTION



DIVISION 26

ELECTRICAL



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SECTION 26 05 00
ELECTRICAL - BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Basic requirements for electrical systems.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 01 61 03 - Equipment: Basic Requirements.
 - 5. Section 03 15 19 - Anchorage to Concrete.
 - 6. Section 10 14 00 - Identification Devices.
 - 7. Section 26 05 19 - Wire and Cable - 600 Volt and Below.
 - 8. Section 26 05 33 - Raceways and Boxes.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Aluminum Association (AA):
 - a. ADM, Aluminum Design Manual.
 - 2. American Iron and Steel Institute (AISI):
 - a. 325, Manual of Steel Construction.
 - 3. ASTM International (ASTM):
 - a. A36, Standard Specification for Carbon Structural Steel.
 - b. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - c. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 4. ETL Testing Laboratories (ETL).
 - 5. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - a. C2, National Electrical Safety Code (NESC).
 - 6. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 7. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - 8. Underwriters Laboratories, Inc. (UL).
- B. Where UL test procedures have been established for the product type, use UL or ETL approved electrical equipment and provide with the UL or ETL label.

1.3 DEFINITIONS

- A. For the purposes of providing materials and installing electrical work the following definitions shall be used.
 - 1. Outdoor area: Exterior locations where the equipment is normally exposed to the weather and including below grade structures, such as vaults, manholes, handholes and in-ground pump stations.
 - 2. Architecturally finished interior area: Offices, laboratories, conference rooms, restrooms, corridors and other similar occupied spaces.
 - 3. Non-architecturally finished interior area: Pump, chemical, mechanical, electrical rooms and other similar process type rooms.
 - 4. Shop fabricated: Manufactured or assembled equipment for which a UL test procedure has not been established.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of submittal process.
 - 2. See Specification Section 01 61 03 and individual specification sections for submittal requirements for products defined as equipment.
 - 3. General requirements:
 - a. Provide manufacturer's technical information on products to be used, including product descriptive bulletin.
 - b. Include data sheets that include manufacturer's name and product model number.
 - 1) Clearly identify all optional accessories.
 - c. Acknowledgement that products are UL or ETL listed or are constructed utilizing UL or ETL recognized components.
 - d. Manufacturer's delivery, storage, handling and installation instructions.
 - e. Product installation details.
 - f. Short Circuit Current Rating (SCCR) nameplate marking per NFPA 70, include any required calculations.
 - g. See individual specification sections for any additional requirements.
- B. Operation and Maintenance Manuals:
 - 1. See Specification Section 01 33 00 for requirements for:
 - a. The mechanics and administration of the submittal process.
 - b. The content process of Operation and Maintenance Manuals.
- C. When a Specification Section includes products specified in another Specification Section, each Specification Section shall have the required Shop Drawing transmittal form per Specification Section 01 33 00 and all Specification Sections shall be submitted simultaneously.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. See Specification Section 01 65 00.
- B. Protect nameplates on electrical equipment to prevent defacing.

1.6 AREA DESIGNATIONS

- A. Designation of an area will determine the NEMA rating of the electrical equipment enclosures, types of conduits and installation methods to be used in that area.
 - 1. Outdoor areas:
 - a. Wet.
 - b. Also, corrosive and/or hazardous when specifically designated on the Drawings or in the Specifications.
 - 2. Indoor areas:
 - a. Dry.
 - b. Also, wet, corrosive and/or hazardous when specifically designated on the Drawings or in the Specifications.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, refer to specific Electrical Specification Sections and specific material paragraphs below for acceptable manufacturers.
- B. Submit request for substitution in accordance with Specification Section 01 25 00.
- C. Provide all components of a similar type by one (1) manufacturer.

2.2 MATERIALS

- A. Electrical Equipment Support Pedestals and/or Racks:
 - 1. Approved manufacturers:
 - a. Modular strut:
 - 1) Unistrut Building Systems.
 - 2) Eaton B-Line.
 - 3) Globe Strut.
 - 4) Thomas & Betts Superstrut.
 - 2. Material requirements:
 - a. Modular strut:
 - 1) Aluminum: AA Type 6063-T6.
 - b. Structural members (e.g., I beams, L and C channels):
 - 1) Aluminum: AA Type 6061-T6 or 6063-T6.
 - c. Mounting plates:
 - 1) Aluminum: AA Type 6063-T6.
 - d. Mounting hardware:
 - 1) Stainless steel.
 - e. Anchorage per Specification Section 03 15 19.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install and wire all equipment, including prepurchased equipment, and perform all tests necessary to assure conformance to the Drawings and Specification Sections and ensure that equipment is ready and safe for energization.
- B. Install equipment in accordance with the requirements of:
 - 1. NFPA 70.
 - 2. IEEE C2.
 - 3. The manufacturer's instructions.
- C. In general, conduit routing is not shown on the Drawings.
 - 1. The Contractor is responsible for routing all conduits including those shown on one-line and control block diagrams and home runs shown on floor plans.
 - 2. Conduit routings and stub-up locations that are shown are approximate; exact routing to be as required for equipment furnished and field conditions.
- D. When complete branch circuiting is not shown on the Drawings:
 - 1. A homerun indicating panelboard name and circuit number will be shown and the circuit number will be shown adjacent to the additional devices (e.g., light fixture and receptacles) on the same circuit.
 - 2. The Contractor is to furnish and install all conduit and conductors required for proper operation of the circuit.
 - 3. The indicated home run conduit and conductor size shall be used for the entire branch circuit.
 - 4. See Specification Section 26 05 19 for combining multiple branch circuits in a common conduit.
- E. Do not use equipment that exceed dimensions or reduce clearances indicated on the Drawings or as required by the NFPA 70.
- F. Install equipment plumb, square and true with construction features and securely fastened.
- G. Install electrical equipment, including pull and junction boxes, minimum of 6 IN from process, gas, air and water piping and equipment.

- H. Install equipment so it is readily accessible for operation and maintenance, is not blocked or concealed and does not interfere with normal operation and maintenance requirements of other equipment.
- I. Device Mounting Schedule:
1. Unless indicated otherwise on the Drawings, mounting heights are as indicated below:
 - a. Light switch (to center): 46 IN.
 - b. Receptacle in architecturally finished areas (to center): 18 IN.
 - c. Receptacle on exterior wall of building (to center): 18 IN.
 - d. Receptacle in non-architecturally finished areas (to center): 46 IN.
 - e. Telephone and data outlet in architecturally finished areas (to center): 18 IN.
 - f. Telephone outlet for wall-mounted phone (to center): 46 IN.
 - g. Safety switch (to center of operating handle): 54 IN.
 - h. Separately mounted motor starter (to center of operating handle): 54 IN.
 - i. Pushbutton or selector switch control station (to center): 46 IN.
 - j. Panelboard (to top): 72 IN.
- J. Avoid interference of electrical equipment operation and maintenance with structural members, building features and equipment of other trades.
1. When it is necessary to adjust the intended location of electrical equipment, unless specifically dimensioned or detailed, the Contractor may make adjustments in equipment locations in accordance with the following without obtaining the Engineer's approval:
 - a. 1 FT at grade, floor and roof level in any direction in the horizontal plane.
 - b. 3 IN for electrical equipment (switchgear, switchboards, MCC, panelboards and transformers) in any direction in the horizontal plane.
 - c. 1 FT on walls in a horizontal direction within the vertical plane.
 - d. Changes in equipment location exceeding those defined above require the Engineer's approval.
- K. Provide electrical equipment support system per the following area designations:
1. Dry areas:
 - a. Aluminum system consisting of aluminum channels and fittings with stainless steel nuts and hardware.
 2. Wet areas:
 - a. Aluminum system consisting of aluminum channels and fittings with stainless steel nuts and hardware.
- L. Provide all necessary anchoring devices and supports rated for the equipment load based on dimensions and weights verified from approved submittals, or as recommended by the manufacturer.
1. See Specification Section 03 15 19.
 2. Do not cut, or weld to, building structural members.
 3. Do not mount safety switches or other equipment to equipment enclosures, unless enclosure mounting surface is properly braced to accept mounting of external equipment.
- M. Provide corrosion resistant spacers to maintain 1/4 IN separation between metallic equipment and/or metallic equipment supports and mounting surface in wet areas, on below grade walls and on walls of liquid containment or processing areas such as Basins, Clarifiers, Digesters, Reservoirs, etc.
- N. Do not place equipment fabricated from aluminum in direct contact with earth or concrete.
- O. Screen or seal all openings into equipment mounted outdoors to prevent the entrance of rodents and insects.
- P. Do not use materials that may cause the walls or roof of a building to discolor or rust.
- Q. Identify electrical equipment and components in accordance with Specification Section 10 14 00.

- R. Provide field markings and/or documentation of available short-circuit current (available fault current) and related information for equipment as required by the NFPA 70 and other applicable codes.
- S. Provide equipment or control panels with Short Circuit Current Rating (SCCR) labeling as required by NFPA 70 and other applicable codes.
 - 1. Determine the SCCR rating by one of the following methods:
 - a. Method 1: SCCR rating meets or exceeds the available fault current of the source equipment when indicated on the Drawings.
 - b. Method 2: SCCR rating meets or exceeds the source equipment's Amp Interrupting Current (AIC) rating as indicated on the Drawings.
 - c. Method 3: SCCR rating meets or exceeds the calculated available short circuit current at the control panel.
 - 2. The source equipment is the switchboard, panelboard, motor control center or similar equipment where the equipment or control panel circuit originates.
 - 3. For Method 3, provide calculations justifying the SCCR rating. Utilize source equipment available fault current or AIC rating as indicated on the Drawings.

3.2 FIELD QUALITY CONTROL

- A. Verify exact rough-in location and dimensions for connection to electrified equipment, provided by others.
 - 1. See Specification Section 01 73 20 for openings and penetrations in structures.
- B. Replace equipment and systems found inoperative or defective and re-test.
- C. Cleaning.
- D. See Specification Section 01 74 00.
- E. The protective coating integrity of support structures and equipment enclosures shall be maintained.
 - 1. Repair galvanized components utilizing a zinc rich paint.
 - 2. Repair painted components utilizing touch up paint provided by or approved by the manufacturer.
 - 3. Repair surfaces which will be inaccessible after installation prior to installation.
 - 4. See Specification Section 26 05 33 for requirements for conduits and associated accessories.
- F. Replace nameplates damaged during installation.

3.3 DEMONSTRATION

- A. Demonstrate equipment in accordance with Specification Section 01 75 00.

END OF SECTION

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SECTION 26 05 19
WIRE AND CABLE - 600 VOLT AND BELOW

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Material and installation requirements for:
 - a. Building wire.
 - b. Control cable.
 - c. Instrumentation cable.
 - d. Wire connectors.
 - e. Insulating tape.
 - f. Pulling lubricant.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 26 05 00 - Electrical - Basic Requirements.
 - 5. Section 26 08 13 - Acceptance Testing.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Canadian Standards Association (CSA):
 - a. Test Methods for Electrical Wires and Cables (FT-4 Vertical Cable Tray Test).
 - 2. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - a. 1202, Standard for Flame-Propagation Testing of Wire and Cable.
 - 3. Insulated Cable Engineers Association (ICEA):
 - a. S-58-679, Standard for Control Cable Conductor Identification.
 - 4. National Electrical Manufacturers Association (NEMA):
 - a. ICS 4, Industrial Control and Systems: Terminal Blocks.
 - 5. National Electrical Manufacturers Association/Insulated Cable Engineers Association (NEMA/ICEA):
 - a. WC 57/S-73-532, Standard for Control Cables.
 - b. WC 70/S-95-658, Non-Shielded Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.
 - 6. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - b. 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.
 - 7. Telecommunications Industry Association/Electronic Industries Alliance/American National Standards Institute (TIA/EIA/ANSI):
 - a. 568, Commercial Building Telecommunications Cabling Standard.
 - 8. Underwriters Laboratories, Inc. (UL):
 - a. 44, Standard for Safety Thermoset-Insulated Wires and Cables.
 - b. 83, Standard for Safety Thermoplastic-Insulated Wires and Cables.
 - c. 467, Standard for Safety Grounding and Bonding Equipment.
 - d. 486A, Standard for Safety Wire Connectors and Soldering Lugs for use with Copper Conductors.
 - e. 486C, Standard for Safety Splicing Wire Connections.
 - f. 510, Standard for Safety Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape.
 - g. 1277, Standard for Safety Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.

- h. 1581, Standard for Safety Reference Standard for Electrical Wires, Cables, and Flexible Cords.
- i. 2250, Standard for Safety Instrumentation Tray Cable.

1.3 DEFINITIONS

- A. Cable: Multi-conductor, insulated, with outer sheath containing either building wire or instrumentation wire.
- B. Instrumentation Cable:
 - 1. Multiple conductor, insulated, twisted or untwisted, with outer sheath.
 - 2. The following are specific types of instrumentation cables:
 - a. Analog signal cable:
 - 1) Used for the transmission of low current (e.g., 4-20mA DC) or low voltage (e.g., 0-10 VDC) signals, using No. 16 AWG and smaller conductors.
 - 2) Commonly used types are defined in the following:
 - a) TSP: Twisted shielded pair.
 - b) TST: Twisted shielded triad.
 - b. Digital signal cable: Used for the transmission of digital signals between computers, PLC's, RTU's, etc.
- C. Control Cable: Multi-conductor, insulated, with outer sheath containing building wires, No. 14, No. 12 or No. 10 AWG.
- D. Building Wire: Single conductor, insulated, with or without outer jacket depending upon type.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
 - 1) Wire connectors.
 - 2) Insulating tape.
 - 3) Cable lubricant.
 - b. See Specification Section 26 05 00 for additional requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. See Specification Section 26 05 00.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Building wire, power and control cable:
 - a. Aetna Insulated Wire.
 - b. Alphawire.
 - c. Cerrowire.
 - d. Encore Wire Corporation.
 - e. General Cable.
 - f. Okonite Company.
 - g. Southwire Company.
 - 2. Instrumentation cable:
 - a. Analog cable:
 - 1) Alphawire.

- 2) Belden Inc.
- 3) General Cable.
- 3. Wire connectors:
 - a. Burndy Corporation.
 - b. Buchanan.
 - c. Ideal.
 - d. IlSCO.
 - e. 3M Co.
 - f. Teledyne Penn Union.
 - g. Thomas and Betts.
 - h. Phoenix Contact.
- 4. Insulating and color coding tape:
 - a. 3M Co.
 - b. Plymouth Bishop Tapes.
 - c. Red Seal Electric Co.

B. Submit request for substitution in accordance with Specification Section 01 25 00.

2.2 MANUFACTURED UNITS

A. Building Wire:

- 1. Conductor shall be copper with 600 V rated insulation.
- 2. Conductors shall be stranded, except for conductors used in lighting and receptacle circuits which may be stranded or solid.
- 3. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
- 4. Conform to NEMA/ICEA WC 70/S-95-658 and UL 83 for type THHN/THWN and THHN/THWN-2 insulation.
- 5. Conform to NEMA/ICEA WC 70/S-95-658 and UL 44 for type XHHW-2 insulation.

B. Control Cable:

- 1. Conductor shall be copper with 600 V rated insulation.
- 2. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
- 3. Conform to NEMA/ICEA WC 57/S-73-532 and UL 83 and UL 1277 for type THHN/THWN insulation with an overall PVC jacket.
- 4. Number of conductors as required, provided with or without bare ground conductor of the same AWG size.
 - a. When a bare ground conductor is not provided, an additional insulated conductor shall be provided and used as the ground conductor (e.g., 6/c No. 14 w/g and 7/c No. 14 are equal).
- 5. Individual conductor color coding:
 - a. ICEA S-58-679, Method 1, Table E-2.
 - b. See PART 3 of this Specification Section for additional requirements.
- 6. Conform to NFPA 70 Type TC and when routed in cable tray IEEE 1202, CSA FT-4 or NFPA 262.

C. Electrical Equipment Control Wire:

- 1. Conductor shall be copper with 600 V rated insulation.
- 2. Conductors shall be stranded.
- 3. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
- 4. Conform to UL 44 for Type SIS insulation.
- 5. Conform to UL 83 for Type MTW insulation.

D. Instrumentation Cable:

- 1. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.

2. Analog cable:
 - a. Tinned copper conductors.
 - b. 300 V or 600 V PVC insulation with PVC jacket.
 - c. Twisted with 100 PCT foil shield coverage with drain wire.
 - d. Six (6) twists per foot minimum.
 - e. Individual conductor color coding: ICEA S-58-679, Method 1, Table E-2.
 - f. Conform to NFPA 262, UL 2250, UL 1581 and NFPA 70 Type ITC.
 3. Digital cable:
 - a. As recommended by equipment (e.g., PLC, RTU) manufacturer.
 - b. Horizontal voice and data cable:
 - 1) Category 6 per TIA/EIA/ANSI 568.
 - 2) Cable shall be label-verified.
 - 3) Cable jacket shall be factory marked at regular intervals indicating verifying organization and performance level.
 - 4) Conductors: No. 24 AWG solid untinned copper.
 - 5) Rated CMP per NFPA 70.
 - c. Conform to NFPA 262 and NFPA 70 Type ITC.
- E. Fiber Optic Cable:
1. Design and fabrication - Multi-mode:
 - a. Type:
 - 1) Indoor: Tight buffered or loose tube with a dry gel water blocking system.
 - 2) Outdoor: Loose tube with a wet or dry gel water blocking system.
 - b. Number of fibers: As indicated on the Drawings.
 - c. Fiber size: 62.5/125 micrometer (core diameter/cladding diameter).
 - d. Glass fiber core.
 - e. Step index.
 - f. Maximum attenuation:
 - 1) At 850 nm: 3.75 dB/km.
 - 2) At 1300 nm: 1.5dB/km.
 - g. Minimum bandwidth:
 - 1) At 850 nm: 160 MHz/km.
 - 2) At 1300 nm: 500 MHz/km.
 - h. Maximum tensile load:
 - 1) Installation: 225 LBS.
 - 2) Long term: 67 LBS.
 - i. Cable jacket material:
 - 1) In rigid steel conduit: PVC, or polyethylene.
 - 2) In plenum or riser: Flame retardant material, PVC not allowed.
 - a) Plenum applications: Cable materials shall pass NFPA 262 requirements.
 - b) Riser applications: Cable materials shall pass UL 1666 requirements.
 - 3) In cable tray: Polyethylene or equivalent; PVC not allowed.
 - a) Meet vertical flame tray test requirements of NFPA 262.
 - j. Cables shall be listed and marked in accordance with the requirements of NFPA 70.
 - k. Optical fiber cable type utilized shall be in accordance with NFPA 70.
 - l. Utilize LC type connectors:
 - 1) Tip material: Ceramic or ceramic/glass composite.
 - 2) Utilize connectors which do not require adhesive, epoxy, or polish.
 2. Design and fabrication - Single-mode:
 - a. Type:
 - 1) Outdoor: Loose tube with a wet or dry gel water blocking system.
 - b. Number of fibers: As indicated on the Drawings.
 - c. Fiber size: Non-dispersion shifted, 9/125 micrometer (core diameter/cladding diameter).
 - d. Glass fiber core.
 - e. Step index.

- f. Maximum attenuation:
 - 1) At 850 nm: 0.5 dB/km.
 - 2) At 1300 nm: 0.4 dB/km.
 - g. Minimum bandwidth:
 - 1) At 850 nm: 160 MHz/km.
 - 2) At 1300 nm: 500 MHz/km.
 - h. Maximum tensile load:
 - 1) Installation: 600 LBS.
 - 2) Long term: 200 LBS.
 - i. Cable jacket material:
 - 1) In conduit: PVC, or polyethylene.
 - j. Cables shall be listed and marked in accordance with the requirements of NFPA 70.
 - k. Optical fiber cable type utilized shall be in accordance with NFPA 70.
 - l. Fiber shall conform to TIA/EIA 492AAAA Class IVa.
 - m. Fiber color code shall conform to TIA/EIA 598-C.
 - n. Utilize FC type connectors:
 - 1) Tip material: Ceramic or ceramic/glass composite.
 - 2) Utilize connectors which do not require adhesive, epoxy, or polish.
- F. Wire Connectors:
- 1. Twist/screw on type:
 - a. Insulated pressure or spring type solderless connector.
 - b. 600 V rated.
 - c. Ground conductors: Conform to UL 486C and/or UL 467 when required by local codes.
 - d. Phase and neutral conductors: Conform to UL 486C.
 - 2. Compression and mechanical screw type:
 - a. 600 V rated.
 - b. Ground conductors: Conform to UL 467.
 - c. Phase and neutral conductors: Conform to UL 486A.
 - 3. Terminal block type:
 - a. High density, screw-post barrier-type with white center marker strip.
 - b. 600 V and ampere rating as required, for power circuits.
 - c. 600 V, 20 ampere rated for control circuits.
 - d. 300 V, 15 ampere rated for instrumentation circuits.
 - e. Conform to NEMA ICS 4 and UL 486A.
- G. Insulating and Color Coding Tape:
- 1. Pressure sensitive vinyl.
 - 2. Premium grade.
 - 3. Heat, cold, moisture, and sunlight resistant.
 - 4. Thickness, depending on use conditions: 7, 8.5, or 10 MIL.
 - 5. For cold weather or outdoor location, tape must also be all-weather.
 - 6. Color:
 - a. Insulating tape: Black.
 - b. Color coding tape: Fade-resistant color as specified herein.
 - 7. Comply with UL 510.
- H. Cold Shrink Insulation:
- 1. Factory expanded sleeve with removable core.
 - 2. With core removed, the insulation will shrink over splice connector providing a water-resistant seal.
 - 3. Material: EPDM Rubber.
 - 4. Voltage: 1000 V.
 - 5. Fungus resistant per ASTM G21.

- I. Pulling Lubricant: Cable manufacturer's standard containing no petroleum or other products which will deteriorate insulation.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Permitted Usage of Insulation Types:
 - 1. Type XHHW-2:
 - a. Building wire and power and control cable in architectural and non-architectural finished areas.
 - b. Building wire and power and control cable in conduit below grade.
 - 2. Type THHN/THWN and THHN/THWN-2:
 - a. Building wire and power and control cable No. 8 AWG and smaller in architectural and non-architectural finished areas.
 - 3. Type SIS and MTW:
 - a. For the wiring of control equipment within control panels and field wiring of control equipment within switchgear, switchboards, motor control centers.
- B. Conductor Size Limitations:
 - 1. Feeder and branch power conductors shall not be smaller than No. 12 AWG unless otherwise indicated on the Drawings.
 - 2. Control conductors shall not be smaller than No. 14 AWG unless otherwise indicated on the Drawings.
 - 3. Instrumentation conductors shall not be smaller than No. 18 AWG unless otherwise indicated on the Drawings.
- C. Color Code All Wiring as Follows:
 - 1. Building wire:

	240 V, 208 V, 240/120 V, 208/120 V	480 V, 480/277 V
Phase 1	Black	Brown
Phase 2	Red *	Orange
Phase 3	Blue	Yellow
Neutral	White	White or Gray
Ground	Green	Green

* Orange when it is a high leg of a 120/240 V Delta system.

- a. Conductors No. 6 AWG and smaller: Insulated phase, neutral and ground conductors shall be identified by a continuous colored outer finish along its entire length.
 - 2. Control cables ICEA S-58-679, Method 1, Table E-2:
 - a. When a bare ground is not provided, one (1) of the colored insulated conductors shall be re-identified by stripping the insulation from the entire exposed length or using green tape to cover the entire exposed length.
 - b. When used in power applications the colored insulated conductors used as phase and neutral conductors may have to be re-identified with 3 IN of colored tape, per the Table herein, applied at the terminations.
- D. Install all wiring in raceway unless otherwise indicated on the Drawings.
- E. Feeder, branch, control and instrumentation circuits shall not be combined in a raceway, cable tray, junction or pull box, except as permitted in the following:
 - 1. Where specifically indicated on the Drawings.
 - 2. Where field conditions dictate and written permission is obtained from the Engineer.

3. Control circuits shall be isolated from feeder and branch power and instrumentation circuits but combining of control circuits is permitted.
 - a. The combinations shall comply with the following:
 - 1) 12 VDC, 24 VDC and 48 VDC may be combined.
 - 2) 125 VDC shall be isolated from all other AC and DC circuits.
 - 3) AC control circuits shall be isolated from all DC circuits.
 4. Instrumentation circuits shall be isolated from feeder and branch power and control circuits but combining of instrumentation circuits is permitted.
 - a. The combinations shall comply with the following:
 - 1) Analog signal circuits may be combined.
 - 2) Digital signal circuits may be combined but isolated from analog signal circuits.
 - b. Multiple branch circuits for similar loads may be combined in a common raceway, such as multiple lighting circuits or multiple receptacle circuits or other 120Vac circuits. Do not combine lighting and receptacle circuits.
 - c. Do not combine control device circuits with lighting or receptacle circuits.
 - d. Contractor is responsible for making the required adjustments in conductor and raceway size, in accordance with all requirements of the NFPA 70, including but not limited to:
 - 1) Up sizing conductor size for required ampacity de-ratings for the number of current carrying conductors in the raceway.
 - 2) The neutral conductors may not be shared.
 - 3) Up sizing raceway size for the size and quantity of conductors.
- F. Ground the drain wire of shielded instrumentation cables at one (1) end only.
1. The preferred grounding location is at the load (e.g., control panel), not at the source (e.g., field mounted instrument).
- G. Splices and terminations for the following circuit types shall be made in the indicated enclosure type using the indicated method.
1. Feeder and branch power circuits:
 - a. Device outlet boxes:
 - 1) Twist/screw on type connectors.
 - b. Junction and pull boxes and wireways:
 - 1) Twist/screw on type connectors for use on No. 8 and smaller wire.
 - 2) Compression, mechanical screw or terminal block or terminal strip type connectors for use on No. 6 AWG and larger wire.
 - c. Motor terminal boxes:
 - 1) Twist/screw on type connectors for use on No. 10 AWG and smaller wire.
 - 2) Insulated mechanical screw type connectors for use on No. 8 AWG and larger wire.
 - d. Manholes or handholes:
 - 1) Twist/screw on type connectors pre-filled with epoxy for use on No. 8 AWG and smaller wire.
 - 2) Watertight compression or mechanical screw type connectors for use on No. 6 AWG and larger wire.
 2. Control circuits:
 - a. Junction and pull boxes: Terminal block type connector.
 - b. Manholes or handholes: Twist/screw on type connectors pre-filled with epoxy.
 - c. Control panels and motor control centers: Terminal block or strips provided within the equipment or field installed within the equipment by the Contractor.
 3. Instrumentation circuits can be spliced where field conditions dictate and written permission is obtained from the Engineer.
 - a. Maintain electrical continuity of the shield when splicing twisted shielded conductors.
 - b. Junction and pull boxes: Terminal block type connector.
 - c. Control panels and motor control centers: Terminal block or strip provided within the equipment or field installed within the equipment by the Contractor.

4. Non-insulated compression and mechanical screw type connectors shall be insulated with tape or hot or cold shrink type insulation to the insulation level of the conductors.

H. Insulating Tape Usage:

1. For insulating connections of No. 8 AWG wire and smaller: 7 MIL vinyl tape.
2. For insulating splices and taps of No. 6 AWG wire or larger: 10 MIL vinyl tape.
3. For insulating connections made in cold weather or in outdoor locations: 8.5 MIL, all weather vinyl tape.

I. Color Coding Tape Usage: For color coding of conductors.

J. Conductor insulation on conductors No. 10 AWG and less shall not be stripped using a side cutter or any other similar tool.

1. The insulation shall be stripped using a stripping tool specifically designed for the conductor size being stripped.

3.2 FIELD QUALITY CONTROL

- A. Acceptance Testing: See Specification Section 26 08 13.

END OF SECTION

SECTION 26 05 26
GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Material and installation requirements for grounding and bonding system(s).
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 10 14 00 - Identification Devices.
 - 5. Section 26 05 00 - Electrical - Basic Requirements.
 - 6. Section 26 05 19 - Wire and Cable - 600 Volt and Below.
 - 7. Section 26 05 33 - Raceways and Boxes.
 - 8. Section 26 08 13 - Acceptance Testing.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
 - 2. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - a. 837, Standard for Qualifying Permanent Connections Used in Substation Grounding.
 - 3. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - 4. Underwriters Laboratories, Inc. (UL):
 - a. 467, Grounding and Bonding Equipment.
- B. Assure ground continuity is continuous throughout the entire Project.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Product technical data.
 - a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
 - 1) Grounding clamps, terminals and connectors.
 - 2) Exothermic welding system.
 - b. See Specification Section 26 05 00 for additional requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Ground rods and bars and grounding clamps, connectors and terminals:
 - a. Erico Products, Inc.
 - b. Harger Lightning & Grounding.
 - c. Heary Brothers.

- d. Hubbell - Burndy.
- e. Robbins Lightning Protection.
- f. Thomas & Betts - Blackburn.
- g. Thompson Lightning Protection.
- 2. Exothermic weld connections:
 - a. Erico Products Inc., Cadweld.
 - b. Harger Lightning & Grounding - Ultraweld.
 - c. Hubbell - Burndy (Thermoweld).
 - d. Thomas & Betts - Furseweld.

2.2 COMPONENTS

- A. Wire and Cable:
 - 1. Bare conductors: Soft drawn stranded copper meeting ASTM B8.
 - 2. Insulated conductors: Color coded green, per Specification Section 26 05 19.
- B. Conduit: As specified in Specification Section 26 05 33.
- C. Ground Bars:
 - 1. Solid copper:
 - a. 1/4 IN thick.
 - b. 2 or 4 IN wide.
 - c. 24 IN long minimum in main service entrance electrical rooms, 12 IN long elsewhere.
 - 2. Predrilled grounding lug mounting holes.
 - 3. Stainless steel or galvanized steel mounting brackets.
 - 4. Insulated standoffs.
- D. Ground Rods:
 - 1. 5/8 IN x 10 FT.
 - 2. Copper-clad:
 - a. 10 MIL minimum uniform coating of electrolytic copper molecularly bonded to a rigid steel core.
 - b. Corrosion resistant bond between the copper and steel.
 - c. Hard drawn for a scar-resistant surface.
- E. Grounding Clamps, Connectors and Terminals:
 - 1. Mechanical type:
 - a. Standards: UL 467.
 - b. High copper alloy content.
 - 2. Compression type for interior locations:
 - a. Standards: UL 467.
 - b. High copper alloy content.
 - c. Non-reversible.
 - d. Terminals for connection to bus bars shall have two bolt holes.
 - 3. Compression type suitable for direct burial in earth or concrete:
 - a. Standards: UL 467, IEEE 837.
 - b. High copper alloy content.
 - c. Non-reversible.
 - d. Factory filled with oxide inhibiting compound.
- F. Exothermic Weld Connections:
 - 1. Copper oxide reduction by aluminum process.
 - 2. Molds properly sized for each application.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General:
1. Install products in accordance with manufacturer's instructions.
 2. Size grounding conductors and bonding jumpers in accordance with NFPA 70, Article 250, except where larger sizes are indicated on the Drawings.
 3. Remove paint, rust, or other non-conducting material from contact surfaces before making ground connections. After connection, apply manufacturers approved touch-up paint to protect metallic surface from corrosion.
 4. Where ground conductors pass through floor slabs or building walls provide nonmetallic sleeves and install sleeve per Specification Section 01 73 20.
 - a. Seal the sleeve interior to stop water penetration.
 5. Do not splice grounding electrode conductors except at ground rods.
 6. Install ground rods and grounding electrode conductors in undisturbed, firm soil.
 - a. Provide excavation required for installation of ground rods and conductors.
 - b. Use driving studs or other suitable means to prevent damage to threaded ends of sectional rods.
 - c. Unless otherwise specified, connect conductors to ground rods with compression type connectors or exothermic weld.
 - d. Provide sufficient slack in conductor to prevent conductor breakage during backfill or due to ground movement.
 - e. Backfill excavation completely, thoroughly tamping to provide good contact between backfill materials and ground rods and conductors.
 7. Do not use exothermic welding if it will damage the structure the grounding conductor is being welded to.
- B. Grounding Electrode System:
1. Provide a grounding electrode system in accordance with NFPA 70, Article 250 and as indicated on the Drawings.
 - a. All grounding electrode conductors terminate on a main ground bar located adjacent to the service entrance equipment.
 2. Grounding electrode conductor terminations:
 - a. Ground bars mounted on wall: Use a two-hole compression type conductor terminal and bolt it to the ground bar with two bolts.
 - b. Ground bars in electrical equipment: Use compression type conductor terminal and bolt it to the ground bar or manufacture's provided mechanical type termination device.
 - c. Piping systems: Use mechanical type connections.
 - d. Building steel, below grade and encased in concrete: Use compression type connector or exothermic weld.
 - e. Building steel, above grade: Use a two-hole compression type conductor terminal and bolt to the steel with two bolts or exothermic weld.
 - f. Ground rod: Compression type or exothermic weld, unless otherwise specified.
 - g. At all above grade terminations, the conductors shall be labeled per Specification Section 10 14 00.
 3. Single ground rod grounding system:
 - a. Single ground rod system consists of a single ground rod.
 - b. Place ground rod a minimum of 10 FT from the structure foundation and 2 FT-6 IN below grade.
 - c. Grounding conductor: Bare conductor, sized as indicated on the Drawings.
- C. Supplemental Grounding Electrode:
1. Provide the following grounding in addition to the equipment ground conductor supplied with the feeder conductors whether or not shown on the Drawings.
 - a. See Grounding Electrode System paragraph for conductor termination requirements.

2. Generator Neutral Grounding Reactor/Resistor:
 - a. Grounding conductor: Bare conductor, size as required by manufacturer.
 3. Generator Surge Arrestor/Capacitor:
 - a. Grounding conductor: Bare conductor, size as required by manufacturer.
 4. Ground cranes and hoists in accordance with NFPA 70, Article 610.
- D. Transformer Separately Derived Grounding System:
1. Install the System Bonding Jumper at the transformer. At the first disconnect, ensure the neutral is isolated from ground.
 2. Structures with a single electrical room/area:
 - a. Connect grounding electrode conductor to the Grounding Electrode System main ground bar.
 3. See Grounding Electrode System paragraph for conductor termination requirements.
- E. Raceway Bonding/Grounding:
1. Install all metallic raceway so that it is electrically continuous.
 2. Provide an equipment grounding conductor in all raceways with insulation identical to the phase conductors, unless otherwise indicated on the Drawings.
 3. NFPA 70 required grounding bushings shall be of the insulating type.
 4. Provide double locknuts at all panels.
 5. Bond all conduits, at entrance and exit of equipment, to the equipment ground bus or lug.
 6. Provide bonding jumpers if conduits are installed in concentric knockouts.
 7. Make all metallic raceway fittings and grounding clamps tight to ensure equipment grounding system will operate continuously at ground potential to provide low impedance current path for proper operation of overcurrent devices during possible ground fault conditions.
- F. Equipment Grounding:
1. Ground all utilization equipment with an equipment grounding conductor.
 2. Use generator manufacturer's provisions for grounding electric generators, or manufacturer's written instructions, except as shown on the Drawings.

3.2 FIELD QUALITY CONTROL

- A. Leave grounding system uncovered until observed by Owner.
- B. Acceptance Testing: See Specification Section 26 08 13.

END OF SECTION

SECTION 26 05 33
RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Material and installation requirements for:
 - a. Conduits.
 - b. Conduit fittings.
 - c. Conduit supports.
 - d. Wireways.
 - e. Outlet boxes.
 - f. Pull and junction boxes.
- B. Related Sections include but are not necessarily limited to:
1. SUDAS Division 1.
 2. Division 01 - General Requirements.
 3. Section 01 04 00 - Special Provisions.
 4. Section 26 05 00 - Electrical - Basic Requirements.
 5. Section 26 05 43 - Electrical - Exterior Underground.
 6. Section 26 27 26 - Wiring Devices.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. Aluminum Association (AA).
 2. American Iron and Steel Institute (AISI).
 3. ASTM International (ASTM):
 - a. D2564, Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
 4. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. TC 2, Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
 - c. TC 3, Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.
 - d. TC 14.BG, Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.
 5. National Electrical Manufacturers Association/American National Standards Institute (NEMA/ANSI):
 - a. C80.5, Electrical Aluminum Rigid Conduit.
 - b. OS 1, Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
 6. Underwriters Laboratories, Inc. (UL):
 - a. 1, Standard for Flexible Metal Conduit.
 - b. 50, Enclosures for Electrical Equipment, Non-Environmental Considerations.
 - c. 360, Standard for Liquid-Tight Flexible Steel Conduit.
 - d. 467, Grounding and Bonding Equipment.
 - e. 514A, Metallic Outlet Boxes.
 - f. 514B, Conduit, Tubing, and Cable Fittings.
 - g. 651, Standard for Schedule 40 and 80 Rigid PVC Conduit and Fittings.
 - h. 870, Standard for Wireways, Auxiliary Gutters, and Associated Fittings.
 - i. 2420, Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.
 - j. 2515, Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
 - 1) Conduit fittings.
 - 2) Support systems.
 - b. See Specification Section 26 05 00 for additional requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. See Specification Section 26 05 00.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Rigid metal conduits and electrical metallic tubing:
 - a. Allied Tube and Conduit Corporation.
 - b. Triangle PWC Inc.
 - c. Western Tube and Conduit Corporation.
 - d. Wheatland Tube Company.
 - e. EASCO Aluminum.
 - f. Indalex.
 - g. VAW of American, Inc.
 - 2. Rigid nonmetallic conduit:
 - a. Prime Conduit (Carlton).
 - b. Cantex.
 - c. Osburn Associates.
 - d. United Fiberglass of America, Inc.
 - 3. Wireway:
 - a. Hoffman Engineering Company.
 - b. Wiegmann.
 - c. Square D.
 - 4. Conduit fittings and accessories:
 - a. Appleton Electric Co.
 - b. Carlton.
 - c. Cantex.
 - d. Crouse-Hinds.
 - e. Killark.
 - f. Osburn Associates.
 - g. OZ Gedney Company.
 - h. RACO.
 - i. Steel City.
 - j. Thomas & Betts.
 - 5. Support systems:
 - a. Unistrut Building Systems.
 - b. Eaton B-Line.
 - c. Kindorf.
 - d. Minerallac Fastening Systems.
 - e. Caddy.
 - f. Thomas & Betts Superstrut.

6. Outlet, pull and junction boxes:
 - a. Appleton Electric Co.
 - b. Eaton Crouse-Hinds.
 - c. Killark.
 - d. O-Z/Gedney.
 - e. Thomas & Betts Steel City.
 - f. Raco.
 - g. Bell.
 - h. Hoffman Engineering Co.
 - i. Wiegmann.
 - j. Eaton B-Line.
 - k. Adalet.
 - l. Rittal.
 - m. Stahlin.

B. Submit request for substitution in accordance with Specification Section 01 25 00.

2.2 RIGID METAL CONDUITS

- A. Rigid Aluminum Conduit (RAC):
 1. AA Type 6063 aluminum alloy, T-1 temper.
 2. Maximum copper content of 0.10%.
 3. Extruded, seamless.
 4. Standards: NFPA 70 Type RMC, NEMA/ANSI C80.5, UL 6.

2.3 RIGID NONMETALLIC CONDUIT

- A. Schedules 80 (PVC-80):
 1. Polyvinyl-chloride (PVC) plastic compound which includes inert modifiers to improve weatherability and heat distribution.
 2. Rated for direct sunlight exposure.
 3. Fire retardant and low smoke emission.
 4. Shall be suitable for use with 90 DEGC wire and shall be marked "maximum 90 DEGC".
 5. Standards: NFPA 70 Type PVC, NEMA TC 2, UL 651.

2.4 WIREWAY

- A. General:
 1. Suitable for lay-in conductors.
 2. Designed for continuous grounding.
 3. Covers:
 - a. Hinged or removable in accessible areas.
 - b. Non-removable when passing through partitions.
 4. Finish: Rust inhibiting primer and manufacturers standard paint inside and out except for stainless steel type.
 5. Standards: UL 870, NEMA 250.
- B. NEMA 4X Wireway:
 1. 14 GA type 316 stainless steel bodies and covers without knockouts and 10 GA stainless steel flanges.
 2. Cover: Fully gasketed and held in place with captive clamp type latches.
 3. Flanges: Fully gasketed and bolted.

2.5 CONDUIT FITTINGS AND ACCESSORIES

- A. Fittings for Use with RAC:
 1. Locknuts:
 - a. Threaded steel or malleable iron.
 - b. Gasketed or non-gasketed.
 - c. Grounding or non-grounding type.

2. Bushings:
 - a. Threaded, insulated metallic.
 - b. Grounding or non-grounding type.
 3. Hubs: Threaded, insulated and gasketed metallic for raintight connection.
 4. Couplings:
 - a. Threaded straight type: Same material and finish as the conduit with which they are used on.
 - b. Threadless type: Gland compression or self-threading type, concrete tight.
 5. Conduit bodies (ells and tees):
 - a. Body: Cast copper free aluminum with threaded hubs.
 - b. Standard and mogul size.
 - c. Cover:
 - 1) Clip-on type with stainless steel screws.
 - 2) Gasketed or non-gasketed cast copper free aluminum.
 6. Expansion couplings:
 - a. 2 IN nominal straight-line conduit movement in either direction.
 - b. Gasketed for wet locations.
 - c. Internally or externally grounded.
 7. Expansion/deflection couplings:
 - a. 3/4 IN nominal straight-line conduit movement in either direction.
 - b. 30-degree nominal deflection from the normal in all directions.
 - c. Metallic hubs, neoprene outer jacket and stainless steel jacket clamps.
 - d. Internally or externally grounded.
 - e. Watertight, raintight and concrete tight.
 8. Standards: UL 467, UL 514B.
- B. Fittings for Use with FLEX-NM:
1. Connector:
 - a. Straight or angle type.
 - b. Nonmetallic construction.
 - c. Liquid tight.
 2. Standards: UL listed.
- C. Fittings for Use with Rigid Nonmetallic PVC Conduit:
1. Coupling, adapters and conduit bodies:
 - a. Same material, thickness, and construction as the conduits with which they are used.
 - b. Homogeneous plastic free from visible cracks, holes or foreign inclusions.
 - c. Bore smooth and free of blisters, nicks or other imperfections which could damage the conductor.
 2. Solvent cement for welding fittings shall be supplied by the same manufacturer as the conduit and fittings.
 3. Standards: ASTM D2564, NEMA TC 3, UL 651, UL 514B.
- D. Weather and Corrosion Protection Tape:
1. PVC based tape, 10 MILS thick.
 2. Protection against moisture, acids, alkalis, salts and sewage and suitable for direct bury.
 3. Used with appropriate pipe primer.

2.6 ALL RACEWAY AND FITTINGS

- A. Mark Products:
1. Identify the nominal trade size on the product.
 2. Stamp with the name or trademark of the manufacturer.

2.7 OUTLET BOXES

- A. Cast Outlet Boxes:
1. Die-cast copper free aluminum with manufacturers standard finish.
 2. Threaded hubs and grounding screw.

3. Styles:
 - a. "FS" or "FD".
 - b. "Bell".
 - c. Single or multiple gang and tandem.
4. Standards: UL 514A.

B. See Specification Section 26 27 26 for wiring devices, wallplates and coverplates.

2.8 PULL AND JUNCTION BOXES

A. NEMA 4 Rated:

1. Body and cover: 14 GA steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
2. Seams continuously welded and ground smooth.
3. No knockouts.
4. External mounting flanges.
5. Hinged or non-hinged cover held closed with stainless steel screws and clamps.
6. Cover with oil resistant gasket.

B. NEMA 4X Rated (metallic):

1. Body and cover: 14 GA Type 304 or 316 stainless steel.
2. Seams continuously welded and ground smooth.
3. No knockouts.
4. External mounting flanges.
5. Hinged door and stainless steel screws and clamps.
6. Door with oil-resistant gasket.

C. NEMA 12 Rated:

1. Body and cover:
 - a. 14 GA steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
 - b. Type 5052 H-32 aluminum, unpainted.
2. Seams continuously welded and ground smooth.
3. No knockouts.
4. External mounting flanges.
5. Non-hinged cover held closed with captivated cover screws threaded into sealed wells or hinged cover held closed with stainless steel screws and clamps.
6. Flat door with oil resistant gasket.

D. Miscellaneous Accessories:

1. Rigid handles for covers larger than 9 SQFT or heavier than 25 LBS.
2. Split covers when heavier than 25 LBS.
3. Weldnuts for mounting optional panels and terminal kits.
4. Terminal blocks: Screw-post barrier-type, rated 600 volt and 20 ampere minimum.

E. Standards: NEMA 250, UL 50.

2.9 SUPPORT SYSTEMS

A. Multi-conduit Surface or Trapeze Type Support and Pull or Junction Box Supports:

1. Material requirements.
 - a. Aluminum: AA Type 6063-T6.

B. Single Conduit and Outlet Box Support Fasteners:

1. Material requirements:
 - a. Stainless steel.

2.10 OPENINGS AND PENETRATIONS IN WALLS AND FLOORS

A. Sleeves, smoke and fire stop fitting through walls and floors:

1. See Specification Section 01 73 20.

PART 3 - EXECUTION

3.1 RACEWAY INSTALLATION - GENERAL

- A. Shall be in accordance with the requirements of:
 - 1. NFPA 70.
 - 2. Manufacturer instructions.
- B. Size of Raceways:
 - 1. Raceway sizes are shown on the Drawings, if not shown on the Drawings, then size in accordance with NFPA 70.
 - 2. Unless specifically indicated otherwise, the minimum raceway size shall be:
 - a. Conduit: 3/4 IN.
 - b. Wireway: 2-1/2 IN x 2-1/2 IN.
- C. Field Bending and Cutting of Conduits:
 - 1. Utilize tools and equipment recommended by the manufacturer of the conduit, designed for the purpose and the conduit material to make all field bends and cuts.
 - 2. Do not reduce the internal diameter of the conduit when making conduit bends.
 - 3. Prepare tools and equipment to prevent damage to the PVC coating.
 - 4. Debur interior and exterior after cutting.
- D. Male threads of conduit systems shall be coated with an electrically conductive anti-seize compound.
- E. The protective coating integrity of conduits, fittings, outlet, pull and junction boxes and accessories shall be maintained.
 - 1. Repair painted components utilizing touch up paint provided by or approved by the manufacturer.
 - 2. Repair surfaces which will be inaccessible after installation prior to installation.
- F. Remove moisture and debris from conduit before wire is pulled into place.
 - 1. Pull mandrel with diameter nominally 1/4 IN smaller than the interior of the conduit, to remove obstructions.
 - 2. Swab conduit by pulling a clean, tight-fitting rag through the conduit.
 - 3. Tightly plug ends of conduit with tapered wood plugs or plastic inserts until wire is pulled.
- G. Only nylon or polyethylene rope shall be used to pull wire and cable in conduit systems.
- H. Where portions of a raceway are subject to different temperatures and where condensation is known to be a problem, as in cold storage areas of buildings or where passing from the interior to the exterior of a building, the raceway shall be sealed to prevent circulation of warm air to colder section of the raceway.
- I. Fill openings in walls, floors, and ceilings and finish flush with surface.
 - 1. See Specification Section 01 73 20.

3.2 RACEWAY ROUTING

- A. Raceways shall be routed in the field unless otherwise indicated.
 - 1. Conduit and fittings shall be installed, as required, for a complete system that has a neat appearance and is in compliance with all applicable codes.
 - 2. Run in straight lines parallel to or at right angles to building lines.
 - 3. Do not route conduits:
 - a. Through areas of high ambient temperature or radiant heat.
 - b. In suspended concrete slabs.
 - c. In concrete members including slabs, slabs on grade, beams, walls, and columns unless specifically located and detailed on structural Drawings.
 - 4. Locate sleeves or conduits penetrating floors, walls, and beams so as not to significantly impair the strength of the construction. Do not place conduit penetrations in columns.

5. Conduit shall not interfere with, or prevent access to, piping, valves, ductwork, or other equipment for operation, maintenance and repair.
 6. Provide pull boxes or conduit bodies as needed so that there is a maximum of 360 DEG of bends in the conduit run or in long straight runs to limit pulling tensions.
- B. All conduits within a structure shall be installed exposed except as follows:
1. As indicated on the Drawings.
- C. Maintain minimum spacing between parallel conduit and piping runs in accordance with the following when the runs are greater than 30 FT:
1. Between instrumentation and telecommunication: 1 IN.
 2. Between instrumentation and 125 V, 48 V and 24 VDC: 2 IN.
 3. Between instrumentation and 600 V and less AC power or control: 6 IN.
 4. Between instrumentation and greater than 600 VAC power: 12 IN.
 5. Between telecommunication and 125 V, 48 V and 24 VDC: 2 IN.
 6. Between telecommunication and 600 V and less AC power or control: 6 IN.
 7. Between telecommunication and greater than 600 VAC power: 12 IN.
 8. Between 125 V, 48 V and 24 VDC and 600 V and less AC power or control: 2 IN.
 9. Between 125 V, 48 V and 24 VDC and greater than 600 VAC power: 2 IN.
 10. Between 600 V and less AC and greater than 600 VAC: 2 IN.
 11. Between process, gas, air and water pipes: 6 IN.
- D. Conduits shall be installed to eliminate moisture pockets.
1. Where water cannot drain to openings, provide drain fittings in the low spots of the conduit run.
- E. Conduit shall not be routed on the exterior of structures except as specifically indicated on the Drawings.
- F. Where sufficient room exists within the housing of roof-mounted equipment, the conduit shall be stubbed up inside the housing.
- G. Provide all required openings in walls, floors, and ceilings for conduit penetration.
1. See Specification Section 01 73 20.

3.3 RACEWAY APPLICATIONS

- A. Permitted Raceway Types Per Wire or Cable Types:
1. Power wire or cables: All raceway types.
 2. Control wire or cables: All raceway types.
 3. Instrumentation cables: Metallic raceway except nonmetallic may be used underground.
 4. Motor leads from a VFD: RAC or shielded VFD cables in all other raceways.
 5. Telecommunication cables: All raceway types.
- B. Permitted Raceway Types Per Area Designations:
1. Dry areas:
 - a. RAC.
 2. Wet areas:
 - a. RAC.
- C. Permitted Raceway Types Per Routing Locations:
1. In concrete block or brick walls:
 - a. PVC-40.
 2. Through floor penetrations, see Specification Section 01 73 20.
 3. Direct buried conduits and ductbanks:
 - a. PVC-80.
 4. Concrete encased ductbanks:
 - a. PVC-80.
- D. NEMA 1 Rated Wireway:
1. Surface mounted in electrical rooms.

- 2. Surface mounted above removable ceilings tiles of an architecturally finished area.
- E. NEMA 12 Rated Wireway:
 - 1. Surface mounted in areas designated as dry in architecturally and non-architecturally finished areas.
- F. Underground Conduit: See Specification Section 26 05 43.

3.4 CONDUIT FITTINGS AND ACCESSORIES

- A. Rigid nonmetallic conduit and fittings shall be joined utilizing solvent cement.
 - 1. Immediately after installation of conduit and fitting, the fitting or conduit shall be rotated 1/4 turn to provide uniform contact.
- B. Install Expansion Fittings:
 - 1. Where conduits are exposed to the sun and conduit run is greater than 200 FT.
 - 2. Elsewhere as identified on the Drawings.
- C. Install Expansion/Deflection Fittings:
 - 1. Where conduits enter a structure.
 - a. Except electrical manholes and handholes.
 - b. Except where the ductbank is tied to the structure with rebar.
 - 2. Where conduits span structural expansions joints.
 - 3. Elsewhere as identified on the Drawings.
- D. Threaded connections shall be made wrench-tight.
- E. Conduit joints shall be watertight:
 - 1. Where subjected to possible submersion.
 - 2. In areas classified as wet.
 - 3. Underground.
- F. Terminate Conduits:
 - 1. In metallic outlet boxes:
 - a. RAC:
 - 1) Conduit hub and locknut.
 - 2) Insulated bushing and two (2) locknuts.
 - 3) Use grounding type locknut or bushing when required by NFPA 70.
 - 2. In NEMA 1 rated enclosures:
 - a. RAC:
 - 1) Conduit hub and locknut.
 - 2) Insulated bushing and two (2) locknuts.
 - 3) Use grounding type locknut or bushing when required by NFPA 70.
 - 3. In NEMA 12 rated enclosures:
 - a. Watertight, insulated and gasketed hub and locknut.
 - b. Use grounding type locknut or bushing when required by NFPA 70.
 - 4. In NEMA 4 and NEMA 4X rated enclosures:
 - a. Watertight, insulated and gasketed hub and locknut.
 - 5. When stubbed up through the floor into floor mount equipment:
 - a. With an insulated grounding bushing on metallic conduits.
 - b. With end bells on nonmetallic conduits.
- G. Threadless couplings shall only be used to join new conduit to existing conduit when the existing conduit end is not threaded and it is not practical or possible to cut threads on the existing conduit with a pipe threader.

3.5 CONDUIT SUPPORT

- A. Permitted multi-conduit surface or trapeze type support system per area designations and conduit types:
 - 1. Dry or wet areas:
 - a. Aluminum system consisting of: Aluminum channels, fittings and conduit clamps with stainless steel nuts and hardware.
 - 2. Conduit type shall be compatible with the support system material.
 - a. Aluminum system may be used with RAC.
- B. Permitted single conduit support fasteners per area designations and conduit types:
 - 1. Dry or wet areas:
 - a. Material: Stainless steel.
 - b. Types of fasteners: Straps, hangers with bolts, clamps with bolts and bolt on beam clamps.
 - 2. Conduit type shall be compatible with the support fastener material.
 - a. Stainless steel system may be used with RAC.
 - b. Nonmetallic fasteners may be used with PVC-80.
- C. Conduit Support General Requirements:
 - 1. Maximum spacing between conduit supports per NFPA 70.
 - 2. Support conduit from the building structure.
 - 3. Do not support conduit from process, gas, air or water piping; or from other conduits.
 - 4. Provide hangers and brackets to limit the maximum uniform load on a single support to 25 LBS or to the maximum uniform load recommended by the manufacturer if the support is rated less than 25 LBS.
 - a. Do not exceed maximum concentrated load recommended by the manufacturer on any support.
 - b. Conduit hangers:
 - 1) Continuous threaded rods combined with struts or conduit clamps: Do not use perforated strap hangers and iron bailing wire.
 - c. Do not use suspended ceiling support systems to support raceways.
 - d. Hangers in metal roof decks:
 - 1) Utilize fender washers.
 - 2) Not extend above top of ribs.
 - 3) Not interfere with vapor barrier, insulation, or roofing.
 - 5. Conduit support system fasteners:
 - a. Use sleeve-type expansion anchors as fasteners in masonry wall construction.
 - b. Do not use concrete nails and powder-driven fasteners.
 - c. Comply with the requirements of Specification Section 05 50 00 for fasteners in cast-in-place concrete construction.

3.6 OUTLET, PULL AND JUNCTION BOX INSTALLATION

- A. General:
 - 1. Install products in accordance with manufacturer's instructions.
 - 2. See Specification Section 26 05 00 and the Drawings for area classifications.
 - 3. Fill unused punched-out, tapped, or threaded hub openings with insert plugs.
 - 4. Size boxes to accommodate quantity of conductors enclosed and quantity of conduits connected to the box.
- B. Outlet Boxes:
 - 1. Permitted uses of metallic outlet boxes:
 - a. Housing of wiring devices:
 - 1) Recessed in all stud framed walls and ceilings.
 - 2) Recessed in poured concrete, concrete block and brick walls of architecturally finished areas and exterior building walls.

- b. Pull or junction box:
 - 1) Above gypsum wall board or acoustical tile ceilings.
 - 2) Above 10 FT in an architecturally finished area where there is no ceiling.
 - 2. Permitted uses of cast outlet boxes:
 - a. Housing of wiring devices surface mounted in non-architecturally finished dry, wet, corrosive, highly corrosive and hazardous areas.
 - b. Pull and junction box surface mounted in non-architecturally finished dry, wet, corrosive and highly corrosive areas.
 - 3. Mount device outlet boxes where indicated on the Drawings and at heights as scheduled in Specification Section 26 05 00.
 - 4. Set device outlet boxes plumb and vertical to the floor.
 - 5. Outlet boxes recessed in walls:
 - a. Locate in ungrouted cell of concrete block with bottom edge of box flush with bottom edge of block and flush with the face of the block.
 - 6. Place barriers between switches in boxes with 277 V switches on opposite phases.
 - 7. Back-to-back are not permitted.
 - 8. When an outlet box is connected to a PVC coated conduit, the box shall also be PVC coated.
- C. Pull and Junction Boxes:
- 1. Install pull or junction boxes in conduit runs where indicated or required to facilitate pulling of wires or making connections.
 - a. Make covers of boxes accessible.
 - 2. Permitted uses of NEMA 1 enclosure:
 - a. Pull or junction box surface mounted above removable ceiling tiles of an architecturally finished area.
 - 3. Permitted uses of NEMA 4 enclosure:
 - a. Pull or junction box surface mounted in areas designated as wet.
 - 4. Permitted uses of NEMA 4X metallic enclosure:
 - a. Pull or junction box surface mounted in areas designated as wet and/or corrosive.
 - 5. Permitted uses of NEMA 12 enclosure:
 - a. Pull or junction box surface mounted in areas designated as dry.

END OF SECTION

SECTION 26 05 43
ELECTRICAL - EXTERIOR UNDERGROUND

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Material and installation requirements for:
 - a. Manholes.
 - b. Handhole.
 - c. Underground conduits and ductbanks.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 31 23 33 - Trenching, Backfilling and Compacting for Utilities.
 - 5. Division 03 - Concrete.
 - 6. Section 10 14 00 - Identification Devices.
 - 7. Section 26 05 26 - Grounding.
 - 8. Section 26 05 33 - Raceways and Boxes.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. HB, Standard Specifications for Highway Bridges.
 - 2. ASTM International (ASTM):
 - a. A536, Standard Specification for Ductile Iron Castings.
 - 3. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - 4. Society of Cable Telecommunications Engineers (SCTE):
 - a. 77, Specification for Underground Enclosure Integrity.

1.3 DEFINITIONS

- A. Direct-buried conduit(s):
 - 1. Individual (single) underground conduit.
 - 2. Multiple underground conduits, arranged in one or more planes, in a common trench.
- B. Concrete encased ductbank: An individual (single) or multiple conduit(s), arranged in one or more planes, encased in a common concrete envelope.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
 - 3. Fabrication and/or Layout Drawings:
 - a. Provide Dimensional Drawings of each manhole indicating all specified accessories and conduit entry locations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Prefabricated composite handholes:
 - a. Armorcast Products Company.
 - b. Quazite Composolite.
 - c. Synertech.
 2. Precast manholes and handholes:
 - a. Lister Industries.
 - b. Oldcastle Precast, Inc.
 - c. Utility Vault Co.
 3. Manhole and handhole and ductbank accessories:
 - a. Cantex Inc.
 - b. Condux International, Inc.
 - c. Neenah.
 - d. Prime Conduit Inc.
 - e. Underground Devices, Inc.
 - f. Unistrut.
- B. Submit request for substitution in accordance with Specification Section 01 25 00.

2.2 MANHOLES AND HANDHOLES

- A. Prefabricated Composite Material Handholes:
1. Handhole body and cover: Fiberglass reinforced polymer concrete conforming to all test provisions of SCTE 77.
 2. Minimum load ratings: SCTE 77 Tier 15.
 3. Open bottom.
 4. Stackable design as required for specified depth.
 5. Cover:
 - a. Engraved legend of "ELECTRIC" or "COMMUNICATIONS".
 - b. Non-gasketed bolt down with stainless steel Penta head bolts.
 - c. Lay-in non-bolt down, when cover is over 100 LBS.
 - d. One or multiple sections so the maximum weight of a section is 125 LBS.
 6. Cover lifting hook: 24 IN minimum in length.
- B. Precast Manholes and Handholes: Per detail on Drawings.
- C. Cast-in-Place Vault:
1. As detailed on Drawings.
 2. Comply with Division 03 Specifications.

2.3 CONCRETE VAULT ACCESSORIES

- A. Cover and Frame: Per Specification Section 08 31 00.
- B. Cable Racks and Hooks:
1. Material: Heavy-duty nonmetallic (glass reinforced nylon).
 2. Hook loading capacity: 400 LBS minimum.
 3. Rack loading capacity: Four (4) hooks maximum.
 4. Hook deflection: 0.25 IN maximum.
 5. Hooks: Length, as required, with positive locking device to prevent upward movement.
 6. Mounding hardware: Stainless steel.
- C. Cable Pulling Irons:
1. 7/8 IN DIA hot-dipped galvanized steel.
 2. 6000 LB minimum pulling load.

D. Ground Rods and Grounding Equipment: See Specification Section 26 05 26.

2.4 UNDERGROUND CONDUIT AND ACCESSORIES

A. Concrete: Comply with Division 03 Specifications.

B. Conduit: See Section 26 05 33.

C. Duct Spacers/Supports:

1. High density polyethylene or high impact polystyrene.
2. Interlocking.
3. Provide 2 IN minimum spacing between conduits.
4. Accessories, as required:
 - a. Hold down bars.
 - b. Ductbank strapping.

PART 3 - EXECUTION

3.1 GENERAL

A. Drawings indicate the intended location of manholes and handholes and routing of ductbanks and direct buried conduit.

1. Field conditions may affect actual routing.

B. Manhole and Handhole Locations:

1. Approximately where shown on the Drawings.
2. As required for pulling distances.
3. As required to keep pulling tensions under allowable cable tensions.
4. As required for number of bends in ductbank routing.
5. Shall not be installed in a swale or ditch.
6. Determine the exact locations after careful consideration has been given to the location of other utilities, grading, and paving.
7. Locations are to be approved by the Engineer prior to excavation and placement or construction of manholes and handholes.

C. Install products in accordance with manufacturer's instructions.

D. Install manholes and handholes in conduit runs where indicated or as required to facilitate pulling of wires or making connections.

E. Comply with Specification Section 31 23 33 for trenching, backfilling and compacting.

3.2 MANHOLES AND HANDHOLES

A. Prefabricated Composite Material Handholes:

1. For use in areas subjected to occasional non-deliberate vehicular traffic.
2. Place handhole on a foundation of compacted 1/4 to 1/2 IN crushed rock or gravel a minimum of 8 IN thick and 6 IN larger than handholes footprint on all sides.
3. Provide concrete encasement ring around handhole per manufacturers installation instructions (minimum of 10 IN wide x 12 IN deep).
4. Install so that the surrounding grade is 1 IN lower than the top of the handhole.
5. Size: As indicated on the Drawings or as required for the number and size of conduits.
6. Provide cable rails and pulling eyes as needed.

B. Precast Manholes and Handholes:

1. For use in vehicular and non-vehicular traffic areas.
2. Place manhole or handhole on a foundation of compacted 1/4 to 1/2 IN crushed rock or gravel a minimum of 8 IN thick and 6 IN larger than manholes or handholes footprint on all sides.
3. Install so that the top of cover is 1 IN above finished grade.

- a. Where existing grades are higher than finished grades, install sufficient number of courses of curved segmented concrete block between top of handhole and manhole frame to temporarily elevate manhole cover to existing grade level.
4. After installation is complete, backfill and compact soil around manholes and handholes.

C. Cast-in-Place Vaults:

1. Constructed as detailed on the Drawings.
 - a. Support cables on walls by cable racks:
 - 1) Provide a minimum of two (2) racks, install symmetrically on each wall of manholes.
 - a) Provide additional cable racks, as required, so that both ends of cable splices will be supported horizontally.
 - 2) Equip cable racks with adjustable hooks: Quantity of cable hooks as required by the number of conductors to be supported.
 - b. Install a cable-pulling iron in each wall opposite each ductbank entrance.
 - c. In each vault, drive 3/4 IN x 10 FT long copper clad ground rod into the earth with approximately 6 IN exposed above finished floor.
 - 1) Connect all metallic conduits, racks, and other metallic components to ground rod by means of #8 AWG minimum copper wire and approved grounding clamps.
 - 2) Utilize a ground bar in the manhole or handholes if the quantity of ground wires exceeds three (3).
 - 3) Connect ground bar with a #2/0 AWG minimum copper wire.

3.3 UNDERGROUND CONDUITS

A. General Installation Requirements:

1. Ductbank types per location:
 - a. Concrete encased ductbank:
 - 1) Under roads.
 - 2) Conduits containing medium voltage cables.
 - 3) Pad mounted transformer secondaries.
 - 4) As indicated in the Ductbank Schedule.
 - b. Direct-buried conduit(s):
 - 1) Area/Roadway lighting.
 - 2) As indicated in the Ductbank Schedule.
2. Do not place concrete or soil until conduits have been observed by the Engineer.
3. Ductbanks shall be sloped a minimum of 4 IN per 100 FT or as detailed on the Drawings.
 - a. Low points shall be at manholes or handholes.
4. During construction and after conduit installation is complete, plug the ends of all conduits.
5. Provide conduit supports and spacers.
 - a. Place supports and spacers for rigid nonmetallic conduit on maximum centers as indicated for the following trade sizes:
 - 1) 1 IN and less: 3 FT.
 - 2) 1-1/4 to 3 IN: 5 FT.
 - 3) 3-1/2 to 6 IN: 7 FT.
 - b. Place supports and spacers for rigid steel conduit on maximum centers as indicated for the following trade sizes:
 - 1) 1 IN and less: 10 FT.
 - 2) 1-1/4 to 2-1/2 IN: 14 FT.
 - 3) 3 IN and larger: 20 FT.
 - c. Securely anchor conduits to supports and spacers to prevent movement during placement of concrete or soil.
6. Stagger conduit joints at intervals of 6 IN vertically.
7. Make conduit joints watertight and in accordance with manufacturer's recommendations.

8. Accomplish changes in direction of runs exceeding a total of 15 DEG by long sweep bends having a minimum radius of 25 FT.
 - a. Sweep bends may be made up of one or more curved or straight sections or combinations thereof.
 9. Furnish manufactured bends at end of runs.
 - a. Minimum radius of 18 IN for conduits less than 3 IN trade size and 36 IN for conduits 3 IN trade size and larger.
 10. Field cuts requiring tapers shall be made with the proper tools and shall match factory tapers.
 11. After the conduit run has been completed:
 - a. Prove joint integrity and test for out-of-round duct by pulling a test mandrel through each conduit.
 - 1) Test mandrel:
 - a) Length: Not less than 12 IN.
 - b) Diameter: Approximately 1/4 IN less than the inside diameter of the conduit.
 - b. Clean the conduit by pulling a heavy duty wire brush mandrel followed by a rubber duct swab through each conduit.
 12. Pneumatic rodding may be used to draw in lead wire.
 - a. Install a heavy nylon cord free of kinks and splices in all unused new ducts.
 - b. Extend cord 3 FT beyond ends of conduit.
 13. Transition from rigid nonmetallic conduit to rigid aluminum conduit, per Specification Section 26 05 33, prior to entering a structure or going above ground.
 - a. Except rigid nonmetallic conduit may be extended directly to manholes, handholes, pad mounted transformer boxes and other exterior pad mounted electrical equipment where the conduit is concealed within the enclosure.
 - b. Terminate steel conduits with insulated bushings.
 14. Place warning tape in trench directly over ductbanks, direct-buried conduit, and direct-buried wire and cable in accordance with Specification Section 10 14 00.
 15. Placement of conduits stubbing into handholes and manholes shall be located to allow for proper bending radiuses of the cables.
- B. Concrete Encased Ductbank:
1. Ductbank system consists of conduits completely encased in minimum 2 IN of concrete and with separations between different cabling types as required in Specification Section 26 05 33 or as detailed on the Drawings.
 2. Install so that top of concrete encased duct, at any point:
 - a. Is not less than 36 IN below grade.
 - b. Is below pavement sub-grading.
 3. Where identified and for a distance 10 FT either side of the area, the concrete shall be reinforced.
 - a. The reinforcement shall consist of #4 bars and #4 ties placed 12 IN on center, in accordance with Division 03 Specification Sections or as detailed on the Drawings.
 4. Conduit separators shall provide a uniform minimum clearance of 2 IN between conduits or as required in Specification Section 26 05 33 for different cabling types.
- C. Direct-Buried Conduit(s):
1. Install so that the top of the uppermost conduit, at any point:
 - a. Is not less than 36 IN below grade.
 - b. Is below pavement sub-grading.
 2. Provide a uniform minimum clearance of 2 IN between conduits or as required in Specification Section 26 05 33 for different cabling types.
 - a. Maintain the separation of multiple planes of conduits by one of the following methods:
 - 1) Install multilevel conduits with the use of conduit supports and separators to maintain the required separations and backfill with flowable fill (100 PSI) or concrete per Specification Section 31 23 33.

- 2) Install the multilevel conduits one level at a time.
 - a) Each level is backfilled with the appropriate amount of soil and compaction, per Specification Section 31 23 33, to maintain the required separations.

END OF SECTION

SECTION 26 08 13
ACCEPTANCE TESTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Basic requirements for acceptance testing.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Section 01 04 00 - Special Provisions.
 - 3. Section 01 61 03 - Equipment - Basic Requirements.
 - 4. Section 26 05 00 - Electrical - Basic Requirements.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - a. 400, Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems.
 - b. 400.3, Guide for Partial Discharge Testing of Power Cable Systems in a Field Environment.
 - 2. InterNational Electrical Testing Association (NETA):
 - a. ATS, Standard for Acceptance Testing Specifications for Electric Power Equipment and Systems.
 - 3. Nationally Recognized Testing Laboratory (NRTL).
 - 4. Telecommunications Industry Association/Electronic Industries Alliance/American National Standards Institute (TIA/EIA/ANSI):
 - a. 455-78-B, Optical Fibres - PART 1-40: Measurement Methods and Test Procedures - Attenuation.
- B. Qualifications:
 - 1. Testing firm qualifications: See Specification Section 01 61 03.
 - 2. Field personnel:
 - a. See Specification Section 01 61 03.
 - b. As an alternative, supervising technician may be certified by the equipment manufacturer.
 - 3. Analysis personnel:
 - a. See Specification Section 01 61 03.
 - b. As an alternative, supervising technician may be certified by the equipment manufacturer.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. See Specification Section 01 61 03 for electrical equipment and connection testing plan submittal requirements.
- B. Informational Submittals:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Within two (2) weeks after successful completion of Demonstration Period (Commissioning Period):
 - a. Single report containing information including:
 - 1) Summary of Project.

- 2) Information from pre-energization testing.
- 3) See testing and monitoring reporting requirements in Specification Section 01 61 03.

PART 2 - PRODUCTS

2.1 FACTORY QUALITY CONTROL

- A. Provide Electrical equipment with all factory tests required by the applicable industry standards or NRTL.
- B. Factory testing will not be accepted in lieu of field acceptance testing requirements specified in this Specification Section and Specification Section 01 61 03.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

- A. General:
 1. See Specification Section 01 61 03.
 2. Complete electrical testing in three (3) phases:
 - a. Pre-energization testing phase.
 - b. Equipment energized with no load.
 - c. Equipment energized under load.
 3. Perform testing in accordance with this Specification Section and NETA ATS.
 4. Provide field setting and programming of all adjustable protective devices and meters to settings as determined by the approved coordination study.
- B. Equipment Monitoring and Testing Plan: See Specification Section 01 61 03.
- C. Instruments Used in Equipment and Connections Quality Control Testing: See Specification Section 01 61 03.
- D. Testing and Monitoring Program Documentation: See Specification Section 01 61 03.
- E. Electrical Equipment and Connections Testing Program:
 1. See Specification Section 01 61 03.
 2. See individual Division 26 Specification Sections for equipment specific testing requirements.
 3. Test all electrical equipment.
 - a. Perform all required NETA testing.
 - b. Perform all required NETA testing plus the optional testing identified with each specific type of equipment in Article 3.2 of this Specification Section.

3.2 SPECIFIC EQUIPMENT TESTING REQUIREMENTS

- A. Cable - Low Voltage:
 1. Perform inspections and tests per NETA ATS 7.3.2.
 - a. Terminations torqued with a calibrated tool.
 - b. At a minimum, Megger cables #4 and larger.
- B. Low Voltage Molded Case Circuit Breakers:
 1. Perform inspections and tests per NETA ATS 7.6.1.1.
 2. Components:
 - a. Test all components per applicable paragraphs of this Specification Section and NETA ATS.
 - b. Thermal magnetic breakers: Visual and mechanical inspection per NETA ATS only.
 - c. Solid-state trip type: Visual and mechanical inspection and electrical tests per NETA ATS.
 3. Record as-left settings.

- C. Grounding:
 - 1. Perform inspections and tests per NETA ATS 7.13.
 - 2. Components: Test all components per applicable paragraphs of this Specification Section and NETA ATS.
- D. Motor Controllers:
 - 1. Perform inspections and tests per NETA ATS 7.16.
 - 2. Components: Test all components per applicable paragraphs of this Specification Section and NETA ATS.
- E. Control System Functional Test:
 - 1. Perform test upon completion of equipment acceptance tests.
 - 2. The test is to prove the correct interaction of all sensing, processing and action devices.
 - 3. Develop a test plan and parameters for the purpose of evaluating the performance of the system.
 - 4. Perform the following tests:
 - a. Verify the correct operation of all interlock safety devices for fail-safe functions in addition to design function.
 - b. Verify the correct operation of all sensing devices, alarms and indicating devices.
 - 5. Systems to be tested: Digital Metering System.

END OF SECTION

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SECTION 26 09 16
CONTROL EQUIPMENT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Operator control devices (selector switches, pushbuttons, indicator lights, etc.).
 - 2. Control devices (timers, relays, contactors, etc.).
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 26 05 00 - Electrical - Basic Requirements.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. ICS 2, Industrial Control and System Controllers, Contactors and Overload Relays Rated 600 Volts.
 - c. ICS 5, Control Circuit and Pilot Devices.
 - 2. Underwriters Laboratories, Inc. (UL):
 - a. 508, Standard for Safety Industrial Control Equipment.

1.3 SYSTEM DESCRIPTION

- A. This Specification specifies components used within other equipment as referenced in other technical specifications.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification:
 - 1) When components are used within equipment specified in another Section, submittal data for components specified herein shall be included with the submittal for the equipment the components are used in.
 - b. See Section 26 05 00 for additional requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Pilot devices, relays, contactors, and termination equipment:
 - a. Allen-Bradley.
 - b. ATC Diversified Electronics.
 - c. Automatic Switch Company (ASCO).
 - d. c3controls.
 - e. Eaton.

- f. General Electric Company.
- g. Idec.
- h. Phoenix Contact.
- i. Potter & Brumsfield.
- j. Schneider Electric.
- k. Siemens.
- l. Time Mark.

2.2 PILOT DEVICES

A. General Requirements:

- 1. Standards: NEMA ICS 5, UL 508.
- 2. Heavy-duty NEMA 4/13 watertight/oiltight.
- 3. Heavy-duty NEMA 4/4X corrosion resistant.
- 4. Heavy-duty factory sealed, explosion-proof and dust ignition-proof (Class I and II).
- 5. Mounting hole: 30.5 MM.
- 6. Contact blocks: 10 amp, NEMA A600 rated, number as required to fulfill functions shown or specified.
- 7. Legend plate marked as indicated on Drawings or specified.

B. Selector Switches:

- 1. Two, three- or four-position rotary switch as required to fulfill functions shown or specified.
- 2. Maintained contact type.
- 3. Knob or lever type operators.

C. Pushbuttons:

- 1. Non-illuminated type:
 - a. Protective boot.
 - b. Momentary contact.
 - c. Standard flush and mushroom operators.
 - d. Green colored buttons for START or ON.
 - e. Red color for STOP or OFF.
 - f. Emergency stop pushbuttons: Mushroom head operator and maintained contact.
- 2. Illuminating type:
 - a. Protective boot.
 - b. Momentary contact.
 - c. Standard flush operator.
 - d. Serves as both pushbutton control and indicating light.
 - e. Green colored lenses: START or ON.
 - f. Red colored lenses: STOP or OFF.
 - g. LED unit with lens and panel gasket.

D. Indicating Lights:

- 1. Allowing replacement of bulb without removal from control panel.
- 2. Lamp: LED, 120 V or 24 V as required.
- 3. Full voltage type.
- 4. Push-to-test indicating lights.
- 5. Plastic lens.
- 6. Color code lights as follows:
 - a. Red: OFF or stopped.
 - b. Amber: Standby; auto mode; ready; alarm; fail.
 - c. Green: ON or running.

2.3 RELAYS

A. General Requirements:

- 1. Standards: NEMA ICS 5, UL 508.

B. Control Relays:

1. General purpose (ice cube) type:
 - a. Plug-in housing.
 - b. Clear polycarbonate dust cover with clip fastener.
 - c. Coil voltage: 120 VAC or as required.
 - d. Contacts:
 - 1) 10 amp continuous.
 - 2) Silver cadmium oxide.
 - 3) Minimum of 3 SPDT contacts.
 - e. Sockets: DIN rail mounted.
 - f. Internal neon or LED indicator is lit when coil is energized.
 - g. Manual operator switch.
2. Industrial type:
 - a. Coil voltage: 120 VAC or as required.
 - b. Contacts:
 - 1) 10 amp, NEMA A600 rated.
 - 2) Double break, silver alloy.
 - 3) Convertible from normally open to normally closed or vice versa, without removing any wiring.
 - 4) Expandable from 2 poles to 12 poles.
 - c. Provide contacts for all required control plus two spares.

C. Time Delay Relays:

1. General purpose type:
 - a. Timing modes: On and Off delay, interval, one shot and repeat cycle.
 - b. Plug-in housing.
 - c. Polycarbonate dust cover with clip fastener.
 - d. Coil voltage: 120 VAC or as required.
 - e. Contacts:
 - 1) 10 amp continuous.
 - 2) Silver cadmium oxide.
 - 3) Two normally open and two normally closed DPDT contacts.
 - f. Sockets: DIN rail mounted.
 - g. External timing adjustment knob.
 - h. Timing ranges: 0.05 seconds to 16.65 HRS.
 - i. Repeat accuracy: +1%.
2. Solid State industrial type:
 - a. Timing modes: On and Off delay and repeat cycle.
 - b. Industrial housing.
 - c. Coil voltage: 120 VAC or as required.
 - d. Contacts:
 - 1) 5 amp, NEMA B150 rated.
 - 2) Silver alloy.
 - 3) Convertible On Delay and Off Delay contacts.
 - 4) One normally open and one normally closed timed contacts.
 - 5) One normally open and one normally closed instantaneous contacts.
 - e. Furnish with "on" and "timing out" indicators.
 - f. External timing adjustment knob.
 - g. Timing ranges: 0.05 seconds to 10 HRS.
 - h. Repeat accuracy: +1%.
3. Mechanical industrial type:
 - a. Timing modes: On and Off delay.
 - b. Coil voltage: 120 VAC or as required.

- c. Contacts:
 - 1) 10 amp, NEMA A600 rated.
 - 2) Double break, silver alloy.
 - 3) Convertible On Delay and Off Delay contacts.
 - 4) Convertible normally open and normally closed timed contacts.
 - 5) Convertible normally open instantaneous contacts.
- d. External timing adjustment knob.
- e. Timing ranges: 0.2 - 60 sec or 5 - 180 sec.
- f. Repeat accuracy: Greater than +10%.

2.4 CONTACTORS

- A. General Requirements:
 - 1. Standards: NEMA ICS 2, UL 508.
- B. Definite Purpose:
 - 1. Coil voltage: 120 VAC or as required.
 - 2. Contacts: Totally enclosed, double-break silver-cadmium-oxide.
 - 3. Resistive load and horsepower rated.
 - 4. Number of poles, continuous ampere rating and voltage, as indicated on Drawings or as specified.
 - 5. Auxiliary contacts, as indicated on Drawings or as specified.

2.5 TERMINATION EQUIPMENT

- A. General Requirements:
 - 1. Modular type with screw compression clamp.
 - 2. Screws: Stainless steel.
 - 3. Current bar: Nickel-plated copper alloy.
 - 4. Thermoplastic insulation rated for -40 to +90 DEGC.
 - 5. Wire insertion area: Funnel-shaped to guide all conductor strands into terminal.
 - 6. End sections and end stops at each end of terminal strip.
 - 7. Machine-printed terminal markers on both sides of block.
 - 8. Spacing: 6 MM.
 - 9. Wire size: 22-12 AWG.
 - 10. Rated voltage: 600 V.
 - 11. DIN rail mounting.
- B. Standard-type block:
 - 1. Rated current: 30 A.
 - 2. Color: Gray body.
- C. Bladed-type disconnect block:
 - 1. Terminal block with knife blade disconnect which connects or isolated the two sides of the block.
 - 2. Rated current: 10 A.
 - 3. Color:
 - a. Panel control voltage leaves enclosure - normal: Gray body, orange switch.
 - b. Foreign voltage entering enclosure: Orange body, orange switch.
- D. Grounded-type block:
 - 1. Electrically grounded to mounting rail.
 - 2. Terminal ground wires and analog cable shields.
 - 3. Color: Green and yellow body.
- E. Fuse Holders:
 - 1. Blocks can be ganged for multi-pole operation.
 - 2. Spacing: 9.1 MM.
 - 3. Wire size: 30-12 AWG.
 - 4. Rated voltage: 300 V.

5. Rated current: 12 A.
6. Fuse size: 1/4 x 1-1/4.
7. Blown fuse indication.
8. DIN rail mounting.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install as indicated and in accordance with manufacturer's recommendations and instructions.

3.2 FIELD QUALITY CONTROL

- A. See Section 26 05 00.

END OF SECTION

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SECTION 26 27 26

WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Material and installation requirements for:
 - a. Wall switches.
 - b. Receptacles.
 - c. Device wallplates and coverplates.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 26 05 00 - Electrical - Basic Requirements.
 - 5. Section 26 05 33 - Raceways and Boxes.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. WD 1, General Color Requirements for Wiring Devices.
 - c. WD 6, Wiring Devices - Dimensional Requirements.
 - 2. Underwriters Laboratories, Inc. (UL):
 - a. 20, General-Use Snap Switches.
 - b. 498, Standard for Attachment Plugs and Receptacles.
 - c. 514A, Metallic Outlet Boxes.
 - d. 894, Standard for Switches for Use in Hazardous (Classified) Locations.
 - e. 943, Ground-Fault Circuit-Interruption.
 - f. 1010, Standard for Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations.
 - g. 1310, Standard for Class 2 Power Units.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
 - b. See Specification Section 26 05 00 for additional requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Wall switches and receptacles:
 - a. Bryant Electric.
 - b. Cooper Wiring Devices by Eaton.
 - c. Hubbell Incorporated Wiring Device-Kellems.

- d. Leviton Manufacturing Company.
- e. Legrand/Pass & Seymour.

2.2 WALL SWITCHES

- A. Basic requirements unless modified in specific requirements paragraph of switches per designated areas or types:
 - 1. Industrial Specification Grade.
 - 2. Quiet action, snap switch.
 - 3. Self-grounding with grounding terminal.
 - 4. Back and side wired.
 - 5. Solid silver cadmium oxide contacts.
 - 6. Rugged thermoplastic and/or nylon housing and one-piece switch arm.
 - 7. Ratings: 20 A, 120/277 VAC.
 - 8. Switch handle type: Toggle.
 - 9. Switch handle color: Gray.
 - 10. Types as indicated on the Drawings:
 - a. Single-pole.
 - b. Double-pole.
 - c. 3-way.
 - d. 4-way.
 - e. Momentary contact.
 - 11. Standards: UL 20, UL 514A, NEMA WD 1, NEMA WD 6.
- B. Dry Non-Architecturally Finished Area Specific Requirements:
 - 1. Coverplate for use on surface mounted outlet boxes:
 - a. Raised steel, galvanized and factory painted finish.
 - b. Single or multiple gang as required.
 - 2. Wallplate for use on recessed outlet boxes:
 - a. 302 or 304 brushed finish stainless steel. Single or multiple gang as required.
- C. Wet or Damp Non-Architecturally Finished or Exterior Area Specific Requirements:
 - 1. Coverplate:
 - a. Cast aluminum, gasketed, stainless steel hardware, natural, lacquer, or factory painted finish.
 - 2. Operator type:
 - a. Side mounted rocker type handle to operate snap switch.
 - b. Front mounted lever type handle to operate snap switch.
 - c. Push/pull operator to operate snap switch.
 - d. Spring type door to cover snap switch.
 - 3. Wet location rated.
 - 4. Single or multiple gang as required.

2.3 RECEPTACLES

- A. Basic requirements unless modified in specific requirements paragraph of receptacles and per designated areas:
 - 1. Industrial Specification Grade.
 - 2. Straight blade.
 - 3. Brass triple wipe line contacts.
 - 4. One-piece grounding system with double wipe brass grounding contacts and self-grounding strap with grounding terminal.
 - 5. Back and side wired.
 - 6. Rating: 20 A, 125 VAC.
 - 7. High impact nylon body.
 - 8. Receptacle body color:
 - a. Normal power: Gray.
 - 9. Duplex or simplex as indicated on the Drawings.

10. Configuration: NEMA 5-20R.
 11. Standards: UL 498, UL 514A, NEMA WD 1, NEMA WD 6.
- B. Receptacle Type Specific Requirements:
1. Basic receptacles:
 - a. Weather-resistant when located in exterior locations or interior damp or wet areas as indicated on the Drawings.
 - 1) Identification: Letters "WR" on face of receptacle.
 2. Ground Fault Circuit Interrupter (GFCI):
 - a. Specification Grade.
 - b. Class A protection.
 - c. Feed through type.
 - d. Test and reset buttons.
 - e. Self-testing.
 - f. Visual indicator light.
 - g. Weather-resistant when located in exterior locations or interior damp or wet areas as indicated on the Drawings.
 - 1) Identification: Letters "WR" on face of receptacle.
 - h. Additional standards: UL 943.
- C. Dry Non-Architecturally Finished Areas Specific Requirements:
1. Coverplate for use on surface mounted outlet boxes:
 - a. Raised steel, galvanized and factory painted finish.
 - b. Cast aluminum, natural, lacquer or factory painted finish.
 - c. Single or multiple gang as required.
 2. Wallplate for use on recessed outlet boxes:
 - a. 302 or 304 brushed finish stainless steel. Single or multiple gang as required.
- D. Exterior Locations Specific Requirements:
1. Coverplate:
 - a. Extra-duty rated, weatherproof (NEMA 3R) while in use, gasketed, stainless steel hardware, copper-free aluminum, 3.2 IN minimum cover depth for #12 AWG cord.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Mount devices where indicated on the Drawings and as scheduled in Specification Section 26 05 00.
- C. See Specification Section 26 05 33 for device outlet box requirements.
- D. Provide blank plates for empty outlets.

END OF SECTION

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SECTION 26 28 00
OVERCURRENT AND SHORT CIRCUIT PROTECTIVE DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Low voltage circuit breakers.
 - 2. Low voltage fuses.

- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 26 05 00 - Electrical: Basic Requirements.
 - 5. Section 26 08 13 - Acceptance Testing.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - 2. Underwriters Laboratories, Inc. (UL):
 - a. 248-1, Low-Voltage Fuses - Part 1: General Requirements.
 - b. 248-8, Low-Voltage Fuses - Part 8: Class J Fuses.
 - c. 489, Standard for Safety Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.
 - d. 943, Standard for Safety for Ground-Fault Circuit-Interrupters.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Product technical data including:
 - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
 - b. See Specification Section 26 05 00 for additional requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Circuit breakers:
 - a. Eaton.
 - b. General Electric Company.
 - c. Square D Company.
 - d. Siemens.
 - 2. Fuses:
 - a. Eaton Bussmann, Inc.
 - b. Littelfuse, Inc.
 - c. Mersen

- B. Submit request for substitution in accordance with Specification Section 01 25 00.

2.2 CIRCUIT BREAKERS

- A. Molded Case Type:
 - 1. General:
 - a. Standards: UL 489.
 - b. Unit construction.
 - c. Over-center, toggle handle operated.
 - d. Quick-make, quick-break, independent of toggle handle operation.
 - e. Manual and automatic operation.
 - f. All poles open and close simultaneously.
 - g. Three (3) position handle: On, off and tripped.
 - h. Molded-in ON and OFF markings on breaker cover.
 - i. One-, two- or three-pole as indicated on the Drawings.
 - j. Current and interrupting ratings as indicated on the Drawings.
 - k. Bolt on type.
 - 2. Thermal magnetic type:
 - a. Inverse time overload and instantaneous short circuit protection by means of a thermal magnetic element.
 - b. Frame size 150 amp and below:
 - 1) Non-interchangeable, non-adjustable thermal magnetic trip units.
 - c. Frame sizes 225 to 400 amp (trip settings less than 400A):
 - 1) Interchangeable and adjustable instantaneous thermal magnetic trip units.
 - d. Ground Fault Circuit Interrupter (GFCI) Listed:
 - 1) Standard: UL 943.
 - 2) One- or two-pole as indicated on the Drawings.
 - 3) Class A ground fault circuit.
 - 4) Trip on 5 mA ground fault (4-6 mA range).
 - 3. Solid state trip type:
 - a. Inverse time overload, instantaneous short circuit and ground fault protection by means of a solid state trip element, associated current monitors and flux shunt trip mechanism.
 - b. Frame size 400 amp to 1200 amp (trip settings between 400 and 1200A):
 - 1) Standard rating.
 - 2) Interchangeable current sensor or rating plug.
 - 3) Adjustable long time pick-up setting.
 - a) Adjustable from 50 to 100 PCT of the current sensor or rating plug.
 - 4) Adjustable short time pick-up setting.
 - 5) Adjustable instantaneous pick-up.
 - 6) Fixed ground fault pick-up, when indicated on the Drawings.
 - 7) Arc energy reduction pick-up where indicated on the Drawings. Activated by switch on trip unit.
 - 4. Motor circuit protector:
 - a. Adjustable instantaneous short circuit protection by means of a magnetic or solid state trip element.
 - b. Sized for the connected motor.

2.3 FUSES

- A. UL Class J fuses:
 - 1. Standard: UL 248-1 and UL 248-8.
 - 2. Dual-element time-delay and current limiting rejection type.
 - 3. Ratings: 600 V, 0-600 amps and 200,000 RMS AIC symmetrical.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Current and interrupting ratings as indicated on the Drawings.

- B. Series rated systems not acceptable.
- C. Devices shall be ambient temperature compensated.
- D. Circuit Breakers:
 - 1. Molded case circuit breakers shall incorporate the following, unless indicated otherwise on the Drawings:
 - a. Frame sizes 400 amp and less with trip setting less than 400A shall be thermal magnetic type.
 - b. Frame sizes 400 amp and larger shall be solid state trip type.
 - c. Frame sizes 1000 amp and above shall include integral ground fault protection, when indicated on the Drawings.
 - d. Frame sizes 1200 amp and above shall include integral arc reduction protection, when indicated on the Drawings.
 - e. Motor circuit protectors sized for the connected motor.
- E. Fuses:
 - 1. UL Class J: Use for feeder devices 600 amps and smaller.

3.2 FIELD QUALITY CONTROL

- A. Adjustable Circuit Breakers:
 - 1. Set all circuit breaker adjustable taps as defined in the coordination study, except adjust motor circuit protectors per the motor nameplate and NFPA 70 requirements.
- B. Testing:
 - 1. Acceptance testing: See Specification Section 26 08 13.
 - 2. Adjustable circuit breakers:
 - a. Test and verify all circuit breaker trip functions using a test set provided by the manufacturer for that purpose for circuit breakers 1200 A and above.

END OF SECTION

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SECTION 26 28 16 SAFETY SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Safety switches.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 26 05 00 - Electrical - Basic Requirements.
 - 5. Section 26 28 00 - Overcurrent and Short Circuit Protective Devices.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. KS 1, Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
 - 2. Underwriters Laboratories, Inc. (UL):
 - a. 98, Enclosed and Dead-Front Switches.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
 - b. Provide a Summary Table or use Exhibit A that associates the safety switch features with connected equipment tag number. Exhibit A indicates minimum data required.
 - c. See Specification Section 26 05 00 for additional requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following safety switch manufacturers are acceptable:
 - 1. Eaton
 - 2. General Electric Company.
 - 3. Square D Company.
 - 4. Siemens.

2.2 SAFETY SWITCHES

- A. General:
 - 1. Non-fusible or fusible as indicated on the Drawings.
 - 2. Suitable for service entrance when required.
 - 3. NEMA Type HD heavy-duty construction.
 - 4. Switch blades will be fully visible in the OFF position with the enclosure door open.
 - 5. Quick-make/quick-break operating mechanism.
 - 6. Deionizing arc chutes.

7. Manufacture double-break rotary action shaft and switchblade as one (1) common component.
 8. Clear line shields to prevent accidental contact with line terminals.
 9. Operating handle (except NEMA 7 and NEMA 9 rated enclosures):
 - a. Red and easily recognizable.
 - b. Padlockable in the OFF position.
 - c. Interlocked to prevent door from opening when the switch is in the ON position with a defeater mechanism.
- B. Ratings:
1. Horsepower rated of connected motor.
 2. Voltage and amperage: As indicated on the Drawings.
 3. Short circuit withstand:
 - a. Non-fused: 10,000A.
 - b. Fused: 200,000A.
- C. Accessories, when indicated in PART 3 of this Specification Section or on the Drawings:
1. Neutral kits.
 2. Ground lug kits.
 3. Auxiliary contact kits:
 - a. Opens before main switch.
 - b. Rated 10A at 125/250 VAC.
 - c. One (1) N.O. and one (1) N.C. contact.
- D. Enclosures:
1. NEMA 1 rated:
 - a. Body and cover: Sheet steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
 - b. With or without knockouts, hinged and lockable door.
 2. NEMA 3R rated:
 - a. Body and cover: Sheet steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
 - b. With or without knockouts, hinged and lockable door.
 3. NEMA 4 rated:
 - a. Body and cover: Sheet steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
 - b. No knockouts, external mounting flanges, hinged, gasketed and lockable door.
 4. NEMA 12 rated:
 - a. Body and cover: Sheet steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
 - b. No knockouts, external mounting flanges, hinged and gasketed door.
- E. Overcurrent and short circuit protective devices:
1. Fuses.
 2. See Specification Section 26 28 00 for overcurrent and short circuit protective device requirements.
- F. Standards: NEMA KS 1, UL 98.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install as indicated and in accordance with manufacturer's instructions and recommendations.
- B. Install switches adjacent to the equipment they are intended to serve unless otherwise indicated on the Drawings.

- C. Provide auxiliary contact kit on local safety switches for motors being controlled by a variable frequency drive.
 - 1. The VFD is to be disabled when the switch is in the open position.
- D. Permitted uses of NEMA 1 enclosure:
 - 1. Surface or flush mounted in areas designated dry in architecturally finished areas.
- E. Permitted uses of NEMA 3R enclosure:
 - 1. Surface mounted in exterior location for HVAC equipment only.
- F. Permitted uses of NEMA 4 enclosure:
 - 1. Surface mounted in areas designated as wet.
- G. Permitted uses of NEMA 12 enclosure:
 - 1. Surface mounted in areas designated as dry in non-architecturally finished areas.

END OF SECTION

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SECTION 26 50 00
INTERIOR AND EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Material and installation requirements for:
 - a. Interior building and exterior building mounted luminaires.
 - b. Exterior and site luminaires.
 - c. Lamps and LEDs.
 - d. Ballasts and drivers.
- B. Related Sections include but are not necessarily limited to:
1. SUDAS Division 1.
 2. Division 01 - General Requirements.
 3. Section 01 04 00 - Special Provisions.
 4. Division 03 - Concrete.
 5. Section 26 05 00 - Electrical - Basic Requirements.
 6. Section 26 05 19 - Wire and Cable - 600 Volt and Below.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. American National Standards Institute (ANSI):
 - a. C78.377, Specification for the Chromaticity of Solid State Lighting Products.
 2. Federal Communications Commission (FCC):
 - a. Code of Federal Regulations (CFR), 47 CFR 18, Industrial, Scientific and Medical Equipment.
 3. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - a. C62.41, Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
 4. Illuminating Engineering Society of North America (IESNA):
 - a. LM-79, Electrical and Photometric Measurements of Solid-State Lighting Products.
 - b. LM-80, Measuring Lumen Maintenance of LED Light Sources.
 5. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000Volts Maximum).
 6. National Electrical Manufacturers Association/American National Standards Institute (NEMA/ANSI):
 - a. SSL 1, Electronic Drivers for LED Devices, Arrays and Systems.
 7. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - b. 101, Life Safety Code.
 8. Underwriters Laboratories, Inc. (UL):
 - a. 248-4, Low-Voltage Fuses - Part 4: Class CC Fuses.
 - b. 924, Standard for Emergency Lighting and Power Equipment.
 - c. 1012, Power Units Other Than Class 2.
 - d. 1310, Class 2 Power Units.
 - e. 1598, Luminaires.
 - f. 8750, Light Emitting Diode (LED) Equipment for Use in Lighting Products.
 9. United States Department of Energy (USDOE):
 - a. EPCAct, the National Energy Policy Act.

1.3 DEFINITIONS

- A. Average Rated Life for HID, fluorescent and induction luminaire light sources:
 - 1. The time after which 50% of a large group of light sources will have failed and 50% will have survived under normal operating conditions.
- B. Useful Life for LED luminaire light sources:
 - 1. The operating hours before reaching 70% of the initial rated lumen output (L70) with no catastrophic failures under normal operating conditions.
 - 2. This is also known as 70% "Rated Lumen Maintenance Life" as defined in IESNA LM-80.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Product technical data:
 - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
 - b. Identify luminaire by Luminaire Schedule designation.
 - c. Luminaire data sheet:
 - 1) Name of manufacturer.
 - 2) Complete order information (catalog number).
 - 3) Description of construction and optics.
 - 4) Total input wattage.
 - 5) Luminous efficacy (lumens/Watt).
 - 6) Dimensional size.
 - 7) Weight.
 - 8) UL nameplate data for luminaires used in Class 1, Division 1 and 2 areas.
 - 9) Effective Projected Areas (EPA) for pole mounted luminaires.
 - d. Solid state Luminaire additional data:
 - 1) Voltage.
 - 2) Initial and IES L70 lumens.
 - 3) Luminous efficacy (lumens/Watt).
 - 4) Correlated Color Temperature (CCT).
 - 5) Color Rendering Index (CRI).
 - 6) Total Harmonic Distortion (THD).
 - 7) Driver type (0-10V, constant voltage, constant current).
 - 8) Dimming range and control device compatibility.
 - 9) Emergency battery driver:
 - a) Compatibility with lighting module.
 - b) Lumen output of lighting module in emergency operation.
 - c) Battery life.
 - d) Description of testing.
 - e) Ambient operating temperature.
 - 10) Warranty information.
 - e. See Specification Section 26 05 00 for additional requirements.
 - 3. Certifications: Solid-state Luminaire Useful Life Certificate.
- B. Contract Closeout Information:
 - 1. Operation and Maintenance Data:
 - a. See Specification Section 01 33 00 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
 - b. Submittal data for each component covered by warranty.
 - c. Warranty.

1.5 WARRANTY

- A. Minimum of a five (5) year Warranty from date of manufacture against failure for solid-state luminaire including LED arrays, LED drivers and integral control devices. The solid-state product is considered defective if more than 15% of the individual light emitting diodes fail to illuminate.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Luminaires: Per Luminaire Schedule.
 - 2. Solid State Light Sources:
 - a. Cree.
 - b. Xicato.
 - c. Luminaire manufacturer's proprietary system.
 - 3. LED Driver: Luminaire manufacturer's standard.

2.2 GENERAL REQUIREMENTS

- A. All Luminaires and Electrical Components:
 - 1. UL labeled.
 - 2. Luminaires complete with lamps and ballasts or LED modules and drivers.
 - 3. Rated for area classification as indicated on the Drawings.
 - a. In Class I, Division 1 and 2 areas, the temperature rating of the luminaires and lamp or LED combination shall not exceed the auto-ignition temperature of the atmosphere in which the Luminaire is used.
- B. Electrical components of recessed luminaires shall be accessible and removable through luminaire without having to remove luminaire from ceiling.
- C. No live parts normally exposed to contact.
- D. When intended for use in wet areas: Mark luminaire "Suitable for wet locations."
- E. When intended for use in damp areas: Mark luminaire "Suitable for damp locations" or "Suitable for wet locations."

2.3 LUMINAIRES

- A. Standards and Listings: UL 1598.
- B. Housings:
 - 1. As indicated in the Luminaire Schedule and the following:
 - a. Extruded aluminum housings, where scheduled, shall be at least 1/8 IN thick.
 - b. Punch and form housings prior to finishing (post-paint).
- C. Castings:
 - 1. As indicated in the Luminaire Schedule and the following:
 - a. Uniform quality, free from imperfections affecting strength and appearance.
 - b. Exterior surfaces, if not receiving a finish coat, shall be smooth and match adjacent surfaces. At least one coat of clear methacrylate lacquer shall be applied unless a painted finish is specified.
- D. Fasteners:
 - 1. As indicated in the Luminaire Schedule and the following:
 - a. Aluminum or steel luminaires: Cadmium-plated or an equivalent.
 - b. Stainless steel luminaires: Stainless steel.
 - c. Bronze luminaires: Bronze or stainless steel.

- d. Non-metallic luminaires: Stainless steel.
- E. Finishes:
 - 1. As indicated in the Luminaire Schedule and the following:
 - a. Painted surfaces:
 - 1) Manufacturer's standard metal pretreatment and baked or air-dried, light-stabilized enamel finish; acrylic, alkyd, epoxy, polyester or polyurethane.
 - 2) White finishes shall have minimum 85% reflectance.
 - b. Unpainted surfaces:
 - 1) Interior: Clear anodic coating, satin finish.
 - 2) Exterior: Clear anodic coating.
- F. Lens/Louver Frames:
 - 1. As indicated in the Luminaire Schedule and the following:
 - a. Extruded aluminum with mitered corners.
 - b. Hinging or other normal motion shall not cause lens or louver to drop out.
 - c. No light leak between frame and housing.
- G. Lenses:
 - 1. As Indicated in the Luminaire Schedule and the Following:
 - a. 100% virgin, UV stabilized acrylic.
 - b. Linear fluorescent luminaires: Male conical prismatic, minimum thickness 0.150 IN, size as required.
 - c. Held securely in place but must also be removable for cleaning and relamping.
 - d. Luminaires with directional lenses shall include a lens orientation device to ensure that lens installation provides light distribution as designed.
 - e. No light leaks between the lens and the luminaire.
- H. Reflectors:
 - 1. As Indicated in the Luminaire Schedule and the Following:
 - a. Linear fluorescent luminaires: High-purity #12 aluminum reflector sheet, 0.047 IN (15 GA) or heavier, free from fabrication or assembly damages. No exposed rivets, springs or other hardware after installation. Shape reflectors in modified elliptical or parabolic contour to produce no apparent brightness. Lamp image or any part of lamp shall not be visible in 45 degree zone.
 - b. Down Light Reflector and Baffle Finishes: First-quality "Alzak" anodized specular finish.
 - c. Troffer reflector finish: Integral reflectors shall be painted white after fabrication with a minimum reflectance value of 90%.
- I. Gaskets:
 - 1. As Indicated in the Luminaire Schedule and the Following:
 - a. Gaskets at face plates or frames of recessed luminaires which serve as ceiling trim and which allow interior access.
 - b. Moisture seal gaskets at exterior locations and in other designated wet areas.
 - c. Secure frames to luminaire bodies with screws or other means, to result in tight installation, without light leaks.
- J. Ventilation:
 - 1. Ventilation openings of adequate size and quantity to permit operation of lamps and ballast without affecting rated output or life expectancy. Include wire mesh screens.
- K. Wiring:
 - 1. Factory-wired to be compatible with the project electrical and controls systems.
- L. Mounting Accessories:
 - 1. Provide appropriate mounting accessories for each luminaire, compatible with various structural conditions encountered.

2. All luminaires with adjustable beam angles shall have a locking device to ensure that the beam distribution is not affected during relamping or cleaning.
3. Luminaire Suspension Material:
 - a. Unfinished Spaces:
 - 1) 1/2 IN minimum diameter swivel stem, unless otherwise noted.
 - 2) Safety chain on high bay type.

2.4 SOLID-STATE LUMINAIRES - ADDITIONAL REQUIREMENTS

- A. Standards:
 1. IESNA LM-79, IESNA LM-80.
 2. NEMA SSL 1.
 3. UL 1012, 1310, and 8750.
- B. Solid state modules and driver to be provided and warranted by luminaire manufacturer.
- C. Solid-State Modules:
 1. Uniform color temperature of 4000K unless otherwise noted on the Luminaire schedule.
 - a. Color temperature measurement shall have a maximum 3 SDCM on the MacAdam Ellipse for frosted lensed luminaires, and 2 SDCM for other luminaire types (ANSI C78.377).
 2. Minimum color rendering index (CRI) of 80 for interior luminaires, 70 for exterior luminaires.
 3. LED module light output and efficacy: Measured in accordance with IESNA LM-79 standards.
 4. LED useful life and lumen maintenance: Measured in accordance with IESNA LM-80 standards.
 5. Driver and LED module: Minimum useful life of 50,000 HRS (L70).
 6. Individual LEDs connected such that a failure of one LED will not result in a light output loss of the entire luminaire.
- D. Driver:
 1. Compatible with solid-state modules and control devices specified.
 2. Operate from 60 Hz input source of 120V through 277V with sustained variations of +/- 10% (voltage and frequency).
 3. Input current Total Harmonic Distortion (THD): Less than 20% when operated at nominal line voltage.
 4. Power Factor: Greater than 0.90.
 5. Avoid interference with infrared devices and eliminate visible flicker.
 6. Comply with ANSI C62.41 Category A for Transient protection.
 7. Comply with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 18, Non-Consumer (Class A) for EMI/RFI (conducted and radiated).
 8. Dimmable drivers capable of continuous dimming over a range of 100% to 1% of rated lumen output. Dimming controlled by a 0-10VDC signal, unless otherwise specified in Luminaire Schedule.
 9. Control device must be compatible with type of driver and coordinated prior to submission of Shop Drawings. List of compatible dimming controllers must include the range of perceived brightness. No visible flicker throughout the dimming range.
 10. Remote-mounting:
 - a. Provide maximum allowable distances for secondary wire runs to luminaires.
 - b. Provide remote mounting hardware and enclosures as required.
 11. Operating temperature range must be suitable for site temperature conditions within exterior and gasketed luminaires.
- E. Luminaire properly heat sunk to assure LED junction temperature ratings are not exceeded.
 1. Provide ambient operating temperature range for which product is warranted.

2.5 EXIT SIGNS AND EMERGENCY LIGHTING UNITS

- A. Standards:
 - 1. UL 924.
 - 2. NFPA 101.
 - 3. Local State or City requirements.
- B. Exit Signs:
 - 1. Housing and finish: As indicated in the Luminaire Schedule.
 - 2. LED illuminated with integral driver.
 - 3. AC powered or AC and battery powered: As indicated in the Luminaire Schedule.
 - 4. Battery powered units:
 - a. Battery type: As indicated in the Luminaire Schedule.
 - b. Self-testing/self-diagnostic.
 - 1) Electronic circuitry automatically test emergency lighting for a minimum of 30 seconds every 30 days and 90 minutes once a year.
 - c. Consist of batter, charger and electronic circuitry.
 - d. Solid state charging indicator light to monitor the charger and battery.
 - e. Single-pole test switch.
 - f. A user selectable audible alarm. The alarm shall be engaged unless noted otherwise on the Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Coordinate Luminaire Types with Ceiling Construction:
 - 1. Provide mounting hardware for the ceiling system in which the luminaire is to be installed.
- B. Provide mounting brackets and/or structural mounting support for wall-mounted luminaires.
 - 1. Do not support luminaire from conduit system.
 - 2. When luminaire is supported from outlet boxes, install per NFPA 70.
 - 3. Supports for luminaire mounted on exterior walls shall not be attached to exterior face of the wall.
- C. Provide pendant luminaires with swivel hangers which will allow luminaire to swing in any direction but will not permit stem to rotate.
 - 1. Provide hangers with enclosure rating (NEMA 1, 4, or 7) equal to enclosure requirements of area in which they are installed.
 - 2. Swivel hangers for luminaires in mechanical equipment areas: Shock absorbing type.
 - 3. Secure low and high bay luminaires with safety chain or safety aircraft cable to the building structure.
 - a. Chain or cable to prevent luminaire from falling more than 3 IN before the luminaire is caught by the chain or cable.
- D. Pendant Mounted, Open, Industrial Fluorescent Luminaire:
 - 1. Not in continuous rows:
 - a. Supported by conduit or by approved chains or cable:
 - b. Hardwired to ceiling mounted junction box.
- E. Mount luminaire at heights indicated in Specification Section 26 05 00 or per Luminaire Schedule or as indicted on the Drawings.
- F. Install exterior luminaires so that water cannot enter or accumulate in the wiring compartment.
- G. Ground luminaire and ballasts.

3.2 LIGHTING CONTROL

- A. Exterior wall mounted and pole mounted fixtures controlled as detailed on the Drawings.

3.3 ADJUST AND CLEAN

- A. See Specification Section 01 74 00.
- B. Aim all emergency lighting units, so that, the path of egress is illuminated.

END OF SECTION

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DIVISION 31

EARTHWORK



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SECTION 31 10 00 SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Site clearing, tree protection, stripping topsoil, and demolition.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 31 23 00 - Earthwork.
 - 5. Section 31 25 00 - Soil Erosion and Sediment Control.
 - 6. Section 32 91 13 - Topsoiling and Finished Grading.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Iowa Statewide Urban Design and Specifications (SUDAS), 2022 Edition.

PART 2 - PRODUCTS - (NOT APPLICABLE TO THIS SPECIFICATION SECTION)

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect existing trees and other vegetation to remain against damage.
 - 1. Do not smother trees by stockpiling construction materials or excavated materials within drip line.
 - 2. Avoid foot or vehicular traffic or parking of vehicles within drip line.
 - 3. Provide temporary protection as required.
- B. Repair or replace trees and vegetation damaged by construction operations.
 - 1. Repair to be performed by a qualified tree surgeon/licensed arborist.
 - 2. Remove trees which cannot be repaired and restored to full-growth status.
 - 3. Replace with new trees of minimum 4 IN caliper or as required by local tree ordinance.
- C. Owner will obtain authority for removal and alteration work on adjoining property, as applicable.

3.2 SITE CLEARING

- A. Topsoil Removal:
 - 1. Strip topsoil to depths encountered or as specified within the soils report, 4 IN minimum.
 - a. Remove heavy growths of grass before stripping.
 - b. Stop topsoil stripping sufficient distance from such trees to prevent damage to main root system.
 - c. Separate from underlying subsoil or objectionable material.
 - 2. Stockpile topsoil where directed by Engineer.
 - a. Construct storage piles to freely drain surface water.
 - b. Seed or cover storage piles to prevent erosion.
- B. Clearing and Grubbing:
 - 1. Clear from within limits of construction all trees not marked to remain.
 - a. Include shrubs, brush, downed timber, rotten wood, heavy growth of grass and weeds, vines, rubbish, structures and debris.

2. Grub (remove) from within limits of construction all stumps, roots, root mats, logs, and debris encountered.
- C. Disposal of Waste Materials:
1. Do not burn combustible materials on site.
 2. Remove all waste materials from site.
 3. Do not bury organic matter on site.

3.3 ACCEPTANCE

- A. Upon completion of the site clearing, obtain Engineer's acceptance of the extent of clearing, depth of stripping, and rough grade.

END OF SECTION

SECTION 31 23 00

EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Earthwork - excavation, backfilling, grading, compaction, disposal of waste and surplus materials, placing crushed stone, construction of berms, sheeting, bracing, dewatering and other Earthwork related work.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 31 25 00 - Soil Erosion and Sediment Control.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. C33/C33M, Standard Specification for Concrete Aggregates.
 - b. D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 FT-LBF/FT³).
 - c. D2487, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 - d. D4253, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
 - e. D4254, Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
 - 2. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR Part 1926.650, Safety and Health Regulations for Construction - Excavations, referred to herein as OSHA Standards.
 - 3. Iowa Statewide Urban Design and Specifications (SUDAS), 2022 Edition.

1.3 DEFINITIONS

- A. Excavation:
 - 1. Consists of removal of material encountered to subgrade elevations required or indicated.
 - 2. Includes excavation of soils; pavements and other obstructions visible on surface; underground structures, utilities, and other items indicated to be demolished and removed; boulders; and rock.
- B. Foundations: Footings, base slabs, foundation walls, mat foundations, grade beams, piers and any other support placed directly on soil or rock.
- C. Geotechnical Engineer: Independent geotechnical specialist providing field quality control for the project.
- D. Structure: Buildings, foundations, slabs, tanks, curbs, or other man-made stationary features occurring above or below ground surface.
- E. Subgrade: The earth or soil layer immediately below foundation bearing elevation, subbase material, fill material, backfill material, or topsoil materials.

- F. Unauthorized Excavation:
 - 1. Consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Engineer.
 - a. Unauthorized excavation, as well as associated remedial work as directed by Engineer or Geotechnical Engineer, shall be at Contractor's expense.
 - 2. Unsuitable Soil Materials: Soil materials encountered at or below subgrade elevation of insufficient strength and stiffness to support construction as determined by the Geotechnical Engineer.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - 3. Certifications.
- B. Samples:
 - 1. Coordinate samples and testing for approval of off-site materials with the Geotechnical Engineer.

1.5 PROJECT CONDITIONS

- A. Salvageable Items: Carefully remove items to be salvaged, and store on Owner's premises unless otherwise directed.
- B. Dispose of waste materials, legally, off site.
 - 1. Burning, as a means of waste disposal, is not permitted.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Fill and Backfill:
 - 1. Selected material approved by Geotechnical Engineer from site excavation or from offsite borrow.
 - 2. Structural Fill:
 - a. Low volume change (LVC) cohesive soil.
 - b. May be granular soil at Contractor's option except for work near influent channel
 - c. Free of organic matter, frozen material and debris.
 - d. Low volume change (LVC) cohesive soil:
 - 1) ASTM D2487 classification: CL.
 - 2) On-site inorganic lean clays or imported low plasticity cohesive soils.
 - 3) Liquid limit: Less than 40.
 - 4) Maximum plasticity index: 20.
 - 5) On-site materials shall be moisture conditioned as required.
 - 6) Shale materials shall not be used as LVC fill.
 - e. Granular soil:
 - 1) ASTM D2487 classification: GW, GP, GM, GC, SW, SP, SM or SC.
- B. Working Surface:
 - 1. Top 6 IN: Clean crushed rock with all particles passing the 1-1/2 IN sieve and 10-15% passing the No. 200 sieve.
 - 2. Remainder: Clean crushed rock with all particles passing the 1-1/2 IN sieve and less than 5% passing the No. 200 sieve.
 - 3. Do not install working surface near influent channel.

- C. Granular Fill Under Building Floor Slabs-On-Grade, Electrical Equipment Pads, Manholes, and Handholes:
 - 1. Clean, granular material.
 - 2. Less than 5% fines passing the No. 200 sieve.
 - 3. ASTM C33/C33M gradation size No. 67, 3/4 IN to No. 4 or other material acceptable to Geotechnical Engineer.
- D. Granular Fill Under Base Slabs with Pressure Relief Valves:
 - 1. Drainage material: Conform to ASTM C33/C33M, Size No. 67.
 - 2. Filter material: Conform to ASTM C33/C33M requirements for fine aggregate.
- E. Flowable Fill: See Specification Section 03 09 00.

PART 3 - EXECUTION

3.1 PROTECTION

- A. Erosion Control:
 - 1. See Specification Section 31 25 00.
 - 2. Clean paved roadways daily of any spillage of dirt, rocks or debris from vehicles and equipment entering or leaving site.
 - 3. Conduct work to minimize erosion of site. Remove eroded material washed off site.
 - a. If necessary or requested by Engineer, construct stilling areas to settle and detain eroded material.
- B. Protect existing surface and subsurface features on-site and adjacent to site as follows:
 - 1. Provide barricades, coverings, or other types of protection necessary to prevent damage to existing items indicated to remain in place.
 - 2. Protect and maintain benchmarks, monuments or other established reference points and property corners.
 - a. If disturbed or destroyed, replace at own expense to full satisfaction of Owner and controlling agency.
 - 3. Verify location of utilities.
 - a. Omission or inclusion of utility items does not constitute nonexistence or definite location.
 - b. Secure and examine local utility records for location data.
 - c. Take necessary precautions to protect existing utilities from damage due to any construction activity.
 - 1) If utilities are indicated to remain in place, provide adequate means of support and protection during earthwork operations.
 - 2) Do not interrupt existing utilities serving facilities occupied by Owner or others, during occupied hours, except when permitted in writing by Owner and then only after acceptable temporary utility services have been provided.
 - 3) Obtain Owner's approval prior to disconnecting any utility service.
 - d. Repair damages to utility items at own expense.
 - e. In case of damage, notify Engineer at once so required protective measures may be taken.
 - 4. Maintain free of damage, existing sidewalks, structures, and pavement, not indicated to be removed.
 - a. Protect new and existing structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
 - b. Any item known or unknown or not properly located that is inadvertently damaged shall be repaired to original condition.
 - c. All repairs to be made and paid for by Contractor.
 - 5. Provide full access to public and private premises, fire hydrants, street crossings, sidewalks and other points as designated by Owner to prevent serious interruption of travel.

6. Maintain stockpiles and excavations in such a manner to prevent inconvenience or damage to structures on-site or on adjoining property.
7. Avoid surcharge or excavation procedures which can result in heaving, caving, or slides.

3.2 SITE EXCAVATION AND GRADING

- A. The site excavation and grading work includes the offsite disposition of all material:
 1. That exceed quantities required for earthwork on the project.
 2. That the Geotechnical Engineer classifies as unclassified excavation.
 3. That the Geotechnical Engineer classifies as unacceptable.
 4. That the Geotechnical Engineer classifies as potentially contaminated.
- B. Excavation and Grading:
 1. Perform as required by the Contract Drawings.
 2. Contract Drawings may indicate both existing grade and finished grade required for construction of Project.
 - a. Stake all units, structures, piping, roads, parking areas and walks and establish their elevations.
 - b. Perform other layout work required.
 - c. Replace property corner markers to original location if disturbed or destroyed.
 3. Preparation of ground surface for embankments or fills:
 - a. Before fill is started, scarify to a minimum depth of 6 IN in all proposed embankment and fill areas.
 - b. Where ground surface is steeper than one vertical to four horizontal, plow surface in a manner to bench and break up surface so that fill material will bind with existing surface.
 4. Protection of finish grade:
 - a. During construction, shape and drain embankment and excavations.
 - b. Maintain ditches and drains to provide drainage at all times.
 - c. Protect graded areas against action of elements prior to acceptance of work.
 - d. Reestablish grade where settlement or erosion occurs.
- C. Borrow:
 1. Provide necessary amount of approved fill compacted to density equal to that indicated in this Specification.
 2. Include cost of all borrow material in original proposal.
 3. Fill material to be approved by Geotechnical Engineer prior to placement.
- D. Construct embankments and fills as required by the Contract Drawings:
 1. Construct embankments and fills at locations and to lines of grade indicated.
 - a. Completed fill shall correspond to shape of typical cross section or contour indicated regardless of method used to show shape, size, and extent of line and grade of completed work.
 2. Provide approved fill material which is free from roots, organic matter, trash, frozen material, and stones having maximum dimension greater than 6 IN.
 - a. Ensure that stones larger than 4 IN are not placed in upper 6 IN of fill or embankment.
 - b. Do not place material in layers greater than 8 IN loose thickness.
 - c. Place layers horizontally and compact each layer prior to placing additional fill.
 3. Compact soils as required to obtain specified density. Selection of appropriate equipment is the Contractor's responsibility.
 - a. In general, compact cohesive soils by sheepsfoot, and granular soils by pneumatic rollers, vibrators, or by other equipment as required to obtain specified density.
 - b. Control moisture for each layer necessary to meet requirements of compaction.
- E. Grading Tolerances: ± 0.10 IN.

3.3 USE OF EXPLOSIVES

- A. Blasting with any type of explosive is prohibited.

3.4 COMPACTION DENSITY REQUIREMENTS

- A. Obtain approval from Geotechnical Engineer with regard to suitability of soils and acceptable subgrade prior to subsequent operations.
- B. Provide dewatering system necessary to successfully complete compaction and construction requirements.
- C. Remove frozen, loose, wet, or soft material and replace with approved material as directed by Geotechnical Engineer.
- D. Stabilize subgrade with well graded granular materials as directed by Geotechnical Engineer.
- E. Assure by results of testing that compaction densities comply with the following requirements:
 - 1. All areas:

LOCATION	COMPACTION DENSITY	MOISTURE CONTENT
Cohesive soils	98% per ASTM D698	-1 to +4% of optimum
Cohesionless soils	75% relative density per ASTM D4253 and ASTM D4254	

3.5 EXCAVATION, FILLING, AND BACKFILLING FOR STRUCTURES

- A. General:
 - 1. In general, work includes, but is not necessarily limited to, excavation for structures and retaining walls, removal of underground obstructions and undesirable material, backfilling, filling, and fill, backfill, and subgrade compaction.
 - 2. Obtain fill and backfill material necessary to produce grades required.
 - a. Materials and source to be approved by Geotechnical Engineer.
 - b. Excavated material approved by Geotechnical Engineer may also be used for fill and backfill.
 - 3. In the paragraphs of this Specification Section, the word "soil" also includes any type of rock subgrade that may be present at or below existing subgrade levels.
- B. Excavation Requirements for Structures:
 - 1. General:
 - a. Do not commence excavation for foundations for structures until Geotechnical Engineer approves:
 - 1) The removal of topsoil and other unsuitable and undesirable material from existing subgrade.
 - 2) Density and moisture content of site area compacted fill material meets requirements of specifications.
 - b. Engineer grants approval to begin excavations.
 - 2. Dimensions:
 - a. Excavate to elevations and dimensions indicated or specified.
 - b. Allow additional space as required for construction operations and inspection of foundations.
 - c. Slope sides of excavations to comply with local codes, ordinances, and requirements of agencies having jurisdiction.
 - d. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
 - 3. Removal of obstructions and undesirable materials in excavation includes, but is not necessarily limited to, removal of old foundations, existing construction, unsuitable subgrade soils, expansive type soils, and any other materials which may be concealed beneath present grade, as required to execute work indicated on Contract Drawings.
 - a. If undesirable material and obstructions are encountered during excavation, remove material and replace as directed by Geotechnical Engineer.

- b. Remove unsuitable subgrade soils located below foundations. The bottom of the overexcavation shall be located outside the exterior limits of foundations around the perimeter of structure the following horizontal distance, whichever is greater:
 - 1) As indicated on Drawings.
 - 2) As directed by Geotechnical Engineer.
- c. When excavation has reached required subgrade elevations, notify Geotechnical Engineer, who will make an inspection of conditions.
 - 1) If Geotechnical Engineer determines that bearing materials at required subgrade elevations are unsuitable, provide Subgrade Stabilization as specified herein.
- 4. Install working surface over approved subgrade.
 - a. Minimum thickness: 6 IN.
 - b. Do not install working surface near influent channel.
- 5. Level off bottoms of excavations to receive foundations, floor slabs, equipment support pads, or compacted fill.
 - a. Remove loose materials and bring excavations into approved condition to receive concrete or fill material.
 - b. Where compacted fill material must be placed to bring subgrade elevation up to underside of construction, scarify existing subgrade upon which fill material is to be placed to a depth of 6 IN and then compact to density stated in this Specification Section before fill material can be placed thereon.
 - c. Do not carry excavations lower than shown for foundations except as directed by Geotechnical Engineer or Engineer.
 - d. If any part of excavations is carried below required depth without authorization, notify Engineer and correct unauthorized excavation as directed. Corrections may include:
 - 1) Under soil supported footings, foundation bases, or retaining walls, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation.
 - a) Concrete fill may be used to bring elevations to proper position.
 - 2) In locations other than those above, including slabs on grade and pile supported foundations, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Geotechnical Engineer.
 - 3) No extra compensation will be made to Contractor for correcting unauthorized excavations.
- 6. Make excavations large enough for working space, forms, dampproofing, waterproofing, and inspection.
- 7. Notify Geotechnical Engineer and Engineer as soon as excavation is completed in order that subgrades may be inspected.
 - a. Do not commence further construction until subgrade under compacted fill material, under foundations, under floor slabs-on-grade, under equipment support pads, and under retaining wall footings has been inspected and approved by the Geotechnical Engineer as being free of undesirable material, being of compaction density required by this specification, and being capable of supporting the allowable foundation design bearing pressures and superimposed foundation, fill, and building loads to be placed thereon.
 - b. Geotechnical Engineer shall be given the opportunity to inspect subgrade below fill material both prior to and after subgrade compaction.
 - c. Place fill material, foundations, retaining wall footings, floor slabs-on-grade, and equipment support pads as soon as weather conditions permit after excavation is completed, inspected, and approved and after forms and reinforcing are inspected and approved.
 - d. Before concrete or fill material is placed, protect approved subgrade from becoming loose, wet, frozen, or soft due to weather, construction operations, or other reasons.

8. Dewatering:
 - a. Where groundwater is or is expected to be encountered during excavation, install a dewatering system to prevent softening and disturbance of subgrade below foundations and fill material, to allow foundations and fill material to be placed in the dry, and to maintain a stable excavation side slope.
 - b. Groundwater shall be maintained at least 3 FT below the bottom of any excavation.
 - c. Review Geotechnical investigation before beginning excavation and determine where groundwater is likely to be encountered during excavation.
 - d. Employ dewatering specialist for selecting and operating dewatering system.
 - e. Keep dewatering system in operation until dead load of structure exceeds possible buoyant uplift force on structure.
 - f. Dispose of groundwater to an area which will not interfere with construction operations or damage existing construction.
 - 1) Install groundwater monitoring wells as necessary.
 - g. Shut off dewatering system at such a rate to prevent a quick upsurge of water that might weaken the subgrade.
9. Subgrade stabilization:
 - a. If subgrade under foundations, fill material, floor slabs-on-grade, or equipment support pads is in a frozen, loose, wet, or soft condition before construction is placed thereon, remove frozen, loose, wet, or soft material and replace with approved compacted material as directed by Geotechnical Engineer.
 - b. Provide compaction density of replacement material as stated in this Specification Section.
 - c. Loose, wet, or soft materials, when approved by Geotechnical Engineer, may be stabilized by a compacted working mat of well graded crushed stone.
 - d. Compact stone mat thoroughly into subgrade to avoid future migration of fines into the stone voids.
 - e. Remove and replace frozen materials as directed by Geotechnical Engineer.
 - f. Method of stabilization shall be performed as directed by Geotechnical Engineer.
 - g. Do not place further construction on the repaired subgrades, until the subgrades have been approved by the Geotechnical Engineer.
10. Do not place floor slabs-on-grade including equipment support pads until subgrade below has been approved, piping has been tested and approved, reinforcement placement has been approved, and Contractor receives approval to commence slab construction.
 - a. Do not place building floor slabs-on-grade including equipment support pads when temperature of air surrounding the slab and pads is or is expected to be below 40 DEGF before structure is completed and heated to a temperature of at least 50 DEGF.
11. Protection of structures:
 - a. Prevent new and existing structures from becoming damaged due to construction operations or other reasons.
 - b. Prevent subgrade under new and existing foundations from becoming wet and undermined during construction due to presence of surface or subsurface water or due to construction operations.
12. Shoring:
 - a. Shore, slope, or brace excavations as required to prevent them from collapsing.
 - b. Remove shoring as backfilling progresses but only when banks are stable and safe from caving or collapse.
 - c. Construct shoring that is required to retain water as part of the dewatering system, using non-permeable details such as interlock sealant for sheet piles.
13. Drainage:
 - a. Control grading around structures so that ground is pitched to prevent water from running into excavated areas or damaging structures.
 - b. Maintain excavations where foundations, floor slabs, equipment support pads or fill material are to be placed free of water.
 - c. Provide pumping required to keep excavated spaces clear of water during construction.

- d. Should any water be encountered in the excavation, notify Engineer and Geotechnical Engineer.
 - e. Provide free discharge of water by trenches, pumps, wells, well points, or other means as necessary and drain to point of disposal that will not damage existing or new construction or interfere with construction operations.
14. Frost protection:
- a. Do not place foundations, slabs-on-grade, equipment support pads, or fill material on frozen ground.
 - b. When freezing temperatures may be expected, do not excavate to full depth indicated, unless foundations, floor slabs, equipment support pads, or fill material can be placed immediately after excavation has been completed and approved.
 - c. Protect excavation from frost if placing of concrete or fill is delayed.
 - d. Where a concrete slab is a base slab-on-grade located under and within a structure that will not be heated, protect subgrade under the slab from becoming frozen until final acceptance of the Project by the Owner.
 - e. Protect subgrade under foundations of a structure from becoming frozen until structure is completed and heated to a temperature of at least 50 DEGF.
- C. Fill and Backfill Inside of Structure and Below Foundations, Base Slabs, Floor Slabs, Equipment Support Pads and Piping:
1. General:
 - a. Subgrade to receive fill or backfill shall be free of undesirable material as determined by Geotechnical Engineer and scarified to a depth of 6 IN and compacted to density specified herein.
 - b. Surface may be stepped by at not more than 12 IN per step or may be sloped at not more than 2%.
 - c. Do not place any fill or backfill material until subgrade under fill or backfill has been inspected and approved by Geotechnical Engineer as being free of undesirable material and compacted to specified density.
 2. Obtain approval of fill and backfill material and source from Geotechnical Engineer prior to placing the material.
 3. Granular fill under floor slabs-on-grade: Place all floor slabs-on-grade on a minimum of 6 IN of granular fill unless otherwise indicated.
 4. Granular fill under base slabs with pressure relief valves:
 - a. Provide a minimum thickness of 6 IN of filter material over the subgrade.
 - b. Provide a minimum thickness of 1 FT of drainage material between the bottom of the base slab and the top of the filter material.
 - c. Compact as specified in this Specification Section.
 - d. A geotextile filter fabric approved by the Engineer may be substituted for the filter material.
 5. Fill and backfill placement:
 - a. Prior to placing fill and backfill material, optimum moisture and maximum density properties for proposed material shall be obtained from Geotechnical Engineer.
 - b. Place fill and backfill material in thin lifts as necessary to obtain required compaction density.
 - c. Compact material by means of equipment of sufficient size and proper type to obtain specified density.
 - d. Use hand operated equipment for filling and backfilling within 5 FT of walls and less than 3 FT above pipes.
 - 1) Compaction equipment exceeding 3000 LBS dead weight shall not be used within 5 FT of the wall as a minimum
 - 2) Contractor is responsible for method of compaction so as not to damage wall.
 - e. Use hand operated equipment for filling and backfilling next to walls.
 - f. Do not place fill and backfill when the temperature is less than 40 DEGF and when subgrade to receive fill and backfill material is frozen, wet, loose, or soft.
 - g. Use vibratory equipment to compact granular material; do not use water.

6. Where fill material is required below foundations, place fill material, conforming to the required density and moisture content as required to fill the specified overexcavation to bottom of foundation.
- D. Filling and Backfilling Outside of Structures:
1. This paragraph of this Specification applies to fill and backfill placed outside of structures above bottom level of both foundations and piping but not under paving.
 2. Provide material as approved by Geotechnical Engineer for filling and backfilling outside of structures.
 3. Fill and backfill placement:
 - a. Prior to placing fill and backfill material, obtain optimum moisture and maximum density properties for proposed material from Geotechnical Engineer.
 - b. Place fill and backfill material in thin lifts as necessary to obtain required compaction density.
 - c. Compact material with equipment of proper type and size to obtain density specified.
 - d. Use hand operated equipment for filling and backfilling within 5 FT of walls and less than 3 FT above pipes.
 - 1) Compaction equipment exceeding 3000 LBS dead weight shall not be used within 5 FT of the wall as a minimum
 - 2) Contractor is responsible for method of compaction so as not to damage wall.
 - e. Use only hand operated equipment for filling and backfilling next to walls and retaining walls.
 - f. Do not place fill or backfill material when temperature is less than 40 DEGF and when subgrade to receive material is frozen, wet, loose, or soft.
 - g. Use vibratory equipment for compacting granular material; do not use water.
 4. Backfilling against walls:
 - a. Do not backfill around any part of structures until each part has reached specified 28-day compressive strength and backfill material has been approved.
 - b. Do not start backfilling until concrete forms have been removed, trash removed from excavations, pointing of masonry work, concrete finishing, dampproofing and waterproofing have been completed.
 - c. Do not place fills against walls until floor slabs at top, bottom, and at intermediate levels of walls are in place and have reached 28-day required compressive strength to prevent wall movement.
 - 1) See Contract Drawings for specific exceptions.
 - d. Bring backfill and fill up uniformly around the structures and individual walls, piers, or columns.
- E. Backfilling Outside of Structures Under Piping or Paving:
1. When backfilling outside of structures requires placing backfill material under piping or paving, the material shall be placed from bottom of excavation to underside of piping or paving at the density required for fill under piping or paving as indicated in this Specification Section.
 2. This compacted material shall extend transversely to the centerline of piping or paving a horizontal distance each side of the exterior edges of piping or paving equal to the depth of backfill measured from bottom of excavation to underside of piping or paving.
 3. Provide special compacted bedding or compacted subgrade material under piping or paving as required by other Specification Sections for the Project.

3.6 FIELD QUALITY CONTROL

- A. All excavation, trenching, and related sheeting, bracing, etc. shall comply with the requirements of OSHA Standards, and state requirements. Where conflict between OSHA and state regulations exists, the more stringent requirements shall apply.
- B. Special Inspection and Testing: See Section 01 45 33.

- C. Responsibilities of Special Inspector:
1. Review proposed materials for fill and backfill around structures.
 2. All testing, observation and work indicated as being performed by the Geotechnical Engineer in this Specification Section .
 3. Services will include verification and documentation of satisfactory soil materials, subgrade quality, sampling, placement, moisture conditioning, compaction and testing of proposed soil materials, and field testing for quality control.
 4. Moisture density relations, to be established by the Geotechnical Engineer required for all materials to be compacted.
 5. Extent of compaction testing will be as necessary to assure compliance with specifications.
 6. Under no circumstance provide less than one field density test on subgrade and each compacted fill layer for every 2000 SQFT.
 7. Prepare and submit inspection and test reports to Engineer.
 - a. Coordinate such work with other Special Inspectors.
 8. Test reports to include the following:
 - a. Report and certification of aggregate fill and drainage fill.
 - b. Test reports on borrow material.
 - c. Verification of suitability of each footing subgrade material, in accordance with specified requirements.
 - d. Field reports; in-place soil density and moisture tests.
 - e. One optimum moisture-maximum density curve for each type of soil encountered.
 - f. Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.
 - g. Other documentation necessary for Geotechnical Engineer to approve earthwork.
 - h. Assist Engineer to determine corrective measures necessary for defective work.
- D. Responsibilities of Testing Agency for Site Excavation and Grading:
1. All testing, observation and work indicated as being performed by the Geotechnical Engineer in other than Article 3.5 of this Specification Section.
 2. Services will include verification and documentation of satisfactory soil materials, subgrade quality, sampling, placement, moisture conditioning, compaction and testing of proposed soil materials, and field testing for quality control.
 3. Moisture density relations, to be established by the Geotechnical Engineer required for all materials to be compacted.
 4. Extent of compaction testing will be as necessary to assure compliance with specifications.

END OF SECTION

SECTION 31 23 33
TRENCHING, BACKFILLING, AND COMPACTING FOR UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Excavation, trenching, backfilling, and compacting for all underground utilities.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 31 23 00 - Earthwork.

1.2 QUALITY ASSURANCE

- 1. "Iowa Statewide Urban Design and Specifications" - SUDAS Standard Specifications 2022, Section 3010 - Trench Excavation and Backfill.
- B. Qualifications: Hire an independent soils laboratory to conduct in-place moisture-density tests for backfilling to assure that all work complies with this Specification Section.

1.3 DEFINITIONS

- A. Excavation: All excavation will be defined as unclassified.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - 3. Submit sieve analysis reports on all granular materials.
- B. Informational Submittals:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Trench shield (trench box) certification if employed:
 - a. SUDAS Standard Specifications 2022, Section 3010.3.03 - Trench Protection.
 - b. Engineer is not responsible to, and will not, review and approve.

1.5 SITE CONDITIONS

- A. Avoid overloading or surcharge a sufficient distance back from edge of excavation to prevent slides or caving.
 - 1. Maintain and trim excavated materials in such manner to be as little inconvenience as possible to public and adjoining property owners.
- B. Provide full access to public and private premises and fire hydrants, at street crossings, sidewalks and other points as designated by Owner to prevent serious interruption of travel.
- C. Protect and maintain benchmarks, monuments or other established points and reference points and if disturbed or destroyed, replace items to full satisfaction of Owner and controlling agency.
- D. Verify location of existing underground utilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stabilization Materials:
 - 1. SUDAS Standard Specifications 2022, Section 3010.2.05 - Stabilization Materials.
 - 2. SUDAS Standard Specifications 2022, Section 3010.2.03 - Backfill Material, A. - Class II Material.
 - 3. SUDAS Standard Specifications 2022, Section 3010.2.02 - Bedding Material, A. - Class I Material.

PART 3 - EXECUTION

3.1 EXCAVATION

- A. Groundwater Dewatering:
 - 1. SUDAS Standard Specifications 2022, Section 3010.3.04 - Dewatering.
- B. Trench Excavation:
 - 1. SUDAS Standard Specifications 2022, Section 3010.3.01 - Trench Excavation.

3.2 PREPARATION OF FOUNDATION FOR PIPE LAYING

- A. Rock Excavation:
 - 1. SUDAS Standard Specifications 2022, Section 3010.3.02 - Rock or Unstable Soils in Trench Bottom.
- B. Subgrade Stabilization:
 - 1. SUDAS Standard Specifications 2022, Section 3010.3.02 - Rock or Unstable Soils in Trench Bottom.

3.3 BACKFILLING METHODS

- A. Backfill:
 - 1. SUDAS Standard Specifications 2022, Section 3010.3.05 - Pipe Bedding and Backfill.
 - 2. SUDAS Standard Specifications 2022, Figures 3010.104.
- B. Compaction:
 - 1. Comply with Specification Section 31 23 00.
- C. Water flushing for consolidation is not permitted.

3.4 FIELD QUALITY CONTROL

- 1. SUDAS Standard Specifications 2022, Section 3010.3.06 - Trench Compaction Testing.
- 2. Owner will pay for all passing trench compaction testing.
- 3. Contractor will pay for all non-passing trench compaction testing.

3.5 PAVEMENT REMOVAL AND REPLACEMENT

- A. All Portland cement concrete and asphalt required to be removed for construction shall be cut prior to removal. Cut by sawing, vertical cut to be 4 IN minimum. The remaining depth of section may be broken out in a manner subject to Engineers approval. Width of section removed to be either a width not greater than the outside diameter of the water main plus 4 FT-0 IN or broken out to the nearest joint.
- B. Replace Portland cement concrete and asphalt equal to or better than original paving plus 2 IN.
- C. Debris resulting from the above operations shall be removed and hauled as directed by the Engineer.

END OF SECTION

SECTION 31 25 00
SOIL EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Soil erosion and sediment control.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.

1.2 QUALITY ASSURANCE

- 1. "Iowa Statewide Urban Design and Specifications" - SUDAS Standard Specifications 2022, Section 9040 - Erosion and Sediment Control, Section 9010 - Seeding.

1.3 SUBMITTALS

- A. SUDAS Standard Specifications 2018, Section 9010.1.03 - Submittals.
- B. NPDES Submittal:
 - 1. SUDAS Standard Specifications 2018, Section 9040.1.07 - Special Requirements, Section 9040.3.01 - SWPPP Preparation, Section 9040.3.02 - SWPPP Management, Section 9040.3.03 - Erosion and Sediment Control Inspection.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Temporary Erosion Control Seeding:
 - 1. SUDAS Standard Specifications 2022, Section 9010.2.02.D.
 - a. Type 4 (Urban Temporary Erosion Control Mixture).
- B. Mulch:
 - 1. SUDAS Standard Specifications 2022, Section 9040.2.16 - Erosion Control Mulch.
- C. Dust Control:
 - 1. SUDAS Standard Specifications 2022, Section 9040.2.15 - Dust Control.
- D. Erosion Control Blankets:
 - 1. SUDAS Standard Specifications 2022, Section 9040.2.05 - Temporary Rolled Erosion Control Products (RECP).
 - a. RECP Type 3 (Extended Term).
- E. Silt Fence:
 - 1. SUDAS Standard Specifications 2022, Section 9040.2.13 - Silt Fence.
- F. Stabilization Construction Entrance:
 - 1. SUDAS Standard Specifications 2022, Section 9040.2.14 - Stabilization Construction Entrance.
- G. Wattles:
 - 1. SUDAS Standard Specifications 22 Section 9040.2.06 - Wattles.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Erosion and Sediment Control - NPDES Requirements:
 - 1. SUDAS Standard Specifications 2022, Section 9040.1.07 - Special Requirements, Section 9040.3.01 - SWPPP Preparation, Section 9040.3.02 - SWPPP Management, Section 9040.3.03 - Erosion and Sediment Control Inspection.
- B. Dust Control:
 - 1. SUDAS Standard Specifications 2022, Section 9040.3.20 - Dust Control.
- C. Silt Fence:
 - 1. SUDAS Standard Specifications 2022, Section 9040.3.18 - Silt Fences.
- D. Stabilization Construction Entrance:
 - 1. SUDAS Standard Specifications 2022, Section 9040.3.19 - Stabilization Construction Entrance.
- E. Mulch:
 - 1. SUDAS Standard Specifications 2022, Section 9040.3.21 - Erosion Control Mulching.
- F. Erosion Control Blankets:
 - 1. SUDAS Standard Specifications 2022, Section 9040.3.08 - Temporary Rolled Erosion Control Products (RECP).
- G. Wattles:
 - 1. SUDAS Standard Specifications 2022, Section 9040.3.09 - Wattles.

3.2 DURING CONSTRUCTION PERIOD

- A. Temporary Erosion Control Seeding:
 - 1. SUDAS Standard Specifications 2022, Section 9010.3.04.D and 9010.3.04.E.3.

3.3 NEAR COMPLETION OF CONSTRUCTION

- A. Eliminate temporary erosion control measures.
- B. Grade to finished or existing grades.
- C. Fine grade all remaining earth areas, then seed and mulch.
 - 1. See Specification Section 32 92 00.
- D. Install Erosion Control Blankets:
 - 1. SUDAS Standard Specifications 2022, Section 9040.3.08 - Temporary Rolled Erosion Control Products (RECP).

END OF SECTION



DIVISION 32

EXTERIOR IMPROVEMENTS



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SECTION 32 13 13
CONCRETE PAVEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Concrete pavement.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 03 09 00 - Concrete.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. "Iowa Statewide Urban Design and Specifications" - SUDAS Standard Specifications 2022, Section 7010 - Portland Cement Concrete Pavement.
 - 2. Iowa Department of Transportation (IDOT) Standard Specifications.

1.3 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 1. SUDAS Standard Specifications 2022, Section 7010.1.03 - Submittals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portland Cement Concrete Pavement:
 - 1. SUDAS Standard Specifications 2022, Section 7010.2.01 - Materials.
- B. Mixes:
 - 1. SUDAS Standard Specifications 2022, Section 7010.2.02 - Mixes - Class C.
- C. Crushed Stone Aggregate Base:
 - 1. Iowa Department of Transportation Standard Specifications, Section 4120.04 - Class A Crushed Stone.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Subgrade Preparation:
 - 1. SUDAS Standard Specifications 2022, Section 7010.3.01 - Final Subgrade Preparation.
- B. Granular Subbase Preparation:
 - 1. SUDAS Standard Specifications 2022, Section 7010.3.02 - Subbase Preparation.

3.2 EXECUTION

- A. Portland Cement Concrete Pavement:
 - 1. SUDAS Standard Specifications 2022, Section 7010.3.01 - Equipment.
 - 2. SUDAS Standard Specifications 2022, Section 7010.3.02 - Pavement Construction.
 - 3. SUDAS Standard Specifications 2022, Section 7010.3.02 - Setting Forms.
 - 4. SUDAS Standard Specifications 2022, Section 7010.3.02 - Placing Reinforcement.
 - 5. SUDAS Standard Specifications 2022, Section 7010.3.02 - Joints.

6. SUDAS Standard Specifications 2022, Section 7010.3.02 - Concrete Placement.
7. SUDAS Standard Specifications 2022, Section 7010.3.02 - Finishing.
8. SUDAS Standard Specifications 2022, Section 7010.3.02 - Surface Curing.
9. SUDAS Standard Specifications 2022, Section 7010.3.02 - Joint Sealing.
10. SUDAS Standard Specifications 2022, Section 7010.3.02 - Form Removal.
11. SUDAS Standard Specifications 2022, Section 7010.3.04 - Pavement Protection.
12. SUDAS Standard Specifications 2022, Section 7010.3.05 - Use of Pavement.

3.3 FIELD QUALITY CONTROL

- A. SUDAS Standard Specifications 2022, Section 7010.3.07 - Quality Control.
 1. Quality Control Coring for pavement thickness is not required.
 2. Owner will pay for all passing Plastic Concrete Testing.
 3. Contractor will pay for all other listed testing and non-passing Plastic Concrete Testing.

END OF SECTION

SECTION 32 16 23
CONCRETE SIDEWALK AND STEPS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Concrete sidewalk.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 03 09 00 - Concrete.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. "Iowa Statewide Urban Design and Specifications" - SUDAS Standard Specifications 2022, Section 7030 - Sidewalks, Shared Use Paths, and Driveways.
 - 2. Iowa Department of Transportation (IDOT) Standard Specifications.

1.3 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 1. SUDAS Standard Specifications 2022, Section 7030.1.03 - Submittals.
- B. Samples:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Samples of fabricated jointing materials and devices.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portland Cement Concrete:
 - 1. SUDAS Standard Specifications 2022, Section 7030.2.01 - Portland Cement Concrete.
- B. Detectable Warnings:
 - 1. SUDAS Standard Specifications 2022, Section 7030.2.07 - Detectable Warnings.
- C. Joint Sealant:
 - 1. SUDAS Standard Specifications 2022, Section 7030.2.09 - Isolation and Expansion Joint Sealant.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Removals:
 - 1. SUDAS Standard Specifications 2022, Section 7030.3.01 - Removals.
- B. Subgrade Preparation:
 - 1. SUDAS Standard Specifications 2022, Section 7030.3.02 - Subgrade Preparation.

3.2 EXECUTION

- A. Portland Cement Sidewalks, Shared Use Paths and Driveways:
 - 1. SUDAS Standard Specifications 2022, Section 7030.3.04 - Setting Forms.
 - 2. SUDAS Standard Specifications 2022, Section 7030.3.04 - Joints.
 - 3. SUDAS Standard Specifications 2022, Section 7030.3.04 - Concrete Placement.
 - 4. SUDAS Standard Specifications 2022, Section 7030.3.04 - Finishing.
 - 5. SUDAS Standard Specifications 2022, Section 7030.3.04 - Surface Curing.
 - 6. SUDAS Standard Specifications 2022, Section 7030.3.04 - Joint Sealing.
 - 7. SUDAS Standard Specifications 2022, Section 7030.3.04 - Form Removal.
 - 8. SUDAS Standard Specifications 2022, Section 7030.3.07 - Detectable Warning Installation.

3.3 FIELD QUALITY CONTROL

- A. SUDAS Standard Specifications 2022, Section 7030.3.08 - Slope and Smoothness Testing.
- B. SUDAS Standard Specifications 2022, Section 7030.3.11 - Material Testing.
- C. Owner will pay for all passing concrete tests. Contractor will pay for all non-passing concrete tests.

END OF SECTION

SECTION 32 91 13
TOPSOILING AND FINISHED GRADING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Topsoiling and finished grading.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 31 10 00 - Site Clearing.
 - 5. Section 31 23 00 - Earthwork.
 - 6. Section 31 25 00 - Soil Erosion and Sediment Control.
 - 7. Section 32 92 00 - Seeding, Sodding and Landscaping.
- C. Location of Work: All areas within limits of grading and all areas outside limits of grading which are disturbed in the course of the work.

1.2 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Project Data: Test reports for furnished topsoil.

1.3 SITE CONDITIONS

- A. Verify amount of topsoil stockpiled and determine amount of additional topsoil, if necessary to complete work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil:
 - 1. Original surface soil typical of the area.
 - 2. Existing topsoil stockpiled under Specification Section 31 10 00.
 - 3. Friable, loamy soil capable of supporting native plant growth.

2.2 TOLERANCES

- A. Finish Grading Tolerance: ± 0.1 FT from required elevations.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Correct, adjust and/or repair rough graded areas.
 - 1. Cut off mounds and ridges.
 - 2. Fill gullies and depressions.
 - 3. Perform other necessary repairs.
 - 4. Bring all sub-grades to specified contours, even and properly compacted.
- B. Loosen surface to depth of 2 IN, minimum.
- C. Remove all stones and debris over 2 IN in any dimension.

3.2 ROUGH GRADE REVIEW

- A. Reviewed by Engineer in Specification Section 31 10 00.

3.3 PLACING TOPSOIL

- A. Do not place when subgrade is wet or frozen enough to cause clodding.
- B. Spread and lightly compact to a depth of 4 IN for all disturbed earth areas.
- C. If topsoil stockpiled is less than amount required for work, furnish additional topsoil at no cost to Owner.
- D. Provide finished surface free of stones, sticks, or other material 1 IN or more in any dimension.
- E. Provide finished surface smooth and true to required grades.
- F. Restore stockpile area to condition of rest of finished work.

3.4 ACCEPTANCE

- A. Upon completion of topsoiling, obtain Engineer's acceptance of grade and surface.
- B. Make test holes where directed to verify proper placement and thickness of topsoil.

END OF SECTION

SECTION 32 92 00
SEEDING, SODDING AND LANDSCAPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Seeding: Soil preparation.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 32 91 13 - Topsoiling and Finished Grading.
- C. Location of Work: All areas which are disturbed in the course of the work.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. "Iowa Statewide Urban Design and Specifications" - SUDAS Standard Specifications 2022, Section 9010 - Seeding.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. SUDAS Standard Specifications 2022, Section 9010.1.03 - Submittals.
- B. Quality Assurance:
 - 1. SUDAS Standard Specifications 2022, Section 9010.1.03 - Quality Assurance.
- C. Delivery, Storage and Handling:
 - 1. SUDAS Standard Specifications 2022, Section 9010.1.05 - Delivery, Storage, and Handling.
- D. Scheduling:
 - 1. SUDAS Standard Specifications 2022, Section 9010.1.06 - Scheduling and Conflicts.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil:
 - 1. SUDAS Standard Specifications 2022, Section 2010.2.01 - Topsoil.
- B. Seed:
 - 1. SUDAS Standard Specifications 2022, Section 9010.2.01 - Seed.
- C. Seed Mixture:
 - 1. SUDAS Standard Specifications 2022, Section 9010.2.02 - Seed Mixtures and Seeding Dates.
 - a. Type 1 (Permanent Lawn Mixture).
- D. Fertilizer:
 - 1. SUDAS Standard Specifications 2022, Section 9010.2.03 - Fertilizer.
- E. Water:
 - 1. SUDAS Standard Specifications 2022, Section 9010.2.06 - Water.
- F. Mulch:
 - 1. SUDAS Standard Specifications 2022, Section 9010.2.07 - Mulch.

PART 3 - EXECUTION

3.1 SOIL PREPARATION

- A. Equipment: SUDAS Standard Specifications 2022, Section 9010.3.01 - Equipment.
- B. Seedbed Preparation: SUDAS Standard Specifications 2022, Section 9010.3.04.C - Seedbed Preparation, Permanent.
- C. Seed Preparation: SUDAS Standard Specifications 2022, Section 9010.3.04.E.
- D. Fertilizing: SUDAS Standard Specifications 2022, Section 9010.3.04.B for Type 1 Seeding.

3.2 INSTALLATION

- A. Seeding:
 - 1. SUDAS Standard Specifications 2022, Section 9010.3.04 - Conventional Seeding.
 - 2. SUDAS Standard Specifications 2022, Section 9010.3.04 - Mulching.
- B. Watering:
 - 1. SUDAS Standard Specifications 2022, Section 9010.3.07 - Watering.

3.3 MAINTENANCE AND REPLACEMENT

- A. Reseeding:
 - 1. SUDAS Standard Specifications 2022, Section 9010.3.08 - Re-Seeding.
- B. Cleanup:
 - 1. SUDAS Standard Specifications 2022, Section 9010.3.09 - Cleanup.

END OF SECTION



DIVISION 40

PROCESS INTERCONNECTIONS



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SECTION 40 05 50
ELECTRIC ACTUATORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Electric actuators for sluice gates.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 01 61 03 - Equipment - Basic Requirements.
 - 5. Section 09 96 00 - High Performance Industrial Coatings.
 - 6. Section 40 05 51 - Valves - Basic Requirements.
 - 7. Section 40 05 59 - Fabricated Stainless Steel Slide Gates.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volt Maximum).
 - b. MG 1, Motors and Generators.

1.3 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Shop Drawings:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Wiring and control diagrams for electric actuators.
- C. Operation and Maintenance Manuals: See Specification Section 01 78 23.
- D. Informational Submittals:
 - 1. Written verification from valve actuator manufacturer that actuators have been installed properly, that all limit switches and position potentiometers have been properly adjusted, and that the valve actuator responds correctly to the valve position command.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Limitorque.
 - 2. Rotork.
 - 3. Or approved equal.
- B. Submit requests for substitutions in accordance with Specification Section 01 25 00.

2.2 VALVE ACTUATORS

- A. Electric Actuators (480 V, 3 Phase):
 - 1. Electrical components including motors, controls, switches, control systems, etc., shall be rated for area classifications shown on Drawings.

2. Furnish electric actuator integral with valves and gates consisting of:
 - a. Motor.
 - b. Gearing.
 - c. Handwheel.
 - d. Limit and torque switches.
 - e. Lubricants.
 - f. Heating elements.
 - g. Wiring.
 - h. Terminals for motor power and controls.
 - i. Drive nut.
3. Housing/Enclosure:
 - a. Provide cast iron gear housing and cast iron load bearing enclosure.
 - b. Non-load bearing enclosure and housing: Aluminum or cast iron.
 - c. Rated for area classification shown on Drawings.
 - d. Provide O-ring seals for covers and entries.
 - e. Terminal and limit switch compartment covers are to be fastened to gear housing by stainless steel fasteners with capture device to prevent loss.
 - f. The motor operators incorporate a double seated and potted entry cap to prevent damage to the actuator as a result of water entering the conduit.
 - 1) The entry shall include connection terminals and a potted section isolating the field connection points from the interior of the actuator.
4. Motors:
 - a. Provide motors that are totally enclosed, high torque design made expressly for valve or gate actuator service and capable of operating the valve or gate under full differential pressure for complete open-close and reverse cycle of travel at least twice in immediate succession without overheating.
 - b. Design motors in accordance with NEMA MG1 standards, with Class B insulation, and to operate successfully at any voltage within 10% above or below rated voltage.
 - c. Provide positive method to ensure motor bearings are permanently lubricated.
 - d. Provide three thermal switches imbedded in windings:
 - 1) 120 DEG apart.
 - 2) Provide motor shutdown at high temperature.
 - e. Motor housing:
 - 1) Aluminum or cast iron.
 - 2) Totally enclosed non-ventilated with cooling fins.
 - f. Provide motor capable of operating in any position.
 - g. Provide motor sealed from gearcase to allow any mounting position.
 - h. Provide motors suitable for 480 V, 3 Phase, 60 Hz.
5. Gearing:
 - a. Provide power gearing consisting of heat treated steel helical gears, carburized and hardened alloy steel worm, and alloy bronze worm gear, all grease or oil bath lubricated, designed for 100% overload, and effectively sealed against entrance of foreign matter.
 - b. Provide gearing mechanism constructed to permit field changes of reduction gear ratio.
 - c. Design actuators so that motor comes up to speed before stem load is encountered in either opening or closing operation.
 - d. Limit switch gearings and feedback device reduction gearing:
 - 1) Steel or bronze.
 - e. Support rotating shafts with anti-friction bearings.
 - f. Provide separate drive nut/thrust bearing assembly:
 - 1) Mounted to base of actuator.
 - 2) High tensile bronze.
 - 3) Quarter turn actuator: Provide 90 DEG mounting intervals.
 - 4) Provide grease fitting on drive assembly.

6. Handwheel:
 - a. Permanently attached for manual operation.
 - b. Positive declutch mechanism to engage and disengage handwheel.
 - c. Handwheel shall not rotate during motor operation.
 - d. Inoperable motor shall not prevent manual operation.
7. Limit torque and thrust loads in both closing and opening directions by torque limit switches.
 - a. Provide torque switches with micrometer adjustment and reference setting indicator. Assure adjustment variation of approximately 40% in torque setting.
 - b. Provide switches having rating of not less than 6 A at 120 Vac and 2.2 A at 115 Vdc.
 - c. Limit and torque switches shall have totally sealed contacts.
8. Furnish electric actuator with two geared limit switch assemblies with each switch assembly having four separate limit switches:
 - a. Assure each limit switch assembly is geared to driving mechanism and is independently adjustable to trip at any point at and between the fully open and fully closed valve or gate position.
 - b. Provide minimum of two normally open contacts and two normally closed contacts at each end of valve or gate travel.
 - c. Provide switches with inductive contact rating of not less than 6 A at 120 Vac, 3 A at 240 Vac, 1.5 A at 480 Vac, 2.2 A at 115 Vdc and 1.1 A at 230 Vdc.
 - d. Limit switches shall be fully adjustable when power is applied to actuator.
9. Provide space heating elements sized to prevent condensation in motor, control enclosure, and geared limit switch compartment(s).
 - a. Furnish heating elements rated at 120 Vac with heaters continuously energized.
10. Open-close actuator controls:
 - a. Provide control assembly with necessary holding relays, reversing starter, control transformers of sufficient capacity to provide control power, space heating element power, and valve position transmitter.
 - b. Provide control assembly in an enclosure rated for the defined area classification.
 - c. Controls for open/close actuator:
 - 1) Provide prewired stainless steel integral pushbutton station rated for area classification as shown on the Drawings with:
 - a) Open pushbutton.
 - b) Close pushbutton.
 - c) Stop pushbutton.
 - d) Local/off/Remote switch.
 - e) Full open light.
 - f) Full close light.
 - g) Open and close relays as required.
 - 2) Provide control enclosure to accept:
 - a) Remote open/close switches.
 - 3) Provide contacts in control enclosure:
 - a) Remote/local contact.
 - b) Full open contact.
 - c) Full close contact.
 - 4) Wire all components to an internal terminal strip and include mounted wiring diagram inside enclosure.

B. Exterior actuators shall be rated for operation from -30 to 120 DEGF.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

- B. Painting Requirements:
 - 1. Comply with Specification Section 09 96 00 for painting and protective coatings.
- C. Install electric actuators above or horizontally adjacent to valve and gear box to optimize access to controls and external handwheel.
- D. Install actuators accessible for operation, inspection, and maintenance.

3.2 FIELD QUALITY CONTROL

- A. Employ and pay for services of equipment manufacturer's field service representative(s) to:
 - 1. Inspect equipment covered by these Specifications.
 - 2. Supervise pre-start adjustments and installation checks.
 - 3. Conduct initial startup of equipment and perform operational checks.
 - 4. Provide Owner, through the Contractor, a written statement that manufacturer's equipment has been installed properly, started up and is ready for operation by Owner's personnel.
 - 5. Provide Personnel Training for a minimum of 8 HRS at jobsite per Specification Section 01 75 00 on operation and maintenance of the actuator equipment.
 - 6. Provide the following:
 - a. For equipment inspection: 1 HR minimum, or as needed, for each actuator.
 - b. For equipment start-up and testing: 1 HR minimum for each actuator.

3.3 ADJUSTING

- A. Adjustment valves, actuators, and appurtenant equipment to comply with Specification Section 01 75 00.
 - 1. Operate valve, open and close at system pressures.

3.4 SCHEDULE

- A. Water Control Gate Schedule: See Specification Section 40 05 59.

END OF SECTION

SECTION 40 05 51
VALVES - BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Valving, actuators, and valving appurtenances.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 01 61 03 - Equipment - Basic Requirements.
 - 5. Section 09 96 00 - High Performance Industrial Coatings.
 - 6. Section 40 05 50 - Electric Actuators.
 - 7. Section 40 05 52 - Miscellaneous Valves.
 - 8. Section 40 05 59 - Fabricated Stainless Steel Slide Gates.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International (ASTM):
 - a. A193, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature Service.
 - b. A194, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service.
 - 2. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 3. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).

1.3 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Shop Drawings:
 - 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Valve pressure and temperature rating.
 - d. Valve material of construction.
 - e. Special linings.
 - f. Valve dimensions and weight.
 - g. Valve flow coefficient.
 - h. Wiring and control diagrams for electric or cylinder actuators.
 - i. Short Circuit Current Rating (SCCR) nameplate marking per NFPA 70.
 - 1) Include any required calculations per Specification Section 01 61 03.
 - 2. Test reports.
- C. Contract Closeout Information:
 - 1. Operation and Maintenance Data:
 - a. See Specification Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

D. Informational Submittals:

1. Written verification from valve actuator manufacturer that actuators have been installed properly, that all limit switches and position potentiometers have been properly adjusted, and that the valve actuator responds correctly to the valve position command.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, refer to individual valve Specification Sections for acceptable manufacturers.

2.2 MATERIALS

- A. Refer to individual valve Specification Sections.

2.3 VALVE ACTUATORS

A. Valve Actuators - General:

1. Provide actuators as shown on Drawings or specified.
2. Counterclockwise opening as viewed from the top.
3. Direction of opening and the word OPEN to be cast in handwheel or valve bonnet.
4. Size actuator to produce required torque with a maximum pull of 80 LB at the maximum pressure rating of the valve provided and withstand without damage a pull of 200 LB on handwheel or chainwheel or 300 FT-pounds torque on the operating nut.
5. Unless otherwise specified, actuators for valves to be buried, submerged, or installed in vaults or manholes shall be sealed to withstand at least 20 FT of submergence.
6. Extension stem:
 - a. Install where shown or specified.
 - b. Solid steel or (316 stainless steel where shown on Drawings) with actuator key and nut, diameter not less than stem of valve actuator shaft.
 - c. Pin all stem connections.
 - d. Center in valve box or grating opening band with guide bushing.

B. Exposed Valve Manual Actuators:

1. Provide for all exposed valves not having electric or cylinder actuators.
2. Provide handwheels for all plug valves.
3. Gear actuators to be totally enclosed, permanently lubricated, and with sealed bearings.
4. Provide chainwheel actuators for valves 5 FT or higher from finish floor to centerline of valve actuator.
 - a. Cadmium-plated chain looped to within 3 FT of finish floor.
 - b. Equip chain wheels with chain guides to permit rapid operation with reasonable side pull without "gagging" the wheel.
 - c. For smaller valves with lever or handle operators, provide offset tee handles with attached chain for operation from the operating floor.

C. Electric Actuators: Refer to Specification Section 40 05 50.

D. Valve Lockout Devices:

1. Device manufactured from same material as valve operator, preventing access to valve operator, to accept lock shackle.

2.4 FABRICATION

- A. Refer to individual valve Specification Sections for specifications of each type of valve used on Project.

B. Nuts, Bolts, and Washers:

1. Type 316 or 304 stainless steel: ASTM A193 and ASTM A194.

2.5 SOURCE QUALITY CONTROL

- A. Refer to individual valve Specification Sections.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Painting Requirements: Comply with Specification Section 09 96 00 for High Performance Industrial Coatings.
- C. Support exposed valves and piping adjacent to valves independently to eliminate pipe loads being transferred to valve and valve loads being transferred to the piping.
- D. Install valves accessible for operation, inspection, and maintenance.

3.2 ADJUSTMENT

- A. Adjust valves, actuators, and appurtenant equipment to comply with Specification Section 01 75 00.
 - 1. Operate valve, open and close at system pressures.

END OF SECTION

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SECTION 40 05 52
MISCELLANEOUS VALVES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Wall Type Pressure Relief Valves.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 01 61 03 - Equipment - Basic Requirements.
 - 5. Section 40 05 51 - Valves - Basic Requirements.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Water Works Association (AWWA):
 - a. C550, Standard for Protective Interior Coatings for Valves and Hydrants.

1.3 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Shop Drawings: See Specification Section 40 05 51.
- C. Contract Closeout Information:
 - 1. Operation and Maintenance Data:
 - a. See Specification Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the manufacturers listed in the applicable Articles below are acceptable.
- B. Submit request for substitution in accordance with Specification Section 01 25 00.

2.2 WALL TYPE PRESSURE RELIEF VALVES

- A. Acceptable Manufacturers:
 - 1. Red Valve Tideflex Series 37 Check Valve.
 - 2. Or approved equal.
- B. Materials:
 - 1. Body:
 - a. EPDM.
 - b. Rated for wastewater service and UV resistance by manufacturer.
 - 2. Retaining Ring: 316 stainless steel.
 - 3. Bolts: 316 stainless steel.
- C. Coordinate valve drilling pattern with new 316 stainless steel adaptor flange.

2.3 ACCESSORIES

- A. Furnish any accessories required to provide a completely operable valve.

2.4 MAINTENANCE MATERIALS

- A. Provide two sets of any special tools or wrenches required for operation or maintenance for each type of valve.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: See Specification Section 01 61 03 and Specification Section 40 05 51.
- B. Install in accordance with manufacturer's instructions.

3.2 FIELD QUALITY CONTROL

- A. Clean, inspect, and operate valve to ensure all parts are operable and valve seats properly.
- B. Check and adjust valves and accessories in accordance with manufacturer's instructions and place into operation.

END OF SECTION

SECTION 40 05 59
FABRICATED STAINLESS STEEL SLUICE GATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fabricated Stainless Steel Sluice Gates to be installed on existing wall thimbles.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 01 33 00 - Submittals.
 - 5. Section 01 61 03 - Equipment - Basic Requirements.
 - 6. Section 09 96 00 - High Performance Industrial Coatings.
 - 7. Section 10 14 00 - Identification Devices.
 - 8. Section 40 05 50 - Electric Actuators.
 - 9. Section 40 05 51 - Valves - Basic Requirements.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Water Works Association (AWWA):
 - a. C542, Electric Motor Actuators for Valves and Slide Gates.
 - b. C561, Fabricated Stainless Steel Slide Gates.
 - 2. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 3. Society for Protective Coatings/NACE International (SSPC/NACE):
 - a. SP 5/NACE No. 1, White Metal Blast Cleaning.

1.3 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Shop Drawings:
 - 1. See Specification Section 01 61 03.
 - 2. Product technical data including:
 - a. Evidence to show compliance with manufacturer's coordination requirements specified in 1.4 below.
 - b. Acknowledgment that products submitted meet the requirements of standards referenced.
 - c. Calculations that demonstrate compliance with the deflections, stress, and factor of safety specified.
 - d. Certified Drawings and material specifications for all components.
 - e. Test records.
 - 1) Performance Test.
 - 2) Leakage Test.
- C. Operation and Maintenance Manuals:
 - 1. See Specification Section 01 78 23 for requirements for:
 - a. The mechanics and administration of the submittal process.
 - b. The content of Operation and Maintenance Manuals.
- D. Affidavit of Compliance: See AWWA C561.

1.4 SYSTEM COORDINATION

- A. Slide gates to be installed will be installed in existing concrete structures on existing wall thimbles. It is assumed that the existing bolts will be removed from the thimble frame and the new sluice gate mounted on the thimble frame using the existing bolt holes.
- B. Prior to developing Shop Drawings, the sluice gate manufacturer shall field coordinate the slide gate dimensions, configuration, and bolt hole spacing at each gate location. The sluice gate manufacturer shall provide written confirmation of this field coordination as being completed with the submittal information of the sluice gates specified herein.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. RW Gate Company.
 - 2. Whipps.
 - 3. Hydro Gate.
 - 4. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 25 00.

2.2 EQUIPMENT – SLIDE GATES

- A. General: Provide gates, stems, lifts, and other appurtenances of size, type, material, and construction shown on the Contract Drawings and as specified herein.
- B. Comply with requirements of Specification Section 01 61 03.
- C. Gates: Meet all requirements of AWWA C561 as modified per this Specification Section.
 - 1. Leakage for sluice gates shall be restricted to 0.05 GPM/FT or less of the seal perimeter at the design seating head and the design unseating head.
 - 2. The structural components of the sluice gates shall be designed for 20.0 FT of seating head and 20.0 FT of unseating head.
- D. Materials:
 - 1. Materials subject to dezincification or dealuminization prohibited.
 - 2. “L” grades for all welded components.
 - 3. Frame, guides, slide, yoke, and stem guides:
 - a. Stainless steel, Type 316 and Type 316L.
 - 4. Gear housing: Cast iron, steel, or ductile iron.
 - 5. Actuator pedestal: Stainless steel, Type 316.
 - 6. Rising stem thrust nuts: Stainless steel, Type 316.
 - 7. Stem couplings: Stainless steel, Type 316.
 - 8. Stem guide bushings: Cast or extruded UV stabilized UHMW-PE.
 - 9. Stems: Stainless steel, Type 316.
 - 10. Seals: UV stabilized UHMW-PE.
 - 11. Anchor bolts and fasteners: Stainless steel, Type 316.
 - 12. Flush-bottom sill retainer: Stainless steel, Type 316.
 - 13. Wedges and Pressure Pads: UV stabilized UHMW-PE if required.
 - a. Stainless steel, Type 316.
- E. Fabrication: One-Piece Frames.
 - 1. One-piece frame: Conventional pedestal mounted.
 - 2. Flush bottom seals: Easily replaceable without disassembly of the gate.
 - 3. Side and top seals of gate: Replaceable without removing gate.
 - 4. Wall thimbles: Reuse existing.

2.3 GATE OPERATORS AND LIFTS

- A. General: Provide lifts in accordance with AWWA C541 and C542, or as modified in this Specification Section.
- B. Rising Stem: Provide clear polycarbonate plastic stem cover with Mylar open-close indicator.
 - 1. Aluminum pipe.
- C. Manual Operators:
 - 1. Equip the lift mechanism with a pedestal, torque tube, or baseplate, machined and drilled for mounting the lift housing and ready for bolting to the operating floor, top wall mounting bracket, or gate yoke, as shown on Drawings or specified.
 - 2. Centerline of crank or handwheel: Approximately 36 IN above operating floor.
- D. Electric Operators: See Specification Section 40 05 50.

2.4 FABRICATION

- A. Specified in AWWA C561.
- B. Welded Stainless Steel: Passivated after fabrication.

2.5 SOURCE QUALITY CONTROL

- A. Factory Tests: Shop leakage tests.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. For identification and tagging, and for warning or caution signs, comply with Specification Section 10 14 00.

3.2 FIELD QUALITY CONTROL

- A. Employ and pay for services of equipment manufacturer's field service representative(s) to:
 - 1. Inspect equipment covered by this Specification Section.
 - 2. Supervise adjustments and installation checks.
 - 3. Provide test equipment, tools, and instruments necessary to accomplish equipment testing.
 - 4. Conduct initial start-up of equipment, perform operational checks, and supervise acceptance testing.
 - 5. Provide, through Contractor, a written statement that manufacturer's equipment has been installed properly, started up and is ready for operation by Owner's personnel.
 - 6. Instruct Owner's personnel on operation and maintenance of furnished equipment in accordance with Specification Section 01 79 23.
 - 7. Field Leakage Test for Stainless Steel Slide Gates: Test gate under design seating head and adjust to maximum leakage specified.

3.3 DEMONSTRATION

- A. See Specification Section 01 75 00 - Checkout and Startup Procedures.
- B. Personnel Training:
 - 1. Provide manufacturer's technical representative's time for on-site training of the Owner's personnel in accordance with Specification Section 01 79 23 - Instruction of Operations and Maintenance Personnel.

3.4 GATE SCHEDULE

A. The following table is a schedule of the fabricated slide gates:

GATE EQUIPMENT ID#	SIZE WxH (IN)	DESIGN HEAD (FT) ^a		OPENING DIRECTION ^b	TYPE OF CLOSURE ^c	TYPE OF LIFT MECHANISM ^d	RISING OR NON-RISING STEM ^e	THIMBLE REQUIRED ^f
		SEATING	UNSEATING					
55-FC-G-1	48x48	20.0	20.0	Up Op	FB	Elec/Hdwl	R	No
55-FC-G-2	48x48	20.0	20.0	Up Op	FB	Elec/Hdwl	R	No
55-FC-G-3	48x48	20.0	20.0	Up Op	FB	Elec/Hdwl	R	No
55-FC-G-4	48x48	20.0	20.0	Up Op	FB	Elec/Hdwl	R	No
50-SSC-G-1	12x12	20.0	20.0	Up Op	FB	Elec/Hdwl	R	No
50-RSL-G-1	36x36	20.0	20.0	Up Op	FB	Elec/Hdwl	R	No
55-FC-G-5	48x48	20.0	20.0	Up Op	FB	Elec/Hdwl	R	No
55-FC-G-6	48x48	20.0	20.0	Up Op	FB	Elec/Hdwl	R	No
55-FC-G-7	48x48	20.0	20.0	Up Op	FB	Elec/Hdwl	R	No
55-FC-G-8	48x48	20.0	20.0	Up Op	FB	Elec/Hdwl	R	No
51-SSC-G-1	12x12	20.0	20.0	Up Op	FB	Elec/Hdwl	R	No
51-RSL-G-1	36x36	20.0	20.0	Up Op	FB	Elec/Hdwl	R	No
55-FC-G-9	48x48	20.0	20.0	Up Op	FB	Elec/Hdwl	R	No
55-FC-G-10	48x48	20.0	20.0	Up Op	FB	Elec/Hdwl	R	No
55-FC-G-11	48x48	20.0	20.0	Up Op	FB	Elec/Hdwl	R	No
55-FC-G-12	48x48	20.0	20.0	Up Op	FB	Elec/Hdwl	R	No
52-SSC-G-1	12x12	20.0	20.0	Up Op	FB	Elec/Hdwl	R	No
52-RSL-G-1	36x36	20.0	20.0	Up Op	FB	Elec/Hdwl	R	No

Abbreviations:

- a Design Head: Measured from surface of water to centerline of gate, in feet.
- b Opening Direction: Dn Op = Downward Opening; Up Op = Upward Opening.
- c Type of Closure: W = Weir Service; FB = Flush Bottom (Embedded); FM = Face Mounted.
- d Type of Lift Mechanism: Ped = Pedestal; Elec = Electric; Hdwl = Handwheel; Hyd = Hydraulic, CH = Crank Handle, SQN = Square Nut.
- e Rising or Nonrising Stem: R = Rising; NR = Nonrising.
- f Thimble Required: Wall Thimble is required = YES; Wall Thimble is not required = No.

3.5 GATE ACTUATOR SCHEDULE

A. The following table is a schedule of the Gate Actuators:

GATE EQUIPMENT ID#	TYPE OF SERVICE ⁹ NUMBER OF STARTS/HR	OPERATING CYCLE ^h OC OR MOD	NEMA CL ⁱ	SUPPLY VOLTAGE ^j	CONTROLS ^k	PROCESS CONTROL SIGNAL ^l	FEED BACK ^m
55-FC-G-1	Class 1	OC	4	480 VAC, 3 PH, 60 Hz	IN	C	Yes
55-FC-G-2	Class 1	OC	4	480 VAC, 3 PH, 60 Hz	IN	C	Yes
55-FC-G-3	Class 1	OC	4	480 VAC, 3 PH, 60 Hz	IN	C	Yes
55-FC-G-4	Class 1	OC	4	480 VAC, 3 PH, 60 Hz	IN	C	Yes
50-SSC-G-1	Class 1	OC	4	480 VAC, 3 PH, 60 Hz	IN	C	Yes
50-RSL-G-1	Class 1	OC	4	480 VAC, 3 PH, 60 Hz	IN	C	Yes
55-FC-G-5	Class 1	OC	4	480 VAC, 3 PH, 60 Hz	IN	C	Yes
55-FC-G-6	Class 1	OC	4	480 VAC, 3 PH, 60 Hz	IN	C	Yes
55-FC-G-7	Class 1	OC	4	480 VAC, 3 PH, 60 Hz	IN	C	Yes
55-FC-G-8	Class 1	OC	4	480 VAC, 3 PH, 60 Hz	IN	C	Yes
51-SSC-G-1	Class 1	OC	4	480 VAC, 3 PH, 60 Hz	IN	C	Yes
51-RSL-G-1	Class 1	OC	4	480 VAC, 3 PH, 60 Hz	IN	C	Yes
55-FC-G-9	Class 1	OC	4	480 VAC, 3 PH, 60 Hz	IN	C	Yes
55-FC-G-10	Class 1	OC	4	480 VAC, 3 PH, 60 Hz	IN	C	Yes
55-FC-G-11	Class 1	OC	4	480 VAC, 3 PH, 60 Hz	IN	C	Yes
55-FC-G-12	Class 1	OC	4	480 VAC, 3 PH, 60 Hz	IN	C	Yes
52-SSC-G-1	Class 1	OC	4	480 VAC, 3 PH, 60 Hz	IN	C	Yes
52-RSL-G-1	Class 1	OC	4	480 VAC, 3 PH, 60 Hz	IN	C	Yes

Abbreviations :

- g Type of Service: Number of Starts/Hour: Class 1 = 60 starts per hour; Class 2 = 100 starts per hour; Class 3 = 600 starts per hour; Class 4 = 1200 starts per hour.
- h Operating Cycle: OC = Open/Close; MOD = Modulating.
- i NEMA CL = NEMA Classification (NEMA 4 is standard default).
- j Supply Voltage: Typical voltage is 460 VAC, 3 PH, 60 Hz.
- k Controls: IN = Integral Controls; R = Remotely Mounted Controls.
- l Process Control Signal: Analog = 4-20ma; C = Contact Closure. See I/O list for voltage and source. For communication, indicate communications protocol (Device Net, Profibus, Modbus, etc.).
- m Feedback: FB = Feedback signals required. See I/O list for number of feedback signals and auxiliary devices.

END OF SECTION

SECTION 40 05 59.16
FABRICATED STAINLESS STEEL SLUICE GATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fiberglass Reinforced Plastic (FRP) stop logs and accessories installed at each secondary effluent drop box.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 01 33 00 - Submittals.
 - 5. Section 41 22 20 - Davit Cranes.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. ASTM International:
 - a. ASTM A276 - Stainless Steel Bars.
 - b. ASTM D256 - Izod Impact Strength.
 - c. ASTM D570 - Water Absorption Rate.
 - d. ASTM D638 - Tensile Strength.
 - e. ASTM D695 - Compressive Properties of Rigid Plastic.
 - f. ASTM D696 - Coefficient of Linear Expansion.
 - g. ASTM D790 - Flexural Properties.
 - h. ASTM D2583 - Indentation Hardness.
 - i. ASTM D2563 - Visual Defects.
 - j. ASTM D2584 - Resin, Glass & Filler Content.
- B. Manufacturer's Qualifications:
 - a. Manufacturer shall have experience in designing and manufacturing FRP stop logs and accessories.
 - b. For the manufacturer to be determined acceptable for providing equipment on this project, they must show evidence of a minimum of ten installations and twenty years' experience in the design and manufacturer of similar FRP stop logs and accessories.
 - c. Manufacturer must provide warranty for 25 years against failure due to corrosion of composite materials.

1.3 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Shop Drawings:
 - 1. See Specification Section 01 61 03.
 - 2. Product technical data including:
 - a. Acknowledgment that products submitted meet the requirements of standards referenced.
 - b. Evidence to show compliance with manufacturer's coordination requirements specified in Paragraph 1.5 below.
 - c. Manufacturer's installation instructions.
 - 3. Approval Drawings including:
 - a. All critical dimensions.
 - b. All principal parts and material specifications.

- C. Operation and Maintenance Manuals:
 - 1. See Specification Section 01 78 23 for requirements for:
 - a. The mechanics and administration of the submittal process.
 - b. The content of Operation and Maintenance Manuals.
- D. Informational Submittals:
 - 1. Written verification from manufacturer that stop logs and guide frames have been installed properly.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. See Specification Section 01 65 00 and Section 01 66 00.
- B. Ship all stop logs with suitable packaging to protect products from damage.
- C. Protect stop logs, lifting pins, guide frames, lifting devices, and storage racks from damage.

1.5 SYSTEM COORDINATION

- A. Prior to developing Shop Drawings, the FRP stop log manufacturer shall field coordinate the stop log dimensions and configuration. The FRP stop log manufacturer shall provide written confirmation of this field coordination as being completed with the submittal information of the FRP stop logs specified herein.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Plasti-Fab a Division of Ershigs, Inc.
 - 2. Whipps.
 - 3. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 25 00.

2.2 MATERIALS

- A. Stop log panels shall be:
 - 1. Engineered composite fiberglass reinforced plastic (FRP) completely encapsulating an internal steel reinforcing structure.
 - a. Infusion molded to create a seamless corrosion barrier impervious to moisture.
 - b. FRP resin shall be: Polyester.
 - c. Internal Steel Reinforcing: Carbon Steel as needed for deflection requirements.
 - d. Foam core between steel reinforcing.
 - e. Seal material to be EPDM.
 - f. Color: Coordinate with Owner.
- B. Guide Frame Rails: T-316L stainless steel
- C. Lifting Pins: T-316L stainless steel.
- D. Anchor Bolts: T-316L stainless steel.
- E. Lifting Beam/Poles: T-304L stainless steel.
- F. Storage Racks: T-304L stainless steel.

2.3 DESIGN CRITERIA

- A. Visual inspection for defects shall be made without the aid of magnification. Defects shall be classified as shown in Table 1 Level II of ANSI/ASTM D2563-0, approved 1977, (or any subsequent revision).

- B. Deflection:
 1. Deflection across the stop log width shall be limited to: $L/360$ or 1/4 IN (6mm), whichever is less, at the maximum operating head.
- C. Head Pressure:
 1. Stop log system shall be designed for a maximum head pressure of 4.0 FT.
- D. Stop log panel size as shown on the Contact Drawings.
- E. Surface Conditions:
 1. All stop log panels shall be flat and level.
 2. Warpage throughout the entire stop log panel shall not produce a crown of more than 1/16 IN (1.6 mm) in any direction.

2.4 STOP LOG PANELS

- A. The stop log shall be fabricated by means of vacuum infusion to encapsulate the internal structural matrix totally and protect it against corrosion from moisture or chemical deterioration with a minimum thickness of 1/4 IN (6mm) FRP on the front and back facings, and 3/4 IN (19 mm) FRP on the remaining perimeter.
- B. Stop logs shall be designed so the maximum fiber stress (ultimate or yield, whichever applies) shall exceed 2.5 times the working stress.
- C. Stop logs shall be suitably reinforced to withstand the maximum seating head with a deflection less than $l/360$ of the stop log width or 1/4 IN (6 mm), whichever is less.
- D. Stop log covers that are fabricated from pressed or laminated sheet material and/or glued/bonded to a substructure shall not be acceptable. No seams or joints that may allow water intrusion will be acceptable.
- E. Each stop log shall be molded individually to the exact dimensions specified.
- F. Stop log shall be manufactured of reinforced thermoset plastic in the form of FRP.
- G. Stop log shall have UV Stabilizing pigment in the resin to provide long-term protection from UV.
- H. The surface shall be resin-rich to a depth of 0.010 IN (2.5 mm) to 0.020 IN (5 mm) and reinforced with C-glass or polymeric fiber surfacing material.
- I. The surface shall be free of exposed reinforcing fibers.
- J. The composition of these surface shall be approximately 95% (by weight) resin. The remaining laminate shall be made up of copolymer composite and reinforcing fibers in a form, orientation, and position to meet the mechanical requirements.
- K. Core material must be 100% resistant to decay and attack by fungus and bacteria and be resistant to hydrocarbons. To assure maximum service life, the copolymer composite shall be ultraviolet stabilized and seamless to protect inner structural members from corrosion. Metal, concrete, or wood stop logs subject to corrosion / bacterial breakdown / rot shall not be acceptable alternatives to composite FRP material.
- L. Manufacturing Process:
 1. Stop Log panels shall be manufactured using advanced technology vacuum infusion resin transfer processes.
 2. The closed mold vacuum process must completely evacuate all air from the mold prior to infusing the mold with premium quality resin as specified.
 3. The vacuum infusion process must eliminate the potential of air entrapment and/or voids in the matrix of the stop log panel (which cause defects and performance-detracting irregularities), producing a finished product that is one-piece, seamless, and uniformly impenetrable by fluids, eliminating the chance for interior corrosion.

4. Stop Logs produced by techniques that employ adhesives or mechanical fasteners to attach individual panels to a pre-fabricated framework, resulting in seams along vertical and horizontal axes of the stop log, shall not be allowed, as they create stress-potential areas, portals for fluid infiltration, subsequent de-lamination, and product failure due to corrosion.

M. Panel Structural Reinforcing:

1. Structural reinforcing shall be utilized to attain the necessary stiffness to meet deflection requirements and shall be well-encapsulated with a laminate not less than 1/4 IN (6 mm) thick on each side to ensure against any permeation by water to the core areas.
2. Internal steel structure to be welded per AWS standards, sandblasted, and coated with epoxy vinyl ester resin immediately prior to vacuum infusion to ensure complete bonding with external corrosion barrier.

N. Lifting Pins:

1. T-316 stainless steel lifting pins shall be attached to the Stop Log by passing completely through the log.
2. Stainless steel lifting pin shall be fastened to the log with sufficient reinforcing to withstand the lifting force.
3. Lifting pins attached to the surface of the log are not acceptable.
4. The through holes shall not pass through or be in contact with the internal steel reinforcing.

2.5 SEALS

- A. The stop logs shall be equipped with elastomeric bottom seals to seal between the logs.
- B. Vertical seals shall be mounted on the face at the ends of the stop logs positioned to contact the inside of the guide rails.
- C. Seals shall be made of molded EPDM, having a hardness of 55 to 65 Shore A durometer, with a maximum compression set of 25% and low temperature brittleness to meet suffix F-17 (- 40 DEGF/C).

2.6 GUIDE FRAMES

- A. Guide frames shall be styled for in-channel mounting as shown on the Contract Drawings.
- B. Guide frames shall be fabricated from T-316L stainless steel and shall have a slot suitable for mating with the stop log panels.

2.7 PHYSICAL PROPERTIES

- A. Structural characteristics for FRP glass mat laminates shall meet the following minimum physical properties:
 1. Tensile strength: 15,000 PSI (1034 ksc).
 2. Flexural Modulus: 900,000 PSI (70307 ksc).
 3. Flexural Strength: 20,000 PSI (1406 ksc).
 4. Compressive Strength: 20,000 PSI (1547 ksc).
 5. Impact Strength: 9.0 FT-LBS/IN (1.24 kgf.m/25 mm).
 6. Water absorption: 0.12% (in 24 HRS).
- B. Seals: Extruded EPDM seals shall have the following physical characteristics:
 1. Specific Gravity: 1.25.
 2. Hardness: 55 – 65 Shore A Durometer.
 3. Tensile Strength: 1500 PSI min. (0.07 ksc).
 4. Elongation: 300% min.
 5. Low temperature brittleness: -40 DEGF.

2.8 FABRICATION

- A. Welded Stainless Steel: Passivated after fabrication.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Thoroughly clean and remove all shipping materials prior to installing products.

3.2 FIELD QUALITY CONTROL

- A. Employ and pay for services of equipment manufacturer's field service representative(s) to:
 - 1. Inspect equipment covered by this Specification Section.
 - 2. Supervise adjustments and installation checks.
 - 3. Provide test equipment, tools, and instruments necessary to accomplish equipment testing.
 - 4. Conduct initial start-up of equipment, perform operational checks, and supervise acceptance testing.
 - 5. Provide, through Contractor, a written statement that manufacturer's equipment has been installed properly and is ready for operation by Owner's personnel.
 - 6. Provide manufacturer's technical representative's time for on-site training of the Owner's personnel on operation and maintenance of furnished equipment in accordance with Specification Section 01 79 23 - Instruction of Operations and Maintenance Personnel.

3.3 DEMONSTRATION

- A. See Specification Section 01 75 00 - Checkout and Startup Procedures.

END OF SECTION

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SECTION 40 61 13
PROCESS CONTROL SYSTEMS GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Basic requirements for complete instrumentation system for process control.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Canadian Standards Association (CSA).
 - 2. FM Global (FM).
 - 3. The International Society of Automation (ISA):
 - a. S5.1, Instrumentation Symbols and Identification.
 - b. S5.3, Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic and Computer Systems.
 - c. S20, Standard Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves.
 - 4. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 5. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 - 6. National Institute of Standards and Technology (NIST).
 - 7. Underwriters Laboratories, Inc. (UL):
 - a. 913, Standard for Safety, Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations.
- B. Qualifications:
 - 1. Acceptable System Integrator:
 - a. Electric Pump, Des Moines, IA; no substitutes.
 - b. Experience:
 - 1) Have satisfactorily provided a control system for a minimum of five projects of similar magnitude and function.
- C. Miscellaneous:
 - 1. Comply with electrical classifications and NEMA enclosure types shown on Drawings.

1.3 DEFINITIONS

- A. Calibrate: To standardize a device so that it provides a specified response to known inputs.
- B. Hazardous Areas: Class I, II or III areas as defined in NFPA 70.
- C. Highly Corrosive and Corrosive Areas: Rooms or areas identified on the Drawings where there is a varying degree of spillage or splashing of corrosive materials such as water, wastewater or chemical solutions; or chronic exposure to corrosive, caustic or acidic agents, chemicals, chemical fumes or chemical mixtures.
- D. Intrinsically Safe Circuit: A circuit in which any spark or thermal effect is incapable of causing ignition of a mixture of flammable or combustible material in air under test conditions as prescribed in UL 913.

- E. System Integrator: A Contractor/Subcontractor who combines instrumentation, control devices, hardware, software, and networking products from multiple vendors to provide a fully functioning control system.

1.4 SYSTEM DESCRIPTION

A. Summary:

1. The clarifier mechanisms and all associated controls are being replaced. The system integrator will provide the following at a minimum:
 - a. Perform checkout on the new equipment to ensure proper operation after replacement.
 - b. If the existing PLC program & HMI graphics do not match new equipment, the system integrator must update the programming & graphics to provide a fully functioning system.
2. New sludge blanket level probes and (shared) transmitters are being added for each clarifier. The system integrator will provide PLC programming & HMI graphics for each of the level transmitters meeting the minimum requirements:
 - a. Add PLC programming & HMI graphics for each level transmitter. Match programming / graphics for existing similar instrumentation.
 - b. Add level indication and alarms to the HMI screens and historian.
3. Motorized actuators are being added to sluice gates in the return sludge pump stations.
 - a. Add PLC programming & HMI graphics for actuator matching programming / graphics for similar existing equipment.
4. Furnish and install for new I/O cards, racks and/or panels needed.
5. Add programming for new I/O cards, racks and/or panels needed.

B. Control System Requirements:

1. This Specification Section provides the general requirements for the control system.
2. The control system consists of all primary elements, transmitters, switches, controllers, computers, communication devices, recorders, indicators, panels, signal converters, signal boosters, amplifiers, special power supplies, special or shielded cable, special grounding or isolation, auxiliaries, software, wiring, and other devices required to provide complete control of the plant as specified in the Contract Documents.

C. Utilization of System Integrator:

1. Utilize a System Integrator to provide a fully functioning control system.
 - a. The System Integrator shall be responsible for the provision of an integrated control system fully functioning in accordance with the requirements of the Contract Documents.
 - b. As a minimum, the responsibilities of the System Integrator shall include:
 - 1) Control system performance.
 - 2) Supervision of installation and final connections.
 - 3) Controller programming.
 - 4) HMI configuration.
 - 5) Calibrations.
 - 6) Preparation of Drawings and Operation and Maintenance Manuals.
 - 7) System start-up.
 - 8) Training.
 - 9) Demonstration of substantial completion and all other aspects of the control system.
2. Provide all required coordination of instrumentation with other work to ensure that necessary wiring, conduits, contacts, relays, converters, and incidentals are provided in order to transmit, receive, and control necessary signals to other control elements, to control panels, and to receiving stations.
3. Prior to Shop Drawing preparation, the Systems Integrator shall inspect the Owner's existing equipment and as-constructed electrical documentation so as to be able to fully coordinate the interface of new and existing instrumentation and controls.
 - a. All costs associated with this Work shall be incorporated into the original bid.

- b. Although such Work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure, complete and compatible installation.

1.5 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. Submittals shall be original printed material or clear unblemished photocopies of original printed material.
 - a. Facsimile information is not acceptable.
 - 3. Limit the scope of each submittal to one Specification Section.
 - a. Each submittal must be submitted under the Specification Section containing requirements of submittal contents.
 - b. Do not provide any submittals for Specification Section 40 61 13.
 - 4. Product technical data including:
 - a. Equipment catalog cut sheets.
 - b. Instrument data sheets:
 - 1) ISA S20 or approved equal.
 - 2) Separate data sheet for each instrument type.
 - c. Materials of construction.
 - d. Minimum and maximum flow ranges.
 - e. Pressure loss curves.
 - f. Physical limits of components including temperature and pressure limits.
 - g. Size and weight.
 - h. Electrical power requirements and wiring diagrams.
 - i. NEMA rating of housings.
 - j. Submittals shall be marked with arrows to show exact features to be provided.
 - 5. PLC Equipment Drawings.
 - 6. HMI graphics.
 - 7. Nameplate Layout Drawings.
 - 8. Drawings, systems, and other elements are represented schematically in accordance with ISA S5.1 and ISA S5.3.
 - a. The nomenclature, tag numbers, equipment numbers, panel numbers, and related series identification contained in the Contract Documents shall be employed exclusively throughout submittals.
 - 9. All Shop Drawings shall be modified with as-built information/corrections.
 - 10. All panel and wiring drawings shall be provided in both hardcopy and softcopy.
 - a. Furnish electronic files on CD-ROM or DVD-ROM media.
 - b. Drawings in AUTO CAD format.
 - 11. Provide a parameter setting summary sheet for each field configurable device.
 - 12. Certifications:
 - a. Documentation verifying that calibration equipment is certified with NIST traceability.
 - b. Approvals from independent testing laboratories or approval agencies, such as UL, FM or CSA.
 - 1) Certification documentation is required for all equipment for which the specifications require independent agency approval.
 - 13. Testing reports: Source quality control reports.
- B. Contract Closeout Information:
 - 1. Operation and Maintenance Data:
 - a. See Specification Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

2. Instrumentation and Control Equipment Operation and Maintenance Manual Content:
 - a. Provide a printed copy of the following sheets following the Equipment Record sheets or ISA Data Sheets.
 - 1) Loop Check-out Sheet.
 - 2) Instrument (calibration) Certification Sheet.
 - 3) Final Control Element (i.e.; control valve) Certification Sheet.
 - b. Provide the following detailed information:
 - 1) Use equipment tag numbers from the Contract Documents to identify equipment and system components.
 - 2) As-constructed fabrication or layout drawings and wiring diagrams.
 - c. Additional information as required in the associated equipment or system Specification Section.
3. Warranties: Provide copies of warranties and list of factory authorized service agents.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. See Specification Section 01 65 00.
- B. Do not remove shipping blocks, plugs, caps, and desiccant dryers installed to protect the instrumentation during shipment until the instruments are installed and permanent connections are made.

PART 2 - PRODUCTS

2.1 NEMA TYPE REQUIREMENTS

- A. Provide enclosures/housing for control system components in accordance with the area designations provided on the Drawings.
 1. Areas designated as wet: NEMA Type 4.
 2. Areas designated as wet and/or corrosive: NEMA Type 4X.
 3. Areas designated as Class I hazardous, Groups A, B, C, or D as defined in NFPA 70:
 - a. NEMA Type 7 unless all electrical components within enclosure utilize intrinsically safe circuitry.
 - 1) Utilize intrinsically safe circuits to the maximum extent practical and as depicted in the Contract Documents.
 4. Areas designated as Class II hazardous, Groups E, F, or G as defined in NFPA 70:
 - a. NEMA Type 9 unless all electrical components within enclosure utilize intrinsically safe circuitry.
 - 1) Utilize intrinsically safe circuits to the maximum extent practical and as depicted in the Contract Documents.
 5. Either architecturally or non-architecturally finished areas designated as dry, noncorrosive, and nonhazardous: NEMA Type 12.
 6. Areas designated to be subject to temporary submersion: NEMA 6P.

2.2 PERFORMANCE AND DESIGN REQUIREMENTS

- A. Unless stated otherwise, system operating criteria are as follows:
 1. Stability: After controls have taken corrective action, as result of a change in the controlled variable or a change in setpoint, oscillation of final control element shall not exceed two cycles per minute or a magnitude of movement of 0.5% full travel.
 2. Response: Any change in setpoint or change in controlled variable shall produce a corresponding corrective change in position of final control element and become stabilized within 30 seconds.
 3. Agreement: Setpoint indication of controlled variable and measured indication of controlled variable shall agree within 3% of full scale over a 6:1 operating range.
 4. Repeatability: For any repeated magnitude of control signal, from either an increasing or decreasing direction, the final control element shall take a repeated position within 0.5% of full travel regardless of force required to position final element.

5. Sensitivity: Controls shall respond to setpoint deviations and measured variable deviations within 1.0% of full scale.
6. Performance: All instruments and control devices shall perform in accordance with manufacturer's specifications.

2.3 ACCESSORIES

- A. Provide identification devices for instrumentation system components in accordance with Specification Section 10 14 00.
- B. Provide corrosion resistant spacers to maintain 1/4 IN separation between equipment and mounting surface in wet areas, on below grade walls and on walls of liquid containment or processing areas such as Clarifiers, Digesters, Reservoirs, etc.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Wherever feasible, use bottom entry for all conduit entry to instruments and junction boxes.
- B. Install electrical components per the requirements of the Electrical design.
- C. Panel-Mounted Instruments:
 1. Mount and wire so removal or replacement may be accomplished without interruption of service to adjacent devices.
 2. Locate all devices mounted inside enclosures so terminals and adjustment devices are readily accessible without use of special tools and with terminal markings clearly visible.

3.2 FIELD QUALITY CONTROL

- A. See Specification Section 01 75 00.
- B. Maintain accurate daily log of all startup activities, calibration functions, and final setpoint adjustments.
- C. In the event that instrument air is not available during calibration and testing, supply either filtered, dry, instrument quality air from a portable compressor or bottled, dry, instrument quality air.
 1. Do not, under any circumstances, apply hydrostatic test to any part of the air supply system or pneumatic control system.
- D. Instrumentation Calibration:
 1. Verify and document that all instruments and control devices are calibrated to provide the performance required by the Contract Documents.
 - a. Utilize the Instrument Certification Sheet located at the end of this Specification Section (or Engineer approved equivalent) to document on-site calibration checks.
 2. Factory furnished calibration certifications are acceptable for the following:
 - a. Flow meters.
 - b. Pressure sensors utilized with annular sleeve.
 - c. Temperature sensors.
 3. On-site calibration verification is required for all other instruments, including "smart" transmitters that have been factory calibrated.
 - a. Provide calibration checks at 0%, 25%, 50%, 75% and 100% of span for pressure transmitters and gages.
 - 1) Check for both increasing and decreasing input signals to detect hysteresis.
 - b. In addition to factory calibration certification, temperature sensors and gages shall be checked at a single point for conformance to required accuracy.
 - c. Level transducers/transmitters shall be checked at two points in addition to zero.
 - d. Analytical sensors shall be calibrated in accordance with manufacturer's recommendations.

- e. Check operation of all switches to verify actuation occurs in accordance with manufacturer's specified accuracy.
 - f. Replace any instrument which cannot be properly adjusted.
 - g. Stroke pneumatic control valves with clean dry air to verify control action, positioner settings, and solenoid functions.
 - 4. Calibration equipment shall be certified by an independent agency with traceability to NIST.
 - a. Certification shall be up-to-date.
 - b. Use of equipment with expired certifications shall not be permitted.
 - 5. Calibration equipment shall be at least three times more accurate as the device being calibrated.
- E. Loop Check-Out Requirements are as follows:
- 1. Check control signal generation, transmission, reception and response for all control loops under simulated operating conditions by imposing a signal on the loop at the instrument connections.
 - a. Use actual signals where available.
 - b. Closely observe controllers, indicators, transmitters, HMI displays, recorders, alarm and trip units, remote setpoints, ratio systems, and other control components.
 - 1) Verify that readings at all loop components are in agreement.
 - 2) Make corrections as required.
 - a) Following any corrections, retest the loop as before.
 - 2. Stroke all control valves, cylinders, drives and connecting linkages from the local control station and from the control room operator interface.
 - 3. Utilize Final Control Element Certification Sheet located at the end of this Specification Section (or Engineer approved equivalent) to document check-out of slide gates.
 - 4. Check all interlocks to the maximum extent possible.
 - 5. Utilize the Loop Check-Out Sheet located at the end of this Specification Section (or Engineer approved equivalent) to document on-site calibration checks.
 - 6. In addition to any other as-recorded documents, record all setpoint and calibration changes on all affected Contract Documents and turn over to the Owner.

3.3 POST ACCEPTANCE PROGRAMMING

- A. Contractor shall provide up to 80 HRS of on-site programming to allow for changes to the new PLC cabinet, touch panel, or SCADA system computer programming after the project has been accepted, but prior to end of warranty.
- 1. The programming changes will occur as Owner operates the plant and gains experience.
 - 2. Changes will be made to suit Owner's preferences and may include:
 - a. How information is shown on Operator Interfaces.
 - b. Sequence changes (e.g., changes to add new time delays, changes in order of operation).
 - c. New alarms.
 - d. New hard-programmed setpoints for items that are not adjustable.
 - e. Reports formats including additional information.
 - 3. Hours spent in this phase of the project shall be subject to the following restrictions:
 - a. Requests for programming changes will be directed in writing from the Engineer to Contractor.
 - b. Programming efforts in this phase shall be completed at no additional charge to the Owner until the allotted man-hours are spent.
 - c. Travel time, breaks, lunches and other non-programming time is not included in this number. If on-site resolution is needed, these activities will be provided free of Owner charge so long as the allotment of hours exists.
 - d. Time spent fixing newly discovered or lingering programming errors in satisfaction of warranty obligation shall not be accounted in this allotment. It is reserved for new Owner-requested changes.

4. Contractor shall maintain a record of hours spent, with a detailed explanation of associated work. Any changes are to be documented and presented to Engineer for review and approval, and correction if necessary. The report will be updated every two months or whenever requested by Engineer.

END OF SECTION

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Loop Check-out Sheet

Project Name:	Owner's Project No. (if applicable):	Page of
Project Owner:	Regulatory Agency Project No. (if applicable):	
HDR Project No.:	Date:	

LEAK AND TERMINATION/CONTINUITY CHECKS

DESCRIPTION	FIELD					CONTROL CAB	
	LEAK CHECK ₍₁₎			TERM/CONT CHECK ₍₂₎		TERM/CONT CHECK ₍₂₎	
	Device Tag No.	Process Conn.	Signal Tube	Device Tag No.	Termination Ident.	Device Tag No.	Termination Ident.

1. Leak check for pneumatic signal tubing to be per ISA-PR7.1.
2. Termination/continuity check includes check at terminated equipment for: (a) correct polarity, (b) appropriate signal generation, transmission and reception, and (c) correct shield & ground terminations.

OPERATOR INTERFACE CHECK-OUT

MONITORING POINTS OBSERVED

PARAMETER TYPE	TAG NO.	TAG NO.	TAG NO.	TAG NO.	TAG NO.	TAG NO.
PROCESS VAR						
EQUIP STATUS						
ALARM POINT						

OPERATOR CONTROL FUNCTIONS CHECKED

FUNCTION TYPE	TAG NO.	LOCATION	TAG NO.	LOCATION	TAG NO.	LOCATION

AS LEFT SETTINGS

TAG NO.	SWITCH & ALARM SP	CONTROLLERS			
		Gain	Reset, rpm	Deriv. (rate), min	PV Set Point

Describe all interlocks checked, equipment started/stopped, valves/operators stroked. Describe modes of operation checked, and location of operator interface (local/remote).

I certify that the control loop referenced on this page has been completely checked and functions in accordance with applicable drawings and specifications.

Certified by: _____ Date: _____
 (Work Performed By)



Instrument Certification Sheet

Project Name:	Owner's Project No. (if applicable):
Project Owner:	Regulatory Agency Project No. (if applicable):
HDR Project No.	Date:
Control Loop No.:	
Instrument Tag No.	Transmitter/gauge span:
Manufacturer:	Switch set-point:
Model No.	Switch dead band:
Serial No.	Switch range:

TRANSMITTERS AND INDICATORS

% OF SPAN	INCREASING INPUT			DECREASING INPUT		
	INPUT	OUTPUT	ERROR (% of span)	INPUT	OUTPUT	ERROR (% of span)
0%						
25%						
50%						
75%						
100%						
Other (if applicable)						
Other (if applicable)						

SWITCHES

ACTUATION POINT	INCREASING INPUT			DECREASING INPUT		
	INPUT	OUTPUT	ERROR (% of range)	INPUT	OUTPUT	ERROR (% of range)
High (Increasing input)						
Low (Decreasing input)						

Maximum allowable error (per Contract Documents): _____

Remarks: _____

CALIBRATION EQUIPMENT UTILIZED

DEVICE TYPE	MFR/MODEL NO.	ACCURACY	NIST TRACEABILITY?

Certified by: _____

Date Certified: _____

SECTION 40 61 93
PROCESS CONTROL SYSTEM INPUT-OUTPUT LIST

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Process Control System (PCS) PLC Input/Output (I/O) List description.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 40 61 13 - Process Control System General Requirements.
 - 5. Section 40 90 05 - Control Loop Descriptions.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. The International Society of Automation (ISA):
 - a. 5.1, Instrumentation Symbols and Identification.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. Any proposed deviations from the I/O List format, content and attributes stipulated in this Section shall be submitted for approval. I/O List development shall not proceed until the deviation has been approved.
 - 2. Pre-fabrication I/O Lists for approval.
- B. Operation and Maintenance Manuals:
 - 1. See Specification Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
- C. Informational Submittals:
 - 1. I/O Lists:
 - a. Post-Commissioning Final I/O Lists.
 - b. Submit I/O Lists in PDF and native format Microsoft Excel indexed by Area, Panel, and Point Description.

PART 2 - PRODUCTS

2.1 I/O LIST

- A. The I/O List in the Appendix 40 61 93A to this Section contains I/O point information derived from the Contract Drawings and Specifications.
- B. The I/O List shall be used as the starting point in the development of the final PLC I/O spreadsheet or database.
 - 1. The I/O list does not include internal software points generated by the control system and is used solely within the control system.
- C. The I/O List is organized in columns as follows:
 - 1. idx – Index line number.
 - 2. TAG describes the point name that will be used throughout the control system to identify the point.
 - 3. ASSOCIATED EQUIPMENT is the tag assigned to the associated field equipment (if applicable).

4. DESCRIPTION is a concise English language description of the point's function in relation to the process in terms that a user can easily understand.
 5. FROM is the source of the signal.
 1. TO indicates the control panel in which the I/O (or communications) module is located.
 2. I/O TYPE denotes the signal type such as analog input or output, discrete input or output, pulse, etc.
 3. HARDWIRED / COMMS denotes the method of communication (hardwired, via data-link, etc.).
 4. RANGE is the signal's lower range value and upper range value in engineering units of an analog input or output signal.
 5. ENGINEERING UNITS lists the units associated with the point value.
 6. I/O NOTES used to identify new versus existing I/O.
 7. SPECIAL NOTES is for any pertinent notations that help in identification or understanding of the signal source, features or new/existing status.
- D. I/O List: Refer to Appendix 40 61 93A.

PART 3 - EXECUTION

3.1 I/O DATABASE DEVELOPMENT

- A. The Systems Integrator shall develop the complete I/O List containing all information needed to facilitate panel building, testing and programming, and the fully document the I/O layout and interconnections.
- B. The Systems Integrator shall obtain the Owner's existing tag naming conventions, abbreviations, facility codes, standard state descriptors, and other relevant information prior to creating the I/O List.
- C. Prior to the start of PLC panel modification, the Systems Integrator shall submit an I/O List for review and approval.
- D. The I/O List shall include for each I/O point, at minimum, all information as listed in Section 2.1.C.
- E. Maintain a copy of the complete I/O List with modifications during construction in native file format. I/O List shall be accessible to Owner and Engineer upon request.
- F. Following successful project Commissioning, submit an "As Installed" final I/O List, with all fields representing the updated information, including all field updated information.

3.2 I/O HARDWARE CONFIGURATION

- A. Partition the signals among I/O modules per plant standards to meet customer expectations for process control and monitoring resiliency.

3.3 I/O POINT DATA FIELDS

- A. Information in the I/O List data fields may be subject to review and modification by the Owner or Engineer during the Submittal review phase.
 1. Incorporate changes as directed by the reviewer through the system and associated documentation, at no additional cost to the Owner, subject to the following limitations:
 - a. Requested modifications shall be limited to 20% of the total number of I/O points.
 - 1) This 20% shall not include changes to the I/O List prior to the Submittal review.
 - 2) Corrections for errors by the Systems Integrator shall not count toward the 20% modification limit.

- b. Each unique change shall count as one modification.
 - 1) For example, modifying the description, range, and engineering unit for one analog input counts as three separate modifications.
- c. Analog input alarm limit adjustments shall not count as modifications.

END OF SECTION

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idx	TAG	ASSOCIATED EQUIPMENT	DESCRIPTION	FROM	TO	I/O TYPE	HARDWIRED / COMMS	RANGE	ENGINEERING UNITS	I/O NOTES	SPECIAL NOTES
1	FD-219-QL	55-FC-1	FINAL CLARIFIER 1 MOTOR RUN	CLARIFIER PANEL	PLC-FD	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
2	FD-219-WH	55-FC-1	FINAL CLARIFIER 1 TORQUE ALARM	CLARIFIER PANEL	PLC-FD	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
3	FD-CLAR-1-ZS	55-FC-1	FINAL CLARIFIER 1 POSITION PROX.	CLARIFIER PANEL	PLC-FD	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
4	FD-225-QL	55-FC-2	FINAL CLARIFIER 2 MOTOR RUN	CLARIFIER PANEL	PLC-FD	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
5	FD-225-WH	55-FC-2	FINAL CLARIFIER 2 TORQUE ALARM	CLARIFIER PANEL	PLC-FD	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
6	FD-CLAR-2-ZS	55-FC-2	FINAL CLARIFIER 2 POSITION PROX.	CLARIFIER PANEL	PLC-FD	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
7	FD-227-QL	55-FC-3	FINAL CLARIFIER 3 MOTOR RUN	CLARIFIER PANEL	PLC-FD	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
8	FD-227-WH	55-FC-3	FINAL CLARIFIER 3 TORQUE ALARM	CLARIFIER PANEL	PLC-FD	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
9	FD-CLAR-3-ZS	55-FC-3	FINAL CLARIFIER 3 POSITION PROX.	CLARIFIER PANEL	PLC-FD	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
10	FD-217-QL	55-FC-4	FINAL CLARIFIER 4 MOTOR RUN	CLARIFIER PANEL	PLC-FD	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
11	FD-217-WH	55-FC-4	FINAL CLARIFIER 4 TORQUE ALARM	CLARIFIER PANEL	PLC-FD	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
12	FD-CLAR-4-ZS	55-FC-4	FINAL CLARIFIER 4 POSITION PROX.	CLARIFIER PANEL	PLC-FD	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
13	YI-541	50-RSL-G-1	RETURN SLUDGE WET WELL EQUALIZATION SLUICE GATE-IN REMOTE	GATE ACTUATOR	PLC-FD	DI	Hardwired	N/A	N/A	NEW	
14	ZSC-541	50-RSL-G-1	RETURN SLUDGE WET WELL EQUALIZATION SLUICE GATE-CLOSED FEEDBACK	GATE ACTUATOR	PLC-FD	DI	Hardwired	N/A	N/A	NEW	
15	ZSO-541	50-RSL-G-1	RETURN SLUDGE WET WELL EQUALIZATION SLUICE GATE-OPEN FEEDBACK	GATE ACTUATOR	PLC-FD	DI	Hardwired	N/A	N/A	NEW	
16	ZYC-541	50-RSL-G-1	RETURN SLUDGE WET WELL EQUALIZATION SLUICE GATE-CLOSE COMMAND	GATE ACTUATOR	PLC-FD	DO	Hardwired	N/A	N/A	NEW	
17	ZYO-541	50-RSL-G-1	RETURN SLUDGE WET WELL EQUALIZATION SLUICE GATE-OPEN COMMAND	GATE ACTUATOR	PLC-FD	DO	Hardwired	N/A	N/A	NEW	
18	YI-531	50-SSC-G-1	SECONDARY SCUM SLUICE GATE-IN REMOTE	GATE ACTUATOR	PLC-FD	DI	Hardwired	N/A	N/A	NEW	
19	ZSC-531	50-SSC-G-1	SECONDARY SCUM SLUICE GATE-CLOSED FEEDBACK	GATE ACTUATOR	PLC-FD	DI	Hardwired	N/A	N/A	NEW	
20	ZSO-531	50-SSC-G-1	SECONDARY SCUM SLUICE GATE-OPEN FEEDBACK	GATE ACTUATOR	PLC-FD	DI	Hardwired	N/A	N/A	NEW	
21	ZYC-531	50-SSC-G-1	SECONDARY SCUM SLUICE GATE-CLOSE COMMAND	GATE ACTUATOR	PLC-FD	DO	Hardwired	N/A	N/A	NEW	
22	ZYO-531	50-SSC-G-1	SECONDARY SCUM SLUICE GATE-OPEN COMMAND	GATE ACTUATOR	PLC-FD	DO	Hardwired	N/A	N/A	NEW	
23	YI-501	55-FC-G-1	FINAL CLARIFIER NO. 1 INFLUENT SLUICE GATE-IN REMOTE	GATE ACTUATOR	PLC-FD	DI	Hardwired	N/A	N/A	NEW	
24	ZSC-501	55-FC-G-1	FINAL CLARIFIER NO. 1 INFLUENT SLUICE GATE-CLOSED FEEDBACK	GATE ACTUATOR	PLC-FD	DI	Hardwired	N/A	N/A	NEW	
25	ZSO-501	55-FC-G-1	FINAL CLARIFIER NO. 1 INFLUENT SLUICE GATE-OPEN FEEDBACK	GATE ACTUATOR	PLC-FD	DI	Hardwired	N/A	N/A	NEW	
26	ZYC-501	55-FC-G-1	FINAL CLARIFIER NO. 1 INFLUENT SLUICE GATE-CLOSE COMMAND	GATE ACTUATOR	PLC-FD	DO	Hardwired	N/A	N/A	NEW	
27	ZYO-501	55-FC-G-1	FINAL CLARIFIER NO. 1 INFLUENT SLUICE GATE-OPEN COMMAND	GATE ACTUATOR	PLC-FD	DO	Hardwired	N/A	N/A	NEW	
28	YI-502	55-FC-G-2	FINAL CLARIFIER NO. 2 INFLUENT SLUICE GATE-IN REMOTE	GATE ACTUATOR	PLC-FD	DI	Hardwired	N/A	N/A	NEW	
29	ZSC-502	55-FC-G-2	FINAL CLARIFIER NO. 2 INFLUENT SLUICE GATE-CLOSED FEEDBACK	GATE ACTUATOR	PLC-FD	DI	Hardwired	N/A	N/A	NEW	
30	ZSO-502	55-FC-G-2	FINAL CLARIFIER NO. 2 INFLUENT SLUICE GATE-OPEN FEEDBACK	GATE ACTUATOR	PLC-FD	DI	Hardwired	N/A	N/A	NEW	
31	ZYC-502	55-FC-G-2	FINAL CLARIFIER NO. 2 INFLUENT SLUICE GATE-CLOSE COMMAND	GATE ACTUATOR	PLC-FD	DO	Hardwired	N/A	N/A	NEW	
32	ZYO-502	55-FC-G-2	FINAL CLARIFIER NO. 2 INFLUENT SLUICE GATE-OPEN COMMAND	GATE ACTUATOR	PLC-FD	DO	Hardwired	N/A	N/A	NEW	
33	YI-503	55-FC-G-3	FINAL CLARIFIER NO. 3 INFLUENT SLUICE GATE-IN REMOTE	GATE ACTUATOR	PLC-FD	DI	Hardwired	N/A	N/A	NEW	
34	ZSC-503	55-FC-G-3	FINAL CLARIFIER NO. 3 INFLUENT SLUICE GATE-CLOSED FEEDBACK	GATE ACTUATOR	PLC-FD	DI	Hardwired	N/A	N/A	NEW	
35	ZSO-503	55-FC-G-3	FINAL CLARIFIER NO. 3 INFLUENT SLUICE GATE-OPEN FEEDBACK	GATE ACTUATOR	PLC-FD	DI	Hardwired	N/A	N/A	NEW	
36	ZYC-503	55-FC-G-3	FINAL CLARIFIER NO. 3 INFLUENT SLUICE GATE-CLOSE COMMAND	GATE ACTUATOR	PLC-FD	DO	Hardwired	N/A	N/A	NEW	
37	ZYO-503	55-FC-G-3	FINAL CLARIFIER NO. 3 INFLUENT SLUICE GATE-OPEN COMMAND	GATE ACTUATOR	PLC-FD	DO	Hardwired	N/A	N/A	NEW	
38	YI-504	55-FC-G-4	FINAL CLARIFIER NO. 4 INFLUENT SLUICE GATE-IN REMOTE	GATE ACTUATOR	PLC-FD	DI	Hardwired	N/A	N/A	NEW	
39	ZSC-504	55-FC-G-4	FINAL CLARIFIER NO. 4 INFLUENT SLUICE GATE-CLOSED FEEDBACK	GATE ACTUATOR	PLC-FD	DI	Hardwired	N/A	N/A	NEW	
40	ZSO-504	55-FC-G-4	FINAL CLARIFIER NO. 4 INFLUENT SLUICE GATE-OPEN FEEDBACK	GATE ACTUATOR	PLC-FD	DI	Hardwired	N/A	N/A	NEW	
41	ZYC-504	55-FC-G-4	FINAL CLARIFIER NO. 4 INFLUENT SLUICE GATE-CLOSE COMMAND	GATE ACTUATOR	PLC-FD	DO	Hardwired	N/A	N/A	NEW	
42	ZYO-504	55-FC-G-4	FINAL CLARIFIER NO. 4 INFLUENT SLUICE GATE-OPEN COMMAND	GATE ACTUATOR	PLC-FD	DO	Hardwired	N/A	N/A	NEW	
43	LI-501	55-FC-1	FINAL CLARIFIER 1 SLUDGE BLANKET LEVEL	INSTRUMENT CONTROLLER (LIT-501)	PLC-FD	AI	Ethernet	0 - 4	FEET	EXISTING; CHANGE TO COMMS	PROBE WIRED TO LIT-501
44	XA-501	55-FC-1	FINAL CLARIFIER 1 SLUDGE BLANKET LEVEL SENSOR FAULT	INSTRUMENT CONTROLLER (LIT-501)	PLC-FD	DI	Ethernet	N/A	N/A	NEW	
45	LI-502	55-FC-2	FINAL CLARIFIER 2 SLUDGE BLANKET LEVEL	INSTRUMENT CONTROLLER (LIT-501)	PLC-FD	AI	Ethernet	0 - 4	FEET	EXISTING; CHANGE TO COMMS	PROBE WIRED TO LIT-501
46	XA-502	55-FC-2	FINAL CLARIFIER 2 SLUDGE BLANKET LEVEL SENSOR FAULT	INSTRUMENT CONTROLLER (LIT-501)	PLC-FD	DI	Ethernet	N/A	N/A	NEW	
47	LI-503	55-FC-3	FINAL CLARIFIER 3 SLUDGE BLANKET LEVEL	INSTRUMENT CONTROLLER (LIT-503)	PLC-FD	AI	Ethernet	0 - 4	FEET	EXISTING; CHANGE TO COMMS	PROBE WIRED TO LIT-503
48	XA-503	55-FC-3	FINAL CLARIFIER 3 SLUDGE BLANKET LEVEL SENSOR FAULT	INSTRUMENT CONTROLLER (LIT-503)	PLC-FD	DI	Ethernet	N/A	N/A	NEW	
49	LI-504	55-FC-4	FINAL CLARIFIER 4 SLUDGE BLANKET LEVEL	INSTRUMENT CONTROLLER (LIT-503)	PLC-FD	AI	Ethernet	0 - 4	FEET	EXISTING; CHANGE TO COMMS	PROBE WIRED TO LIT-503
50	XA-504	55-FC-4	FINAL CLARIFIER 4 SLUDGE BLANKET LEVEL SENSOR FAULT	INSTRUMENT CONTROLLER (LIT-503)	PLC-FD	DI	Ethernet	N/A	N/A	NEW	
51	FE-278-QL	55-FC-5	FINAL CLARIFIER 5 MOTOR RUN	CLARIFIER PANEL	PLC-FE	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
52	FE-278-WH	55-FC-5	FINAL CLARIFIER 5 TORQUE ALARM	CLARIFIER PANEL	PLC-FE	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
53	FE-CLAR-5-ZS	55-FC-5	FINAL CLARIFIER 5 POSITION PROX.	CLARIFIER PANEL	PLC-FE	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
54	FE-280-QL	55-FC-6	FINAL CLARIFIER 6 MOTOR RUN	CLARIFIER PANEL	PLC-FE	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
55	FE-280-WH	55-FC-6	FINAL CLARIFIER 6 TORQUE ALARM	CLARIFIER PANEL	PLC-FE	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
56	FE-CLAR-6-ZS	55-FC-6	FINAL CLARIFIER 6 POSITION PROX.	CLARIFIER PANEL	PLC-FE	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
57	FE-286-QL	55-FC-7	FINAL CLARIFIER 7 MOTOR RUN	CLARIFIER PANEL	PLC-FE	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
58	FE-286-WH	55-FC-7	FINAL CLARIFIER 7 TORQUE ALARM	CLARIFIER PANEL	PLC-FE	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
59	FE-CLAR-7-ZS	55-FC-7	FINAL CLARIFIER 7 POSITION PROX.	CLARIFIER PANEL	PLC-FE	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
60	FE-288-QL	55-FC-8	FINAL CLARIFIER 8 MOTOR RUN	CLARIFIER PANEL	PLC-FE	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
61	FE-288-WH	55-FC-8	FINAL CLARIFIER 8 TORQUE ALARM	CLARIFIER PANEL	PLC-FE	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
62	FE-CLAR-8-ZS	55-FC-8	FINAL CLARIFIER 8 POSITION PROX.	CLARIFIER PANEL	PLC-FE	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
63	YI-561	51-RSL-G-1	RETURN SLUDGE WET WELL EQUALIZATION SLUICE GATE-IN REMOTE	GATE ACTUATOR	PLC-FE	DI	Hardwired	N/A	N/A	NEW	
64	ZSC-561	51-RSL-G-1	RETURN SLUDGE WET WELL EQUALIZATION SLUICE GATE-CLOSED FEEDBACK	GATE ACTUATOR	PLC-FE	DI	Hardwired	N/A	N/A	NEW	
65	ZSO-561	51-RSL-G-1	RETURN SLUDGE WET WELL EQUALIZATION SLUICE GATE-OPEN FEEDBACK	GATE ACTUATOR	PLC-FE	DI	Hardwired	N/A	N/A	NEW	
66	ZYC-561	51-RSL-G-1	RETURN SLUDGE WET WELL EQUALIZATION SLUICE GATE-CLOSE COMMAND	GATE ACTUATOR	PLC-FE	DO	Hardwired	N/A	N/A	NEW	
67	ZYO-561	51-RSL-G-1	RETURN SLUDGE WET WELL EQUALIZATION SLUICE GATE-OPEN COMMAND	GATE ACTUATOR	PLC-FE	DO	Hardwired	N/A	N/A	NEW	
68	YI-551	51-SSC-G-1	SECONDARY SCUM SLUICE GATE-IN REMOTE	GATE ACTUATOR	PLC-FE	DI	Hardwired	N/A	N/A	NEW	
69	ZSC-551	51-SSC-G-1	SECONDARY SCUM SLUICE GATE-CLOSED FEEDBACK	GATE ACTUATOR	PLC-FE	DI	Hardwired	N/A	N/A	NEW	
70	ZSO-551	51-SSC-G-1	SECONDARY SCUM SLUICE GATE-OPEN FEEDBACK	GATE ACTUATOR	PLC-FE	DI	Hardwired	N/A	N/A	NEW	
71	ZYC-551	51-SSC-G-1	SECONDARY SCUM SLUICE GATE-CLOSE COMMAND	GATE ACTUATOR	PLC-FE	DO	Hardwired	N/A	N/A	NEW	
72	ZYO-551	51-SSC-G-1	SECONDARY SCUM SLUICE GATE-OPEN COMMAND	GATE ACTUATOR	PLC-FE	DO	Hardwired	N/A	N/A	NEW	
73	YI-505	55-FC-G-5	FINAL CLARIFIER NO. 5 INFLUENT SLUICE GATE-IN REMOTE	GATE ACTUATOR	PLC-FE	DI	Hardwired	N/A	N/A	NEW	
74	ZSC-505	55-FC-G-5	FINAL CLARIFIER NO. 5 INFLUENT SLUICE GATE-CLOSED FEEDBACK	GATE ACTUATOR	PLC-FE	DI	Hardwired	N/A	N/A	NEW	
75	ZSO-505	55-FC-G-5	FINAL CLARIFIER NO. 5 INFLUENT SLUICE GATE-OPEN FEEDBACK	GATE ACTUATOR	PLC-FE	DI	Hardwired	N/A	N/A	NEW	
76	ZYC-505	55-FC-G-5	FINAL CLARIFIER NO. 5 INFLUENT SLUICE GATE-CLOSE COMMAND	GATE ACTUATOR	PLC-FE	DO	Hardwired	N/A	N/A	NEW	
77	ZYO-505	55-FC-G-5	FINAL CLARIFIER NO. 5 INFLUENT SLUICE GATE-OPEN COMMAND	GATE ACTUATOR	PLC-FE	DO	Hardwired	N/A	N/A	NEW	
78	YI-506	55-FC-G-6	FINAL CLARIFIER NO. 6 INFLUENT SLUICE GATE-IN REMOTE	GATE ACTUATOR	PLC-FE	DI	Hardwired	N/A	N/A	NEW	
79	ZSC-506	55-FC-G-6	FINAL CLARIFIER NO. 6 INFLUENT SLUICE GATE-CLOSED FEEDBACK	GATE ACTUATOR	PLC-FE	DI	Hardwired	N/A	N/A	NEW	
80	ZSO-506	55-FC-G-6	FINAL CLARIFIER NO. 6 INFLUENT SLUICE GATE-OPEN FEEDBACK	GATE ACTUATOR	PLC-FE	DI	Hardwired	N/A	N/A	NEW	

idx	TAG	ASSOCIATED EQUIPMENT	DESCRIPTION	FROM	TO	I/O TYPE	HARDWIRED / COMMS	RANGE	ENGINEERING UNITS	I/O NOTES	SPECIAL NOTES
81	ZYC-506	55-FC-G-6	FINAL CLARIFIER NO. 6 INFLUENT SLUICE GATE-CLOSE COMMAND	GATE ACTUATOR	PLC-FE	DO	Hardwired	N/A	N/A	NEW	
82	ZYO-506	55-FC-G-6	FINAL CLARIFIER NO. 6 INFLUENT SLUICE GATE-OPEN COMMAND	GATE ACTUATOR	PLC-FE	DO	Hardwired	N/A	N/A	NEW	
83	YI-507	55-FC-G-7	FINAL CLARIFIER NO. 7 INFLUENT SLUICE GATE-IN REMOTE	GATE ACTUATOR	PLC-FE	DI	Hardwired	N/A	N/A	NEW	
84	ZSC-507	55-FC-G-7	FINAL CLARIFIER NO. 7 INFLUENT SLUICE GATE-CLOSED FEEDBACK	GATE ACTUATOR	PLC-FE	DI	Hardwired	N/A	N/A	NEW	
85	ZSO-507	55-FC-G-7	FINAL CLARIFIER NO. 7 INFLUENT SLUICE GATE-OPEN FEEDBACK	GATE ACTUATOR	PLC-FE	DI	Hardwired	N/A	N/A	NEW	
86	ZYC-507	55-FC-G-7	FINAL CLARIFIER NO. 7 INFLUENT SLUICE GATE-CLOSE COMMAND	GATE ACTUATOR	PLC-FE	DO	Hardwired	N/A	N/A	NEW	
87	ZYO-507	55-FC-G-7	FINAL CLARIFIER NO. 7 INFLUENT SLUICE GATE-OPEN COMMAND	GATE ACTUATOR	PLC-FE	DO	Hardwired	N/A	N/A	NEW	
88	YI-508	55-FC-G-8	FINAL CLARIFIER NO. 8 INFLUENT SLUICE GATE-IN REMOTE	GATE ACTUATOR	PLC-FE	DI	Hardwired	N/A	N/A	NEW	
89	ZSC-508	55-FC-G-8	FINAL CLARIFIER NO. 8 INFLUENT SLUICE GATE-CLOSED FEEDBACK	GATE ACTUATOR	PLC-FE	DI	Hardwired	N/A	N/A	NEW	
90	ZSO-508	55-FC-G-8	FINAL CLARIFIER NO. 8 INFLUENT SLUICE GATE-OPEN FEEDBACK	GATE ACTUATOR	PLC-FE	DI	Hardwired	N/A	N/A	NEW	
91	ZYC-508	55-FC-G-8	FINAL CLARIFIER NO. 8 INFLUENT SLUICE GATE-CLOSE COMMAND	GATE ACTUATOR	PLC-FE	DO	Hardwired	N/A	N/A	NEW	
92	ZYO-508	55-FC-G-8	FINAL CLARIFIER NO. 8 INFLUENT SLUICE GATE-OPEN COMMAND	GATE ACTUATOR	PLC-FE	DO	Hardwired	N/A	N/A	NEW	
93	LI-505	55-FC-5	FINAL CLARIFIER 5 SLUDGE BLANKET LEVEL	INSTRUMENT CONTROLLER (LIT-505)	PLC-FE	AI	Ethernet	0 - 4	FEET	EXISTING; CHANGE TO COMMS	PROBE WIRED TO LIT-505
94	XA-505	55-FC-5	FINAL CLARIFIER 5 SLUDGE BLANKET LEVEL SENSOR FAULT	INSTRUMENT CONTROLLER (LIT-505)	PLC-FE	DI	Ethernet	N/A	N/A	NEW	
95	LI-506	55-FC-6	FINAL CLARIFIER 6 SLUDGE BLANKET LEVEL	INSTRUMENT CONTROLLER (LIT-505)	PLC-FE	AI	Ethernet	0 - 4	FEET	EXISTING; CHANGE TO COMMS	PROBE WIRED TO LIT-505
96	XA-506	55-FC-6	FINAL CLARIFIER 6 SLUDGE BLANKET LEVEL SENSOR FAULT	INSTRUMENT CONTROLLER (LIT-505)	PLC-FE	DI	Ethernet	N/A	N/A	NEW	
97	LI-507	55-FC-7	FINAL CLARIFIER 7 SLUDGE BLANKET LEVEL	INSTRUMENT CONTROLLER (LIT-507)	PLC-FE	AI	Ethernet	0 - 4	FEET	EXISTING; CHANGE TO COMMS	PROBE WIRED TO LIT-507
98	XA-507	55-FC-7	FINAL CLARIFIER 7 SLUDGE BLANKET LEVEL SENSOR FAULT	INSTRUMENT CONTROLLER (LIT-507)	PLC-FE	DI	Ethernet	N/A	N/A	NEW	
99	LI-508	55-FC-8	FINAL CLARIFIER 8 SLUDGE BLANKET LEVEL	INSTRUMENT CONTROLLER (LIT-507)	PLC-FE	AI	Ethernet	0 - 4	FEET	EXISTING; CHANGE TO COMMS	PROBE WIRED TO LIT-507
100	XA-508	55-FC-8	FINAL CLARIFIER 8 SLUDGE BLANKET LEVEL SENSOR FAULT	INSTRUMENT CONTROLLER (LIT-507)	PLC-FE	DI	Ethernet	N/A	N/A	NEW	
110	FF-333-QL	55-FC-9	FINAL CLARIFIER 9 MOTOR RUN	CLARIFIER PANEL	PLC-FF	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
111	FF-333-WH	55-FC-9	FINAL CLARIFIER 9 TORQUE ALARM	CLARIFIER PANEL	PLC-FF	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
112	FF-CLAR-9-ZS	55-FC-9	FINAL CLARIFIER 9 POSITION PROX.	CLARIFIER PANEL	PLC-FF	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
101	FF-340-QL	55-FC-10	FINAL CLARIFIER 10 MOTOR RUN	CLARIFIER PANEL	PLC-FF	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
102	FF-340-WH	55-FC-10	FINAL CLARIFIER 10 TORQUE ALARM	CLARIFIER PANEL	PLC-FF	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
103	FF-CLAR-10-ZS	55-FC-10	FINAL CLARIFIER 10 POSITION PROX.	CLARIFIER PANEL	PLC-FF	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
104	FF-342-QL	55-FC-11	FINAL CLARIFIER 11 MOTOR RUN	CLARIFIER PANEL	PLC-FF	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
105	FF-342-WH	55-FC-11	FINAL CLARIFIER 11 TORQUE ALARM	CLARIFIER PANEL	PLC-FF	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
106	FF-CLAR-11-ZS	55-FC-11	FINAL CLARIFIER 11 POSITION PROX.	CLARIFIER PANEL	PLC-FF	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
107	FF-331-QL	55-FC-12	FINAL CLARIFIER 12 MOTOR RUN	CLARIFIER PANEL	PLC-FF	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
108	FF-331-WH	55-FC-12	FINAL CLARIFIER 12 TORQUE ALARM	CLARIFIER PANEL	PLC-FF	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
109	FF-CLAR-12-ZS	55-FC-12	FINAL CLARIFIER 12 POSITION PROX.	CLARIFIER PANEL	PLC-FF	DI	Hardwired	N/A	N/A	EXISTING	CHECKOUT ONLY
113	YI-581	52-RSL-G-1	RETURN SLUDGE WET WELL EQUALIZATION SLUICE GATE-IN REMOTE	GATE ACTUATOR	PLC-FF	DI	Hardwired	N/A	N/A	NEW	
114	ZSC-581	52-RSL-G-1	RETURN SLUDGE WET WELL EQUALIZATION SLUICE GATE-CLOSED FEEDBACK	GATE ACTUATOR	PLC-FF	DI	Hardwired	N/A	N/A	NEW	
115	ZSO-581	52-RSL-G-1	RETURN SLUDGE WET WELL EQUALIZATION SLUICE GATE-OPEN FEEDBACK	GATE ACTUATOR	PLC-FF	DI	Hardwired	N/A	N/A	NEW	
116	ZYC-581	52-RSL-G-1	RETURN SLUDGE WET WELL EQUALIZATION SLUICE GATE-CLOSE COMMAND	GATE ACTUATOR	PLC-FF	DO	Hardwired	N/A	N/A	NEW	
117	ZYO-581	52-RSL-G-1	RETURN SLUDGE WET WELL EQUALIZATION SLUICE GATE-OPEN COMMAND	GATE ACTUATOR	PLC-FF	DO	Hardwired	N/A	N/A	NEW	
118	YI-571	52-SSC-G-1	SECONDARY SCUM SLUICE GATE-IN REMOTE	GATE ACTUATOR	PLC-FF	DI	Hardwired	N/A	N/A	NEW	
119	ZSC-571	52-SSC-G-1	SECONDARY SCUM SLUICE GATE-CLOSED FEEDBACK	GATE ACTUATOR	PLC-FF	DI	Hardwired	N/A	N/A	NEW	
120	ZSO-571	52-SSC-G-1	SECONDARY SCUM SLUICE GATE-OPEN FEEDBACK	GATE ACTUATOR	PLC-FF	DI	Hardwired	N/A	N/A	NEW	
121	ZYC-571	52-SSC-G-1	SECONDARY SCUM SLUICE GATE-CLOSE COMMAND	GATE ACTUATOR	PLC-FF	DO	Hardwired	N/A	N/A	NEW	
122	ZYO-571	52-SSC-G-1	SECONDARY SCUM SLUICE GATE-OPEN COMMAND	GATE ACTUATOR	PLC-FF	DO	Hardwired	N/A	N/A	NEW	
138	YI-509	55-FC-G-9	FINAL CLARIFIER NO. 9 INFLUENT SLUICE GATE-IN REMOTE	GATE ACTUATOR	PLC-FF	DI	Hardwired	N/A	N/A	NEW	
139	ZSC-509	55-FC-G-9	FINAL CLARIFIER NO. 9 INFLUENT SLUICE GATE-CLOSED FEEDBACK	GATE ACTUATOR	PLC-FF	DI	Hardwired	N/A	N/A	NEW	
140	ZSO-509	55-FC-G-9	FINAL CLARIFIER NO. 9 INFLUENT SLUICE GATE-OPEN FEEDBACK	GATE ACTUATOR	PLC-FF	DI	Hardwired	N/A	N/A	NEW	
141	ZYC-509	55-FC-G-9	FINAL CLARIFIER NO. 9 INFLUENT SLUICE GATE-CLOSE COMMAND	GATE ACTUATOR	PLC-FF	DO	Hardwired	N/A	N/A	NEW	
142	ZYO-509	55-FC-G-9	FINAL CLARIFIER NO. 9 INFLUENT SLUICE GATE-OPEN COMMAND	GATE ACTUATOR	PLC-FF	DO	Hardwired	N/A	N/A	NEW	
123	YI-510	55-FC-G-10	FINAL CLARIFIER NO. 10 INFLUENT SLUICE GATE-IN REMOTE	GATE ACTUATOR	PLC-FF	DI	Hardwired	N/A	N/A	NEW	
124	ZSC-510	55-FC-G-10	FINAL CLARIFIER NO. 10 INFLUENT SLUICE GATE-CLOSED FEEDBACK	GATE ACTUATOR	PLC-FF	DI	Hardwired	N/A	N/A	NEW	
125	ZSO-510	55-FC-G-10	FINAL CLARIFIER NO. 10 INFLUENT SLUICE GATE-OPEN FEEDBACK	GATE ACTUATOR	PLC-FF	DI	Hardwired	N/A	N/A	NEW	
126	ZYC-510	55-FC-G-10	FINAL CLARIFIER NO. 10 INFLUENT SLUICE GATE-CLOSE COMMAND	GATE ACTUATOR	PLC-FF	DO	Hardwired	N/A	N/A	NEW	
127	ZYO-510	55-FC-G-10	FINAL CLARIFIER NO. 10 INFLUENT SLUICE GATE-OPEN COMMAND	GATE ACTUATOR	PLC-FF	DO	Hardwired	N/A	N/A	NEW	
128	YI-511	55-FC-G-11	FINAL CLARIFIER NO. 11 INFLUENT SLUICE GATE-IN REMOTE	GATE ACTUATOR	PLC-FF	DI	Hardwired	N/A	N/A	NEW	
129	ZSC-511	55-FC-G-11	FINAL CLARIFIER NO. 11 INFLUENT SLUICE GATE-CLOSED FEEDBACK	GATE ACTUATOR	PLC-FF	DI	Hardwired	N/A	N/A	NEW	
130	ZSO-511	55-FC-G-11	FINAL CLARIFIER NO. 11 INFLUENT SLUICE GATE-OPEN FEEDBACK	GATE ACTUATOR	PLC-FF	DI	Hardwired	N/A	N/A	NEW	
131	ZYC-511	55-FC-G-11	FINAL CLARIFIER NO. 11 INFLUENT SLUICE GATE-CLOSE COMMAND	GATE ACTUATOR	PLC-FF	DO	Hardwired	N/A	N/A	NEW	
132	ZYO-511	55-FC-G-11	FINAL CLARIFIER NO. 11 INFLUENT SLUICE GATE-OPEN COMMAND	GATE ACTUATOR	PLC-FF	DO	Hardwired	N/A	N/A	NEW	
133	YI-512	55-FC-G-12	FINAL CLARIFIER NO. 12 INFLUENT SLUICE GATE-IN REMOTE	GATE ACTUATOR	PLC-FF	DI	Hardwired	N/A	N/A	NEW	
134	ZSC-512	55-FC-G-12	FINAL CLARIFIER NO. 12 INFLUENT SLUICE GATE-CLOSED FEEDBACK	GATE ACTUATOR	PLC-FF	DI	Hardwired	N/A	N/A	NEW	
135	ZSO-512	55-FC-G-12	FINAL CLARIFIER NO. 12 INFLUENT SLUICE GATE-OPEN FEEDBACK	GATE ACTUATOR	PLC-FF	DI	Hardwired	N/A	N/A	NEW	
136	ZYC-512	55-FC-G-12	FINAL CLARIFIER NO. 12 INFLUENT SLUICE GATE-CLOSE COMMAND	GATE ACTUATOR	PLC-FF	DO	Hardwired	N/A	N/A	NEW	
137	ZYO-512	55-FC-G-12	FINAL CLARIFIER NO. 12 INFLUENT SLUICE GATE-OPEN COMMAND	GATE ACTUATOR	PLC-FF	DO	Hardwired	N/A	N/A	NEW	
145	LI-509	55-FC-9	FINAL CLARIFIER 9 SLUDGE BLANKET LEVEL	INSTRUMENT CONTROLLER (LIT-509)	PLC-FF	AI	Ethernet	0 - 4	FEET	EXISTING; CHANGE TO COMMS	PROBE WIRED TO LIT-509
146	XA-509	55-FC-9	FINAL CLARIFIER 9 SLUDGE BLANKET LEVEL SENSOR FAULT	INSTRUMENT CONTROLLER (LIT-509)	PLC-FF	DI	Ethernet	N/A	N/A	NEW	
143	LI-510	55-FC-10	FINAL CLARIFIER 10 SLUDGE BLANKET LEVEL	INSTRUMENT CONTROLLER (LIT-509)	PLC-FF	AI	Ethernet	0 - 4	FEET	EXISTING; CHANGE TO COMMS	PROBE WIRED TO LIT-509
144	XA-510	55-FC-10	FINAL CLARIFIER 10 SLUDGE BLANKET LEVEL SENSOR FAULT	INSTRUMENT CONTROLLER (LIT-509)	PLC-FF	DI	Ethernet	N/A	N/A	NEW	
147	LI-511	55-FC-11	FINAL CLARIFIER 11 SLUDGE BLANKET LEVEL	INSTRUMENT CONTROLLER (LIT-511)	PLC-FF	AI	Ethernet	0 - 4	FEET	EXISTING; CHANGE TO COMMS	PROBE WIRED TO LIT-511
148	XA-511	55-FC-11	FINAL CLARIFIER 11 SLUDGE BLANKET LEVEL SENSOR FAULT	INSTRUMENT CONTROLLER (LIT-511)	PLC-FF	DI	Ethernet	N/A	N/A	NEW	
149	LI-512	55-FC-12	FINAL CLARIFIER 12 SLUDGE BLANKET LEVEL	INSTRUMENT CONTROLLER (LIT-511)	PLC-FF	AI	Ethernet	0 - 4	FEET	EXISTING; CHANGE TO COMMS	PROBE WIRED TO LIT-511
150	XA-512	55-FC-12	FINAL CLARIFIER 12 SLUDGE BLANKET LEVEL SENSOR FAULT	INSTRUMENT CONTROLLER (LIT-511)	PLC-FF	DI	Ethernet	N/A	N/A	NEW	

SECTION 40 67 00
CONTROL SYSTEM EQUIPMENT PANELS AND RACKS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Requirements for control panels and enclosures utilized as follows:
 - a. Unless noted otherwise, all control panels and enclosures housing control components that are specified in Section 40 72 00.
- B. This Section is only applicable to panels housing Division 26 specified equipment (e.g., motor starters, lighting controls, etc.) when so stated in the applicable Division 26 Section.
- C. This Section is only applicable to panels furnished with Division 46 equipment packages when so stated in the applicable Division 46 Section.
- D. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 10 14 00 - Identification Devices.
 - 5. Division 26 - Electrical.
 - 6. Section 40 61 13 - Process Control Systems General Requirements.
 - 7. Section 40 90 05 - Control Loop Descriptions.
 - 8. Section 40 61 93 - Process Control System Input-Output List.
 - 9. Section 40 72 00 - Level Instrumentation.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American National Standards Institute (ANSI).
 - 2. ASTM International (ASTM):
 - a. B75, Standard Specification for Seamless Copper Tube.
 - 3. National Electrical Manufacturers Association (NEMA):
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. ICS 4, Industrial Control and Systems: Terminal Blocks.
 - 4. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC):
 - 1) Article 409, Industrial Control Panels.
 - 2) Article 504, Intrinsically Safe Systems.
 - 5. Underwriters Laboratories, Inc. (UL):
 - a. 508A, Standard for Industrial Control Panels.
 - b. 698A, Standard for Industrial Control Panels Relating to Hazardous (Classified) Locations.
 - c. 913, Standard for Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations.
- B. Miscellaneous:
 - 1. Approved supplier of Industrial Control Panels under provisions of UL 508A or UL 698A.
 - a. Entire assembly shall be affixed with a UL 508A or UL 698A label "Listed Enclosed Industrial Control Panel" prior to shipment to the jobsite.
 - b. Control panel(s) without an affixed UL 508A or UL 698A label shall be rejected and sent back to the Contractor's factory.

1.3 DEFINITIONS

- A. Panel: Control panels or enclosures listed in the schedule included in this Specification Section.
- B. Foreign Voltages: Voltages that may be present in circuits when the panel main power is disconnected.
- C. Intrinsically Safe:
 - 1. A device, instrument or component that will not produce sparks or thermal effects under normal or abnormal conditions that will ignite a specified gas mixture.
 - 2. Designed such that electrical and thermal energy limits inherently are at levels incapable of causing ignition.
- D. Intrinsically Safe Circuit: A circuit in which any spark or thermal effect is incapable of causing ignition of a mixture of flammable or combustible material in air under test conditions as prescribed in UL 913.
- E. Cable: Multi-conductor, insulated, with outer sheath containing either building wire or instrumentation wire.
- F. Instrumentation Cable:
 - 1. Multiple conductor, insulated, twisted or untwisted, with outer sheath.
 - 2. Instrumentation cable is typically either TSP (twisted-shielded pair) or TST (twisted-shielded triad) and is used for the transmission of low current or low voltage signals.
- G. Ground Fault Circuit Interrupter (GFCI): A type of device (e.g., circuit breaker or receptacle) which detects an abnormal current flow to ground and opens the circuit preventing a hazardous situation.
- H. Programmable Logic Controller (PLC): A specialized industrial computer using programmed, custom instructions to provide automated monitoring and control functions by interfacing software control strategies to input/output devices.
- I. Remote Terminal Unit (RTU): An industrial data collection device designed for location at a remote site, that communicates data to a host system by using telemetry such as radio, dial-up telephone, or leased lines.
- J. Input/Output (I/O): Hardware for the moving of control signals into and/or out of a PLC or RTU.
- K. Supervisory Control and Data Acquisition (SCADA): Used in process control applications, where programmable logic controllers (PLCs) perform control functions but are monitored and supervised by computer workstations.
- L. Highway Addressable Remote Transducer (HART): An open, master-slave protocol for bus addressable field instruments.
- M. Digital Signal Cable: Used for the transmission of digital communication signals between computers, PLCs, RTUs, etc.
- N. Uninterruptible Power Supply (UPS): A backup power unit that provides continuous power when the normal power supply is interrupted.
- O. Loop Calibrator: Portable testing and measurement tool capable of accurately generating and measuring 4-20ma DC analog signals.

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. See Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. See Section 40 61 13.
 - 3. Prepared with computer aided design (CAD) software.
 - 4. Printed on 11 by 17 IN sheets.

5. Drawings shall include a title block containing the following:
 - a. Plant or facility name where panel(s) are to be installed.
 - b. Drawing title.
 - c. Drawing number.
 - d. Revision list with revision number and date.
 - e. Drawing date.
 - f. Drawing scale.
 - g. Manufacturer name, address, and telephone number.
6. Cover sheet for each Drawing set shall indicate the following:
 - a. Plant or facility name.
 - b. Project name.
 - c. Submittal description.
 - d. Revision number.
 - e. Issue date.
7. Table of contents sheet(s) shall indicate the following for each Drawing in the set:
 - a. Drawing number.
 - b. Drawing title.
 - c. Sheet number.
8. Legend and abbreviation sheet shall indicate the following:
 - a. Description of symbols and abbreviations used.
 - b. Panel construction notes including enclosure NEMA rating, finish type and color, wire type, wire color strategy, conductor sizes, and wire labeling strategy.
 - c. Confirmation that the panel(s) are to be affixed with a UL 508A or UL 698A label prior to shipment from the factory.
9. Bill of Material for each panel shall include the following component information:
 - a. Instrument tag number.
 - b. Quantity.
 - c. Functional name or description.
 - d. Manufacturer.
 - e. Complete model number.
 - f. Size or rating.
10. Panel exterior Layout Drawings to scale and shall indicate the following:
 - a. Panel materials of construction, dimensions, and total assembled weight.
 - b. Panel access openings.
 - c. Conduit access locations.
 - d. Front panel device layout.
 - e. Nameplate schedule:
 - 1) Nameplate location.
 - 2) Legend which indicates text, letter height and color, and background color.
 - 3) Short Circuit Current Rating (SCCR) marking per NFPA 70 or statement of exception. Include any required calculations.
 - f. Alarm annunciator window engraving schedule.
 - g. Layouts of graphic panels or mosaic displays.
11. Panel interior Layout Drawings shall be drawn to scale and shall indicate the following:
 - a. Sub-panel or mounting pan dimensions.
 - b. Interior device layouts.
 - c. PLC/RTU general arrangement layouts.
 - d. Wire-way locations, purpose, and dimensions.
 - e. Terminal strip designations.
 - f. Location of external wiring and/or piping connections.
 - g. Location of lighting fixtures, switches and receptacles.
12. Wiring diagrams shall consist of the following:
 - a. Panel power distribution diagrams.
 - b. Control and instrumentation wiring diagrams.
 - c. PLC/RTU I/O information:

- 1) Model number of I/O module.
 - 2) Description of I/O module type and function.
 - 3) Rack and slot number.
 - 4) Terminal number on module.
 - 5) Point or channel number.
 - 6) Programmed point addresses.
 - 7) Signal function and type.
- d. Wiring diagrams shall identify each wire as it is to be labeled.
- B. Manufacturer catalog cut sheets for enclosure, finish, panel devices, control auxiliaries, and accessories.
- C. Contract Closeout Information:
1. Operation and Maintenance Data:
 - a. See Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
 2. See Section 40 61 13.
- D. Informational Submittals:
1. Record Drawings:
 - a. Updated Panel Drawings delivered with the panel(s) from the Contractor's factory.
 - b. Drawings shall be enclosed in transparent plastic and firmly secured within each panel.

PART 2 - EXECUTION

2.1 SCHEDULE

- A. Schedule:

TAG NUMBER	LOCATION	TYPE	MATERIAL	NEMA RATING
PLC-FD	Structure 50 Electrical Room	(Existing)	(Existing)	(Existing)
PLC-FE	Structure 51 Electrical Room	(Existing)	(Existing)	(Existing)
PLC-FF	Structure 52 Electrical Room	(Existing)	(Existing)	(Existing)

END OF SECTION

SECTION 40 72 00
LEVEL INSTRUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Level Transmitters:
 - a. Sludge Blanket Level Sensor and Transmitters.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 40 61 13 - Process Control Systems General Requirements.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. American Society of Mechanical Engineers (ASME):
 - a. B16.5, Pipe Flanges and Flanged Fittings.
 - 2. ASTM International (ASTM):
 - a. A106, Standard Specification for Seamless Carbon Steel Pipe for High Temperature Service.
 - 3. American National Standards Institute (ANSI).

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
 - 2. See Specification Section 40 61 13.
- B. Operation and Maintenance Manuals:
 - 1. See Specification Section 01 78 23 for requirements for:
 - a. The mechanics and administration of the submittal process.
 - b. The content of Operation and Maintenance Manuals.

1.4 SYSTEM DESCRIPTION

- A. The instruments specified in this Specification Section are the primary element components for the control loops shown on the "Y" series Drawings and specified in Specification Section 40 90 05.
- B. These instruments are integrated with other control system components specified under Specification Section 40 61 13 series to produce the functional control defined in the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the manufacturers listed in the Articles describing the elements are acceptable.
- B. Submit request for substitution in accordance with Specification Section 01 25 00.

2.2 LEVEL TRANSMITTERS

- A. Sludge Blanket Level Sensor and Transmitter:
 - 1. Acceptable manufacturers:
 - a. Hach.
 - b. Or approved equal.
 - 2. Specifications:
 - a. General:
 - 1) Measurement Principle: Ultrasonic.
 - 2) Self-contained and provides a continuous level signal.
 - b. Probe:
 - 1) Direct acting type requiring no float pipe, stilling well, or other such device.
 - 2) Automatically compensates for temperature.
 - 3) Equipped with a wiper to clean probe.
 - 4) Equipped with a position sensor that compensates for angle when the probe is not mounted exactly vertically.
 - 5) Sensor shall have a digital output signal and connect to a controller.
 - 6) Material:
 - a) Body: Stainless steel.
 - b) Face: Polyoxymethylene.
 - 7) Process Temperature: up to 122 DEGF.
 - c. Cable:
 - 1) Lengths available: 50 to 500 FT.
 - 2) Material: Vinyl jacketed.
 - d. Level Transmitter:
 - 1) Microprocessor-based, multi-parameter controller for digital analytical devices
 - a) Four channels
 - 2) Controller communicates via Ethernet.
 - 3) Wall-mount or Panel-mount.
 - 4) Enclosure: NEMA-4X (IP65); polycarbonate.
 - 5) Environment: -30 to 120 DEGF.
 - 6) External Power: 120 VAC.
 - 7) Two (2) isolated 4-20 mA signals.
 - 8) Two (2) form-C dry contacts for alarms.
 - 9) Maximum separation from probe: 600 FT.
 - 10) Display: Graphical User Interface with keypad.
 - 11) Includes capability to actively monitor internal components and present diagnostics on the overall health of enabled connected sensors and time to next required maintenance.
 - 3. Schedule (or Instrument List):

TAG NUMBER	SERVICE	RANGE	MOUNTING
LIT-501	Final Clarifier	0-4 FT	WALL
LIT-503	Final Clarifier	0-4 FT	WALL
LIT-505	Final Clarifier	0-4 FT	WALL
LIT-507	Final Clarifier	0-4 FT	WALL
LIT-509	Final Clarifier	0-4 FT	WALL
LIT-511	Final Clarifier	0-4 FT	WALL
LY-501	Final Clarifier	0-4 FT	Hand-rail mounting with pivot pole
LY-502	Final Clarifier	0-4 FT	Hand-rail mounting with pivot pole

TAG NUMBER	SERVICE	RANGE	MOUNTING
LY-503	Final Clarifier	0-4 FT	Hand-rail mounting with pivot pole
LY-504	Final Clarifier	0-4 FT	Hand-rail mounting with pivot pole
LY-505	Final Clarifier	0-4 FT	Hand-rail mounting with pivot pole
LY-506	Final Clarifier	0-4 FT	Hand-rail mounting with pivot pole
LY-507	Final Clarifier	0-4 FT	Hand-rail mounting with pivot pole
LY-508	Final Clarifier	0-4 FT	Hand-rail mounting with pivot pole
LY-509	Final Clarifier	0-4 FT	Hand-rail mounting with pivot pole
LY-510	Final Clarifier	0-4 FT	Hand-rail mounting with pivot pole
LY-511	Final Clarifier	0-4 FT	Hand-rail mounting with pivot pole
LY-512	Final Clarifier	0-4 FT	Hand-rail mounting with pivot pole

2.3 ACCESSORIES

- A. Furnish all mounting brackets, hardware and appurtenances required for mounting primary elements and transmitters.
 1. Materials, unless otherwise specified, shall be as follows:
 - a. Bolts, nuts, washers, expansion anchors: 316 stainless steel.
 - b. Mounting brackets:
 - 1) Standard: 316 stainless steel.
 - 2) Highly corrosive areas: Aluminum.
 - c. Mounting plates, angles: 316 stainless steel.
 - d. Instrument pipe stands: 316 stainless steel.
- B. Provide handheld communicator compatible for all intelligent transmitters furnished.
 1. Handheld communicator shall provide capability to check calibration, change transmitter range, and provide diagnostics.
 2. If these features are provided with the intelligent transmitter that is accessible, the handheld communicator is not required.
- C. Cable lengths between sensors and transmitters shall be continuous (without splices) and as required to accommodate locations as shown on Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install instrument mounting pipe stands level and plumb.
- C. Instrument Mounting:
 1. Mount all instruments where they will be accessible from fixed ladders, platforms, or grade.

2. Mount all local indicating instruments with face forward toward the normal operating area, within reading distance, and in the line of sight.
3. Mount instruments level, plumb, and support rigidly.
4. Mount to provide:
 - a. Protect from heat, shock, and vibrations.
 - b. Provide accessibility for maintenance.
 - c. Free from interference with piping, conduit and equipment.

3.2 TRAINING

- A. Provide manufacturer's technical representative's time for on-site training of the Owner's personnel in accordance with Specification Section 01 79 23 - Instruction of Operations and Maintenance Personnel.

END OF SECTION

SECTION 40 90 05

CONTROL LOOP DESCRIPTIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Instrumentation control loops.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 40 61 13 - Process Control Systems General Requirements.

1.2 QUALITY ASSURANCE

- A. See Specification Section 40 61 13.

1.3 SYSTEM DESCRIPTION

- A. The control loop descriptions provide the functional requirements of the control loops represented in the Contract Documents.
 - 1. Descriptions are provided as follows:
 - a. Major equipment to be controlled.
 - b. Major field mounted instruments (does not include local gages).
 - c. Automatic control functions/interlocks.
 - d. Remote indications and alarms.
- B. The control loop descriptions are not intended to be an inclusive listing of all elements and appurtenances required to execute loop functions but are rather intended to supplement and complement the Drawings and other Specification Sections.
 - 1. The control loop descriptions shall not be considered equal to a bill of materials.
- C. Provide instrumentation hardware and software as necessary to perform control functions specified herein and shown on Drawings.

1.4 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. See Specification Section 40 61 13.
- C. Contract Closeout Information:
 - 1. Operation and Maintenance Data:
 - a. See Specification Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
- D. Control Strategy for Record Documents:
 - 1. Obtain this Specification Section 40 90 05 in electronic format (Microsoft Word) from Engineer at beginning of Project.
 - 2. Revise and update the file monthly during construction and start-up to reflect all changes that occur due to specific equipment and systems supplied on the Project.
 - a. Show all revisions in 'track change' mode.
 - b. Change Specification Section Title to read "Control Loop Descriptions - Contractor Record Document."
 - c. Reference all changes by Request for Information (RFI) number or Change Proposal Request (CPR) number.
 - d. Submit revised file monthly to Engineer for review.

3. Deliver the revised and updated file as a final control loop description Record Document in the Operation and Maintenance Manual described in Specification Section 01 78 23.
4. Provide both paper copy and electronic copy (on CD-ROM) of the Record Document control loop descriptions in the Operation and Maintenance Manual described in Specification Section 01 78 23.

PART 2 - PRODUCTS - (NOT APPLICABLE TO THIS SPECIFICATION SECTION)

PART 3 - EXECUTION

3.1 CONTROL LOOPS

- A. Control Loop - Final Clarifier No. 1 Mechanism:
 1. Description:
 - a. The clarifier mechanism and associated panel are being replaced with similar units.
 2. Major Equipment:
 - a. PLC FD in Building 50.
 - b. Final Clarifier No. 1 Mechanism Panel.
 3. Major Field Instruments:
 - a. Final Clarifier No. 1 Mechanism Torque Switch.
 - b. Final Clarifier No. 1 Mechanism Position Proximity Switch.
 4. Control Logic:
 - a. Control associated with Final Clarifier No. 1 Mechanism is existing in PLC FD in Building 50. Control program shall remain as is.
 5. Indications at Local Control Panel: By Vendor.
 6. Indications at HMIs/OITs: Existing HMI indications to be maintained.
- B. Control Loop - Final Clarifier No. 1 Sludge Blanket Level Monitoring:
 1. Description:
 - a. The level probe and transmitter monitoring the sludge blanket level are being replaced.
 2. Major Equipment:
 - a. PLC FD in Building 50.
 - b. Building 50 Instrument Controllers.
 3. Major Field Instruments:
 - a. Final Clarifier No. 1 Sludge Blanket Level Transmitter.
 4. Control Logic:
 - a. Control associated with Final Clarifier No. 1 Sludge Blanket Level is existing in PLC FD in Building 50. Control program shall remain and tag addressing associated with Final Clarifier No. 1 Sludge Blanket Level shall be changed from existing 4-20 mA signal to the new instrument signal received via communications.
 5. Indications at Local Control Panel:
 - a. None.
 6. Indications at HMIs/OITs:
 - a. Existing HMI indications to be maintained.
- C. Control Loops - Final Clarifier Nos. 2, 3, and 4 Mechanism:
 1. Description for Final Clarifier No. 1 Mechanism is typical for Final Clarifier Nos. 2, 3, and 4 Mechanism.
- D. Control Loops - Final Clarifier Nos. 2, 3, and 4 Sludge Blanket Level Monitoring:
 1. Description for Final Clarifier No. 1 Sludge Blanket Level is typical for Final Clarifier Nos. 2, 3, and 4 Sludge Blanket Level.
- E. Control Loop - Final Clarifier No. 5 Mechanism:
 1. Description:
 - a. The clarifier mechanism and associated panel are being replaced with similar units.

2. Major Equipment:
 - a. PLC FE in Building 51.
 - b. Final Clarifier No. 5 Mechanism Panel.
 3. Major Field Instruments:
 - a. Final Clarifier No. 5 Mechanism Torque Switch.
 - b. Final Clarifier No. 5 Mechanism Position Proximity Switch.
 4. Control Logic:
 - a. Control associated with Final Clarifier No. 5 Mechanism is existing in PLC FE in Building 51. Control program shall remain as is.
 5. Indications at Local Control Panel: By Vendor.
 6. Indications at HMIs/OITs: Existing HMI indications to be maintained.
- F. Control Loop - Final Clarifier No. 5 Sludge Blanket Level Monitoring:
1. Description:
 - a. The level probe and transmitter monitoring the sludge blanket level are being replaced.
 2. Major Equipment:
 - a. PLC FE in Building 51.
 - b. Building 51 Instrument Controllers.
 3. Major Field Instruments:
 - a. Final Clarifier No. 5 Sludge Blanket Level Transmitter.
 4. Control Logic:
 - a. Control associated with Final Clarifier No. 5 Sludge Blanket Level is existing in PLC FE in Building 51. Control program shall remain and tag addressing associated with Final Clarifier No. 5 Sludge Blanket Level shall be changed from existing 4-20 mA signal to the new instrument signal received via communications.
 5. Indications at Local Control Panel:
 - a. None.
 6. Indications at HMIs/OITs:
 - a. Existing HMI indications to be maintained.
- G. Control Loops - Final Clarifier Nos. 6, 7, and 8 Mechanism:
1. Description for Final Clarifier No. 5 Mechanism is typical for Final Clarifier Nos. 6, 7, and 8 Mechanism.
- H. Control Loops - Final Clarifier Nos. 6, 7, and 8 Sludge Blanket Level Monitoring:
1. Description for Final Clarifier No. 5 Sludge Blanket Level is typical for Final Clarifier Nos. 6, 7, and 8 Sludge Blanket Level.
- I. Control Loop - Final Clarifier No. 9 Mechanism:
1. Description:
 - a. The clarifier mechanism and associated panel are being replaced with similar units.
 2. Major Equipment:
 - a. PLC FF in Building 52.
 - b. Final Clarifier No. 9 Mechanism Panel.
 3. Major Field Instruments:
 - a. Final Clarifier No. 9 Mechanism Torque Switch.
 - b. Final Clarifier No. 9 Mechanism Position Proximity Switch.
 4. Control Logic:
 - a. Control associated with Final Clarifier No. 9 Mechanism is existing in PLC FF in Building 52. Control program shall remain as is.
 5. Indications at Local Control Panel:
 - a. By Vendor.
 6. Indications at HMIs/OITs:
 - a. Existing HMI indications to be maintained.
- J. Control Loop - Final Clarifier No. 9 Sludge Blanket Level Monitoring:
1. Description:
 - a. The level probe and transmitter monitoring the sludge blanket level are being replaced.

2. Major Equipment:
 - a. PLC FF in Building 52.
 - b. Building 52 Instrument Controllers.
 3. Major Field Instruments:
 - a. Final Clarifier No. 9 Sludge Blanket Level Transmitter.
 4. Control Logic:
 - a. Control associated with Final Clarifier No. 9 Sludge Blanket Level is existing in PLC FF in Building 52. Control program shall remain and tag addressing associated with Final Clarifier No. 9 Sludge Blanket Level shall be changed from existing 4-20 mA signal to the new instrument signal received via communications.
 5. Indications at Local Control Panel: None.
 6. Indications at HMIs/OITs: Existing HMI indications to be maintained.
- K. Control Loops - Final Clarifier Nos. 10, 11, and 12 Mechanism:
1. Description for Final Clarifier No. 9 Mechanism is typical for Final Clarifier Nos. 10, 11, and 12 Mechanism.
- L. Control Loops - Final Clarifier Nos. 10, 11, and 12 Sludge Blanket Level Monitoring:
1. Description for Final Clarifier No. 9 Sludge Blanket Level is typical for Final Clarifier Nos. 10, 11, and 12 Sludge Blanket Level.
- M. Building 50 Sluice Gates:
1. Description:
 - a. Six sluice gates in the return sludge pump station will be converted from manual to automated gates by adding OPEN / CLOSE electric actuators.
 2. Major Equipment:
 - a. PLC FD in Building 50.
 - b. Final Clarifier No. 1 Influent Sluice Gate: 55-FC-G-1.
 - c. Final Clarifier No. 2 Influent Sluice Gate: 55-FC-G-2.
 - d. Final Clarifier No. 3 Influent Sluice Gate: 55-FC-G-3.
 - e. Final Clarifier No. 4 Influent Sluice Gate: 55-FC-G-4.
 - f. Secondary Scum Sluice Gate: 50-SSC-G-1.
 - g. Return Sludge Wet Well Equalization Sluice Gate: 50-RSL-G-1.
 3. Major Field Instruments:
 - a. None.
 4. Control Logic:
 - a. Control of the sluice gates is in accordance with selections made using selector switches on the actuator along with selections made at the HMI:
 - 1) When the gate actuator Local-Off-Remote (LOR) selector switch is set to LOCAL, the gate may be opened or closed using the gate actuator Open-Stop-Close (OSC) selector switch.
 - 2) When the gate actuator Local-Off-Remote (LOR) selector switch is set to off, the gate will not actuate.
 - 3) When the gate actuator Local-Off-Remote (LOR) selector switch is set to REMOTE, the gate may be opened or closed by the operator using the plant standard gate control faceplate on the HMI.
 - a) Note: The operator must control the valves. There are no “automatic” functions.
 5. Indications at HMI:
 - a. Final Clarifier No. 1 Influent Sluice Gate: 55-FC-G-1:
 - 1) YI-501: Gate in REMOTE.
 - 2) ZSO-501: Gate Open.
 - 3) ZSC-501: Gate Closed.
 - b. Final Clarifier No. 2 Influent Sluice Gate: 55-FC-G-2:
 - 1) YI-502: Gate in REMOTE.
 - 2) ZSO-502: Gate Open.
 - 3) ZSC-502: Gate Closed.

- c. Final Clarifier No. 3 Influent Sluice Gate: 55-FC-G-3:
 - 1) YI-503: Gate in REMOTE.
 - 2) ZSO-503: Gate Open.
 - 3) ZSC-503: Gate Closed.
 - d. Final Clarifier No. 4 Influent Sluice Gate: 55-FC-G-4:
 - 1) YI-504: Gate in REMOTE.
 - 2) ZSO-504: Gate Open.
 - 3) ZSC-504: Gate Closed.
 - e. Secondary Scum Sluice Gate: 50-SSC-G-1:
 - 1) YI-531: Gate in REMOTE.
 - 2) ZSO-531: Gate Open.
 - 3) ZSC-531: Gate Closed.
 - f. Return Sludge Wet Well Equalization Sluice Gate: 50-RSL-G-1:
 - 1) YI-541: Gate in REMOTE.
 - 2) ZSO-541: Gate Open.
 - 3) ZSC-541: Gate Closed.
- N. Building 51 Return Sludge Pump Station Sluice Gates:
1. Description:
 - a. Six sluice gates in the return sludge pump station will be converted from manual to automated gates by adding OPEN / CLOSE electric actuators.
 2. Major Equipment:
 - a. PLC FE in Building 51
 - b. Final Clarifier No. 5 Influent Sluice Gate: 55-FC-G-5.
 - c. Final Clarifier No. 6 Influent Sluice Gate: 55-FC-G-6.
 - d. Final Clarifier No. 7 Influent Sluice Gate: 55-FC-G-7.
 - e. Final Clarifier No. 8 Influent Sluice Gate: 55-FC-G-8.
 - f. Secondary Scum Sluice Gate: 51-SSC-G-1.
 - g. Return Sludge Wet Well Equalization Sluice Gate: 51-RSL-G-1.
 3. Major Field Instruments:
 - a. None.
 4. Control Logic:
 - a. Control of the sluice gates is in accordance with selections made using selector switches on the actuator along with selections made at the HMI:
 - 1) When the gate actuator Local-Off-Remote (LOR) selector switch is set to LOCAL, the gate may be opened or closed using the gate actuator Open-Stop-Close (OSC) selector switch.
 - 2) When the gate actuator Local-Off-Remote (LOR) selector switch is set to off, the gate will not actuate.
 - 3) When the gate actuator Local-Off-Remote (LOR) selector switch is set to REMOTE, the gate may be opened or closed by the operator using the plant standard gate control faceplate on the HMI.
 - a) Note: The operator must control the valves. There are no “automatic” functions.
 5. Indications at HMI:
 - a. Final Clarifier No. 5 Influent Sluice Gate: 55-FC-G-5:
 - 1) YI-505: Gate in REMOTE.
 - 2) ZSO-505: Gate Open.
 - 3) ZSC-505: Gate Closed.
 - b. Final Clarifier No. 6 Influent Sluice Gate: 55-FC-G-6:
 - 1) YI-506: Gate in REMOTE.
 - 2) ZSO-506: Gate Open.
 - 3) ZSC-506: Gate Closed.
 - c. Final Clarifier No. 7 Influent Sluice Gate: 55-FC-G-7:
 - 1) YI-507: Gate in REMOTE.
 - 2) ZSO-507: Gate Open.

- 3) ZSC-507: Gate Closed.
 - d. Final Clarifier No. 8 Influent Sluice Gate: 55-FC-G-8:
 - 1) YI-508: Gate in REMOTE.
 - 2) ZSO-508: Gate Open.
 - 3) ZSC-508: Gate Closed.
 - e. Secondary Scum Sluice Gate: 51-SSC-G-1:
 - 1) YI-551: Gate in REMOTE.
 - 2) ZSO-551: Gate Open.
 - 3) ZSC-551: Gate Closed.
 - f. Return Sludge Wet Well Equalization Sluice Gate: 51-RSL-G-1:
 - 1) YI-561: Gate in REMOTE.
 - 2) ZSO-561: Gate Open.
 - 3) ZSC-561: Gate Closed.
- O. Building 52 Return Sludge Pump Station Sluice Gates:
1. Description:
 - a. Six sluice gates in the return sludge pump station will be converted from manual to automated gates by adding OPEN / CLOSE electric actuators.
 2. Major Equipment:
 - a. PLC FF in Building 52.
 - b. Final Clarifier No. 9 Influent Sluice Gate: 55-FC-G-9.
 - c. Final Clarifier No. 10 Influent Sluice Gate: 55-FC-G-10.
 - d. Final Clarifier No. 11 Influent Sluice Gate: 55-FC-G-11.
 - e. Final Clarifier No. 12 Influent Sluice Gate: 55-FC-G-12.
 - f. Secondary Scum Sluice Gate: 52-SSC-G-1.
 - g. Return Sludge Wet Well Equalization Sluice Gate: 52-RSL-G-1.
 3. Major Field Instruments:
 - a. None.
 4. Control Logic:
 - a. Control of the sluice gates is in accordance with selections made using selector switches on the actuator along with selections made at the HMI:
 - 1) When the gate actuator Local-Off-Remote (LOR) selector switch is set to LOCAL, the gate may be opened or closed using the gate actuator Open-Stop-Close (OSC) selector switch.
 - 2) When the gate actuator Local-Off-Remote (LOR) selector switch is set to off, the gate will not actuate.
 - 3) When the gate actuator Local-Off-Remote (LOR) selector switch is set to REMOTE, the gate may be opened or closed by the operator using the plant standard gate control faceplate on the HMI.
 - a) Note: The operator must control the valves. There are no “automatic” functions.
 5. Indications at HMI:
 - a. Final Clarifier No. 9 Influent Sluice Gate: 55-FC-G-9:
 - 1) YI-509: Gate in REMOTE.
 - 2) ZSO-509: Gate Open.
 - 3) ZSC-509: Gate Closed.
 - b. Final Clarifier No. 10 Influent Sluice Gate: 55-FC-G-10:
 - 1) YI-510: Gate in REMOTE.
 - 2) ZSO-510: Gate Open.
 - 3) ZSC-510: Gate Closed.
 - c. Final Clarifier No. 11 Influent Sluice Gate: 55-FC-G-11:
 - 1) YI-511: Gate in REMOTE.
 - 2) ZSO-511: Gate Open.
 - 3) ZSC-511: Gate Closed.
 - d. Final Clarifier No. 12 Influent Sluice Gate: 55-FC-G-12:
 - 1) YI-512: Gate in REMOTE.

- 2) ZSO-512: Gate Open.
- 3) ZSC-512: Gate Closed.
- e. Secondary Scum Sluice Gate: 52-SSC-G-1:
 - 1) YI-571: Gate in REMOTE.
 - 2) ZSO-571: Gate Open.
 - 3) ZSC-571: Gate Closed.
- f. Return Sludge Wet Well Equalization Sluice Gate: 52-RSL-G-1:
 - 1) YI-581: Gate in REMOTE.
 - 2) ZSO-581: Gate Open.
 - 3) ZSC-581: Gate Closed.

END OF SECTION

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DIVISION 41

**MATERIAL PROCESSING AND HANDLING
EQUIPMENT**



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SECTION 41 22 20

DAVIT CRANES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Davit cranes.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 01 61 03 - Equipment: Basic Requirements.

1.2 QUALITY ASSURANCE

- A. Coordinate mounting location to meet hook reach requirement.
- B. Hook Height: The minimum acceptable distance in feet from bottom of hook in full raised position to the nearest floor surface.
- C. Lift below floor Level Height:
 - 1. The distance in feet from floor level to the surface of the lowest floor from which items may be hoisted.
 - 2. Davit crane lift below floor level capacity varies depending on boom position and base configuration.
- D. Hook Reach: Horizontal distance from hook position to mast center line.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. See Specification Section 01 33 00 for mechanics and administration of submittal process.
 - 2. See Specification Section 01 61 03.
 - 3. Product technical data including Manufacturer's descriptive data and technical literature, catalog cuts, and installation instructions.
- B. Operation and Maintenance Manuals:
 - 1. See Specification Section 01 33 00 for requirements for:
 - a. The mechanics and administration of the submittal process.
 - b. The content of Operation and Maintenance Manuals.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Davit Cranes: Thern Commander 2000, 5PT20S-M3 Series Portable Davit Crane.
 - 2. Or approved equal.
- B. Submit request for substitution in accordance with Specification Section 01 25 00.

2.2 MATERIALS

- A. Davit Crane:
 - 1. Base: Stainless Steel.

2. Spur gear hand winch with break: Stainless Steel.
3. Wire rope and drum assembly: 316 stainless steel.
4. Boom and mast: Stainless Steel.
5. Hook: 304 stainless steel.
6. Cable Spooler: 316 stainless steel.

2.3 EQUIPMENT

- A. Provide one (1) davit crane.
- B. Design Requirements:
 1. Davit Crane:
 - a. Lift Capacity: 2,000 LBS.
 - b. Hook Reach: 28 – 82 IN.
 - c. Hook Height: 29 – 83 IN.
 - d. Boom Angle: boom angle shall be adjustable with a hand operated screw jack acting to raise or lower the boom between horizontal and 45 DEG from horizontal.
 - e. Crane rotates 360 DEG on a pin and sleeve bearing in the base.
 - f. Design such that equipment may easily be disassembled for easy storage and transport.
 - g. Adjustable Boom telescoping to four different lengths and adjusts in height while under load with ratchet style screw-jack.
 - h. Hand Winch Operated Models to include spur or worm gear hand winch with brake for load control.
 - i. Wire rope drum sized with appropriate safety factor to meet specified load capacity.

2.4 ACCESSORIES

- A. Provide 316 Stainless Steel Thern 5BW20S316 Wall-Mount Bases mounted at each of the Secondary Effluent Drop Boxes as shown on the Drawings.
- B. Provide wire ropes including swivel hook with latch: One per installed davit crane.
 1. Length: 28 FT.
 2. Diameter: 0.25 IN.
 3. Wire rope assemblies include a hook and a swaged ball fitting to work with quick disconnect spool and anchor on winches.
- C. Provide one Thern M4312PBSS-K spur gear hand winch (drill drivable) per installed davit crane.
- D. Provide one Thern RW50 cable spooler per installed davit crane.

2.5 EQUIPMENT PAINTING

- A. Stainless steel units constructed of stainless steel with an electro-polished finish for superior corrosion resistant.
- B. Standard factory applied coating is acceptable for equipment covered by this Specification for components that are not stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install crane bases using drilled in epoxy anchors.
- B. Install bases in accordance with Contract Drawings.

END OF SECTION



DIVISION 46

WATER AND WASTEWATER EQUIPMENT



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SECTION 46 13 19
EFFLUENT LAUNDER COVERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Base Bid: Flat-type launder covers, with aluminum guardrail, of extruded aluminum material for the following structures:
 - a. Final Clarifiers (55-FC-1 through 55-FC-12).
 2. Alternate Bid 1: Flat-type launder covers, with aluminum guardrail, of fiberglass reinforced plastic (FRP) material for the following structures:
 - a. Final Clarifiers (55-FC-1 through 55-FC-12).
- B. Related Sections include but are not necessarily limited to:
1. SUDAS Division 1.
 2. Division 01 - General Requirements.
 3. Section 01 04 00 - Special Provisions.
 4. Section 05 50 00 - Metal Fabrications.
 5. Section 05 52 02 - Aluminum Railings.
 6. Section 06 82 00 - Fiberglass Reinforced Plastic Fabrications.
 7. Section 09 96 00 - High Performance Industrial Coatings.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. ASTM International (ASTM):
 - a. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - b. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes.
 - c. D256, Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
 - d. D570, Standard Test Method for Water Absorption of Plastics.
 - e. D618, Standard Practice for Conditioning Plastics for Testing.
 - f. D638, Standard Test Method for Tensile Properties of Plastics.
 - g. D790, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 - h. D2583, Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
 - i. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - j. F594, Standard Specification for Stainless Steel Nuts.
 2. Local Building Code.
- B. Qualifications:
1. Erector to be licensed or approved in writing by manufacturer.
 2. Manufacturer shall have been in the business of providing covers of similar design and construction for at least 5 years.

1.3 DEFINITIONS

- A. Skid-resistant:
1. Manufacturer's standard applied abrasive grit coating.
 2. Abrasive coated tape is not acceptable.
- B. Erector: Individual actually performing work on site.

- C. Installer or Applicator: Installer or applicator is the person actually installing or applying the product in the field at the Project site.
 - 1. Installer and applicator are synonymous.

1.4 PROJECT CONDITIONS

- A. Exposures:
 - 1. Wet and corrosive environment due to sanitary wastewater: Splashing.
- B. Clarifier Information (Contractor shall confirm all dimensions on each clarifier prior to shop drawing submittals):
 - 1. Number of basins: 12.
 - 2. Tank dimensions: 140 FT DIA.
 - 3. Launder width (inside dimension): 3 FT.
 - 4. Effluent Drop Box dimensions (inside dimension): 3 FT x 7 FT.

1.5 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Shop Drawings:
 - 1. Fabrication and/or layout Drawings:
 - a. Final Drawings to be sealed by a Professional Engineer legally authorized to practice in the State of Iowa.
 - b. Drawings shall show all required connections and interferences with concrete structures, bridge structure, piping, and mechanical systems.
 - 2. Design and Shop Drawings for structural support system, cover panels and other system components and accessories that are not fully detailed or dimensioned in manufacturer's product data:
 - a. Structural framing:
 - 1) Furnished complete Erection Drawings prepared under the supervision of a Professional Engineer legally authorized to practice in the State of Iowa.
 - 2) Include details showing fabrication and assembly of the launder cover systems.
 - 3) Show anchor bolt settings and details.
 - b. Cover panels: Provide Drawings showing layouts of all panels, details of edge conditions, joints, corners, custom profiles, supports, anchorages, trim, closures and special details.
 - c. Accessory components:
 - 1) Provide details of accessory components, including access hatches and covers with their lifting handles.
 - 2) All hatches, covers and other components which will be manually lifted off or opened, provide the weight of the component to be lifted or the magnitude of the opening force which will be needed.
 - 3) All Hatches shall be provided with a hold open strap or device connected to the guardrail.
 - d. Structural calculations for the structural supports clearly showing all loads applied by the launder cover to the structures including provisions for expansion and contraction of cover members.
 - e. Professional Engineer's certificate prepared and signed by the Professional Engineer, legally authorized to practice in the State of Iowa, verifying that the structural framing and covering panels meet indicated loading requirements and codes of Authorities Having Jurisdiction.
 - 3. Records certifying the satisfactory inspection of all welds of structural components shall be submitted prior to delivery of the fabricated materials.
 - 4. Erection procedures.

5. Manufacturer's qualifications: Provide list of five (5) previous projects completed by the proposed manufacturer of similar size and complexity. Provide contact names and phone numbers.
 6. System performance warranty:
 - a. Warranty period for all system components and system performance is 5 years after the date of substantial completion.
 - b. Furnish written warranty co-signed by Contractor, covering defects in workmanship and material and failure of the cover system within warranty period.
- C. Operation and Maintenance Manuals: See Section Specification 01 78 23 - Operation and Maintenance Manuals.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. For Aluminum Launder Covers (Base Bid):
 - a. Hallsten Corporation.
 - b. Temcor.
 - c. R.P.S. Engineering.
 2. For FRP Launder Covers (Bid Alternate 1):
 - a. FFI, Fiberglass Fabricators, Inc.
 - b. Warminster Fiberglass.
 - c. Enduro Composites Systems.
- B. No like, equivalent, or "or-equals" items or no substitution is permitted.

2.2 MATERIALS

- A. Aluminum Launder Cover (Base Bid):
1. Structural frame/beam support: ASTM B221 6061-T6 aluminum.
 2. Column Supports: 316L Stainless Steel, ASTM A276.
 3. Cover panels/hatches: ASTM B209 aluminum, 6061-T6 aluminum or 6063-T6 aluminum.
 4. Fasteners: Type 316 stainless steel, ASTM F593, ASTM F594.
 5. Gaskets and closures: Neoprene, EPDM, or silicone.
 6. Expansion anchor bolts: Type 316 stainless steel, ASTM F593, ASTM F594.
- B. Fiberglass Launder Cover (Alternate Bid 1):
1. Structural frame/beam support: Fiberglass or ASTM B221 6061-T6 aluminum.
 2. Column Supports: 316L Stainless Steel, ASTM A276.
 3. Cover panels/hatches: Fiberglass Reinforced Plastic (FRP).
 - a. Isophthalic polyester (Resin Type I) with fiberglass reinforcing.
 - b. Materials shall exhibit these physical minimum properties:
 - 1) Tensile Strength (ASTM D638): 30,000 PSI.
 - 2) Compressive Strength (ASTM D695): 30,000 PSI.
 - 3) Flexural Strength (ASTM D790): 30,000 PSI.
 - 4) Flexural Modulus: 1,800,000 PSI.
 - 5) Notched Izod Impact (ASTM D256): 15 LBS/IN.
 - 6) Barcol Hardness (ASTM D 2583): 45.
 - 7) Water Absorption (ASTM D 570): 0.6% maximum.
 - c. Ultraviolet-light stabilizer shall be added to the laminate.
 4. Fasteners: Type 316 stainless steel ASTM F593, F594.
 5. Gaskets and closures: Neoprene, EPDM, or silicone.
 6. Expansion anchor bolts: Type 316 stainless steel, ASTM F593, F594.

2.3 LAUNDER COVER

- A. General:
1. Configuration: As shown on Drawings.
 2. Design flat launder cover to be fully self-supporting from the periphery of the structure wall and launder wall.
 3. The aluminum cover material (Base Bid) shall have an integral bi-directional slip resistant surface. This surface shall not be achieved by the use of paint or adhesive tapes.
 4. The FRP cover material (Alternate Bid 1) shall have anti-skid silica grit and gel-coat applied to the top of the surface for slip resistance.
 5. Covers must be designed to restrict entry of light over the effluent launders.
 6. Design launder cover to allow for thermal expansion and contraction.
 7. Design of launder cover shall be coordinated with structure, electrical equipment, and clarifier equipment.
 8. Cover panels shall be removable with individual lift weight not exceeding 75 LBS.
 - a. Upon removal of panel, no substructure in the form of beams or boxes shall be allowed.
 - b. Only primary support members will be allowed to remain in place.
- B. Launder Cover Composed of Panels and Beams:
1. Structural frame: Beam type.
 2. Cover or hatch thickness: Minimum thickness to meet or exceed the loading requirements in this Specification.
- C. Design Loadings:
1. Design structural support and covers in accordance with all applicable sections of the Local Building Code.
 2. Design for full dead-load plus the following minimum live-load conditions:
 - a. Snow loads:
 - 1) Ground snow load (Pg): 30 PSF.
 - b. Wind loads:
 - 1) Basic wind speed: 117 MPH.
 - 2) Exposure: C.
 - 3) Wind importance factor: 1.0.
 - c. Live loads: 100 PSF.
- D. Deflection:
1. Design deflection of all structural members and cover panels shall be limited to $L/240$ with L equal to the short span of the components when supporting the total dead and live-load conditions.
 2. This applies to the cover as a whole and to skin spanning between edges of each panel.
- E. Temperature:
1. Design covers to withstand stresses due to ambient temperature ranges as follows:
 - a. Low range: -25 DEGF.
 - b. High range: 120 DEGF.
- F. Configuration:
1. As indicated on the Drawings.
 2. Launder covers shall be composed of panels and beams.
 3. All panels shall interlock with the adjoining beam or panel without the use of fasteners.
 4. Each panel shall be easy to lift with the lifting force not greater than the dead weight of the panel.
 5. Provide aluminum guardrail and toe board on interior radius of fixed portion of launder covers.
 - a. See Section 05 50 00 and Section 05 52 02 for guardrail design requirements.
 6. The interior edge of the launder cover shall be provided with a 1/8 IN thick aluminum curtain as shown on the Drawings.

2.4 ACCESSORIES

- A. Access Hatches:
 - 1. Provide all panels between beam and access hatches as shown on the Drawings.
 - 2. Provide stainless steel gear style hinges on each panel.
 - 3. Access to any location around the launder shall be gained through the use of the integral gear hinged hatches or panel covers.
 - 4. All components shall be extruded aluminum, FRP, or stainless steel.
 - a. No carbon steel shall be used.
 - 5. In the closed position, panels shall be completely flush.
 - a. In the open position, the panel shall rest against the guardrail. A hold open device shall be provided to prevent panel from blowing shut by the wind.
 - 6. Handles shall be an integral mounted aluminum and incorporated into the non-skid deck slat.

PART 3 - EXECUTION

3.1 ERECTION

- A. Erect all components in accordance with manufacturer's recommendations.
- B. Do not force structure or panels during erection.
- C. Provide a mechanical and replaceable seal to isolate the cover perimeter and aluminum supports from the concrete walls.
 - 1. Bare aluminum shall not be installed against existing concrete.
 - 2. Coat surfaces in contact with dissimilar materials. See Specification Section 09 96 00.

3.2 FIELD QUALITY CONTROL

- A. Manufacturer shall provide qualified field supervisor to visit the jobsite after completion of work.
 - 1. Manufacturer shall provide the following Field Quality Control:
 - a. Inspect equipment covered by these Specification requirements.
 - b. Supervise adjustments and installation checks.
 - c. Perform operational checks.
 - d. Provide Owner with a written statement that manufacturer's equipment has been installed properly and is ready for operation by Owner's personnel.
 - e. Provide manufacturer's technical representative's time for on-site training of the Owner's personnel on operation and maintenance of covers in accordance with Specification Section 01 79 23 - Instruction of Operations and Maintenance Personnel.
- B. Testing:
 - 1. After installation, the launder cover shall be tested for conformance with the deflection limits.
 - a. A load of 400 LBS will be placed as directed by the Engineer and the maximum deflection created shall be measured.
- C. Field refabricating of structural components or panels will not be accepted.

END OF SECTION

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SECTION 46 43 22

FINAL CLARIFIER SOLIDS COLLECTION EQUIPMENT - CIRCULAR TANK SUCTION HEADER TYPE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Design, fabrication, installation, and testing requirements for:
 - a. Final clarifier solids collection mechanism and related accessories, including the scum skimmings collection equipment to be installed in existing final clarifier tanks.
- B. Related Sections include but are not necessarily limited to:
 - 1. SUDAS Division 1.
 - 2. Division 01 - General Requirements.
 - 3. Section 01 04 00 - Special Provisions.
 - 4. Section 01 61 03 - Equipment - Basic Requirements.
 - 5. Section 06 85 14 - Flocculation Baffles.
 - 6. Section 05 50 00 - Metal Fabrications.
 - 7. Section 05 52 02 - Aluminum Railing.
 - 8. Section 09 96 00 - High Performance Industrial Coatings.
 - 9. Section 10 14 00 - Identification Devices.
 - 10. Division 26 - Electrical.
 - 11. Section 46 13 19 - Effluent Launder Covers.

1.2 QUALITY ASSURANCE

- A. Referenced Standards:
 - 1. Aluminum Association (AA):
 - a. ASD 1, Aluminum Standards and Data.
 - 2. American Bearing Manufacturers Association (ABMA):
 - a. ABMA 9, Load Ratings and Fatigue Life for Ball Bearings.
 - 3. American Gear Manufacturers Association (AGMA):
 - a. AGMA 2001-D04, Fundamental Rating Factors and Calculation Methods for Involute Spur and Helical Gear Teeth.
 - b. AGMA 2001-D04 (Revision of ANSI/AGMA 2001--C95), Fundamental Rating Factors and Calculation Methods for Involute Spur and Helical Gear Teeth.
 - c. AGMA 2004-C08, Gear Materials, Heat Treatment and Processing Manual.
 - d. AGMA 6013-A06, Standard for Industrial Enclosed Gear Drives.
 - e. 6010-E, Standard for Spur, Helical, Herringbone, and Bevel Enclosed Drives.
 - f. AGMA 6034-B92, Practice for Enclosed Cylindrical Wormgear Speed Reducers and Gearmotors.
 - 4. American Institute of Steel Construction (AISC):
 - a. Steel Construction Manual.
 - 5. American Iron and Steel Institute (AISI).
 - 6. ASTM International (ASTM):
 - a. A36/A36M, Standard Specification for Carbon Structural Steel.
 - b. A48/A48M, Standard Specification for Gray Iron Castings.
 - c. A276/A276M, Standard Specification for Stainless Steel Bars and Shapes.
 - d. A536, Standard Specification for Ductile Iron Castings.
 - e. E18, Standard Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials.
 - 7. American Welding Society (AWS):
 - a. D1.1, Structural Welding Code - Steel.
 - b. D1.6, Structural Welding Code – Stainless Steel.

8. National Association of Corrosion Engineers (NACE).
 9. National Electrical Manufacturers Association (NEMA).
 - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
 - b. MG 1, Motors and Generators.
 10. National Fire Protection Association (NFPA):
 - a. 70, National Electrical Code (NEC).
 11. Occupational Safety and Health Administration (OSHA).
 12. Society of Automotive Engineers (SAE):
 - a. AMS 6440M, Steel, Bars, Forgings, and Tubing 1.45Cr (0.98 1.10C) (SAE 52100) For Bearing Applications.
- B. Qualifications:
1. Utilize workers, procedures and practices which comply with the American Welding Society D1.1 and D1.6.
 2. Manufacturer's Qualifications:
 - a. Manufacturer shall have experience in designing and manufacturing final clarifier mechanisms of similar size and configuration to that specified herein.
 - b. For the manufacturer to be determined acceptable for providing equipment on this project, they must show evidence of a minimum of ten installations and ten years' experience in the design and manufacturer of similar clarifier mechanisms with diameters equal to, or greater than 90% of the diameter of that specified herein.

1.3 SUBMITTALS

- A. See Specification Section 01 33 00 for requirements for the mechanics and administration of the submittal process.
- B. Shop Drawings:
1. See Specification Section 01 61 03 - Equipment - Basic Requirements.
 2. Product technical data including:
 - a. Evidence to show compliance with manufacturer's qualification requirements specified in Paragraph 1.2.B.
 - b. Evidence to show compliance with manufacturer's coordination requirements specified in Paragraphs 1.5.B, 1.5.C, and 1.5.D.
 - c. Acknowledgement that products submitted meet requirements of standards referenced.
 - d. Manufacturer, model and type of all equipment.
 - e. Complete erection and installation information.
 - f. Complete construction details, materials of construction, Drawings of mechanisms, drive, gears, gear reducers, bridge, electrical and control diagrams, and other similar information.
 - g. Catalog cut sheets for purchase subcomponents.
 - h. Local control panel data sheets.
 - 1) Catalog sheet on all components.
 - 2) Wiring diagrams.
 - 3) Short Circuit Current Rating (SCCR) nameplate marking per NFPA 70. Include any required calculations per Section 01 61 03.
 - i. Manufacturer, model, type and certification of compliance to ABMA 9 bearing life.
 - j. AGMA rated alarm, stall and ultimate torque capabilities.
 - k. Certification of the AGMA drive rating calculations signed by a registered Professional Engineer.
 - l. Size, make and type of electric motors and drive systems.
 - m. For-information-only calculations as follows:
 - 1) Provide complete solids transport calculations substantiating the suction header design and mechanism tip speed.
 - a) Provide actual field verified suction header performance data:
 - (1) Field verification clarifier to be 120 FT DIA or larger.
 - (2) Test site and testing lab shall be identified as well as test methods.

- (3) Calculations alone will not be an adequate substitute for field performance verification data.
 - 2) Center column and bridge support calculations.
 - 3) Complete process calculations substantiating the size of the center column ports and flocculating feedwell.
 - 4) Statement signed by a Professional Engineer registered in the State of Iowa that structural members have been designed to support the loadings specified.
 - 5) Calculations and details must bear the stamp of a Professional Engineer registered in the State of Iowa.
 - 3. List and part numbers of manufacturer's recommended spare parts, specifically denoting:
 - a. Wear items.
 - b. Long-delivery items.
 - c. All items convenient for stock as optional replacement items.
- C. Other:
 - 1. Proposed procedures, equipment, personnel and schedule for equipment testing specified in Part 3.
 - 2. Details of any revision necessary to adapt the piping, structural, electrical, and instrumentation design to the equipment proposed.
- D. Contract Closeout Information:
 - 1. Manufacturer's certification and copy of report and test results verifying completion of checkout, start-up, testing, and other related field services specified in Part 3.
 - a. Contractor to provide all material testing and inspection reports to the Engineer within 5 days of testing and/or inspections performed by the Contractor.
 - 2. Submit copy of field torque test results to Engineer.
 - 3. Submit copy of laser level results for weirs, baffles, and scum system for each clarifier to Engineer and Owner.
 - 4. Operation and Maintenance Data: See Specification Section 01 78 23 - Operation and Maintenance Manuals.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. See Specification Section 01 65 00 and Section 01 66 00.
- B. Factory Assembly:
 - 1. Assemble each mechanism in factory to ensure proper fit of parts. Annotate parts with erection marks.
 - 2. Disassemble mechanism into largest sections allowed by carrier regulations for shipment.

1.5 SYSTEM COORDINATION

- A. Provide single source supply and coordination responsibility through the collection mechanism manufacturer for the complete final clarifier mechanism construction, including scum skimming system.
- B. Equipment is to be installed in existing concrete tanks. The Contractor and collection mechanism manufacturer shall coordinate collection mechanism dimensions, configuration, and orientations at each basin. The collection mechanism manufacturer shall provide written confirmation of this coordination being completed with the submittal information of the equipment specified herein.
- C. New aluminum stairs to the clarifier bridge walkway are to be fabricated as shown on the Drawings by others. The collection mechanism manufacturer shall provide the elevations of the new bridge walkway to the Contractor to ensure proper coordination of elevations of the stair landings and walkways between the two systems. The collection mechanism manufacturer shall provide written confirmation of this coordination being completed with the submittal information of the equipment specified herein.

- D. Flocculation Baffles are to be installed on the Flocculating Feedwell of the collection as specified in Section 06 85 14. The Contractor shall provide that information to the collection mechanism manufacturer to ensure proper coordination between the two systems. The collection mechanism manufacturer shall provide written confirmation of this coordination being completed with the submittal information of the equipment specified herein.

1.6 PROJECT CONDITIONS

- A. Equipment suitable for installation in mixed liquor from a municipal wastewater treatment plant activated solids process.
- B. Equipment to be installed in existing 140± FT DIA concrete final clarifier basins.
- C. Wastewater temperature: 45 to 80 DEGF.
- D. Ambient temperature: -30 to 120 DEGF.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
 - 1. Evoqua.
 - 2. Ovivo.
 - 3. Walker Process Equipment.
- B. No like, equivalent or "or-equal" item or substitution is permitted.

2.2 PERFORMANCE AND DESIGN CRITERIA

- A. Final Clarifier No. 1 through No. 12 (55-FC-CM-1 through 55-FC-CM-12):
 - 1. Tank inside diameter: 140 FT DIA.
 - 2. Sidewater depth: 14 FT - 1 IN.
 - 3. Side Wall Depth: 15 FT - 10 IN.
 - 4. Floor slope: 1/4 IN to 12 IN.
 - 5. Inboard concrete launder.
 - 6. Influent column inside diameter: 47.5 IN.
 - 7. AGMA 20-year continuous rated running torque applied at output of drive unit: 53,300 FT-LBS minimum.
 - 8. Stall or motor cutout torque: 120% of continuous.
 - 9. Minimum turntable ball race diameter: 59 IN.
 - 10. Minimum spur gear pitch diameter: 55 IN.
 - 11. Drive output speed: 0.021 RPM. (9.2 FPM tip speed).
 - 12. Drive pinion: Single or two-piece.
 - 13. Flocculating feedwell.
 - a. Size: 28 FT DIA.
 - b. Flocculation feed well to be equipped with flocculation baffles (Refer to Section 06 85 14 - Flocculation Baffles).
 - c. Depth below high-water surface: 5.5 FT.
 - d. Minimum overall height: 6.0 FT.
 - 1) Extend a minimum of 6 IN above the high-water surface.
 - 14. Maximum head loss in the influent pipe at Peak Hour Flow (influent + RAS) of 308 MGD through 12 clarifiers: 4.0 IN.
 - 15. Thickness of all submerged and wetted metal members: 1/4 IN minimum unless otherwise indicated.

16. Process Design Information:

	ANNUAL AVERAGE	MAXIMUM MONTH
Influent flow ¹ (w/o RAS), MGD	56	104
RAS flow, MGD	23	42
Influent + RAS flow, MGD	79	146
MLSS, mg/L	3,000-5,000	3,000-5,000
RAS solids, mg/L	8,000-15,000	8,000-15,000

¹ For Average Annual condition, a minimum of 10 clarifiers can be expected to be online. For Maximum Month condition, a minimum of 11 clarifiers can be expected to be online.

B. Structural Design Criteria:

1. Maximum ratio of unbraced length to least radius of gyration (slenderness ratio):
 - a. Compression members: 120.
 - b. Tension members: 240 (for angle about the Z-Z axis).
2. Maximum unit stress at all structural members when subject to twice the drive motor running torque: 130% of AISC allowable stresses.
3. All welding shall conform to AWS D1.6.

2.3 MATERIALS

A. General:

1. All stainless steel components shall be provided with bead blast passivation.

B. Bridge and Access Platform: 304L Stainless Steel, ASTM A276.

C. Center Column: 316L Stainless Steel, ASTM A276.

D. Plate: 316L Stainless Steel, ASTM A276.

E. Structural Shapes: 316L Stainless Steel, ASTM A276.

F. Tube: 316L Stainless Steel, ASTM A276.

G. Flocculating feedwell, center drive cage, solids suction header and associated support arms and manifold, scum troughs, scum skimmer, and all other wetted metal components not indicated shall be 316L stainless steel.

H. Drive Mechanism:

1. Main Spur Gear:
 - a. Ductile iron: ASTM A536, Grade 80-55-06, 80-60-03, 100-70-03, or 120-80-02.
 - b. Cast iron: ASTM A48, Class 60 or 50A.
 - c. Forged steel: AISI Grade 4140, 4150, 4340, or 8620.
2. Main Bearings: AISI Grade 52100, Rockwell C64, ASTM E18.
3. Worm and Worm Shaft:
 - a. Ductile iron: ASTM A536, Grade 80-55-06.
 - b. Steel: AISI Grade 8620.
4. Pinion and Pinion Shaft:
 - a. Ductile iron: ASTM A536, 80-55-06.
 - b. Steel: AISI Grade 4140 or 4150.
5. Gear Housing: Gray iron, ASTM A48, Class 40B.
6. Shear Pins: 2017-T4, AA ASD 1, aluminum screw machine stock or CD1018 steel.
7. Shear Pin Holes: Hardened steel, Rockwell "C" 62-64.
8. Turntable Base: Gray iron, ASTM A48.
9. Replaceable Liner Strips: Steel, minimum Rockwell "C" 38-42.
10. Drive Dust Shield: Steel, ASTM A36.

11. Drive Seal: Felt or neoprene.
 12. Lip Seals: Neoprene.
 13. Oil Drain: stainless steel piping equipped with stainless steel ball valve including handle and hardware.
- I. Scum Skimmer Wiper: Neoprene.
 - J. Fasteners and attachment hardware including anchor bolts:
 1. ASTM A276, 316 Stainless Steel.
 2. Comply with Division 5.
 - K. Weirs and Baffles:
 1. Effluent weirs: ASTM A276, 304 stainless steel.
 2. Adhesive anchor bolts: 316 stainless steel.
 3. Angle brackets: ASTM A276, 304 stainless steel.
 4. Washers: 316 stainless steel.
 5. Baffles: ASTM A276, 304 stainless steel.

2.4 FABRICATION

- A. See Specification Section 01 61 03 - Equipment - Basic Requirements.
- B. General:
 1. Welds on submerged or partially-submerged components shall be continuous.
 2. Dull sharp corners of cut or sheared edges by at least two (2) passes of a power grinder.
- C. Center Column:
 1. Hollow cylinder designed to withstand vertical loads, torque loads, and eccentric loads exerted by rotating solids suction header, scum skimmer arms, drive cage, bridge and access platform.
 2. Flanged base for anchor-bolting to concrete base of clarifier.
 - a. Provide watertight connection seal.
 - b. Minimum of eight anchor bolts, or as required if more than eight required. Bolt diameter 1 IN minimum.
 3. Provide flanged top and stiffeners for supporting the attached items.
 4. Provide a drive mechanism mounting plate set plumb with the centerline of the center pier.
 5. Center column shall serve as an influent pipe and have a minimum of four equally spaced ports at the top to direct flow into the influent feedwell at a velocity of less than 1 FT/sec at average Influent + RAS flow and less than 2 FT/sec at maximum month Influent + RAS flow.
 6. Provide easily accessible and removable plate near the bottom of the center column for draining column.
 - a. Removable plate shall provide a clear square opening not less than 18 IN x 18 IN.
 - b. The opening to be reinforced as needed to withstand the imposed loads on the center pier.
- D. Flocculating Feedwell:
 1. Fabricated from 3/16 IN minimum thickness stainless steel plate.
 2. Reinforcing rim angles, angle stiffeners and supporting brackets shall be structural 316L stainless steel members of minimum thickness 1/4 IN.
 3. Provide baffled openings in feedwell at liquid level to allow release of skimmings in a tangential direction.
 - a. Minimum four openings.
 4. Support the feedwell from drive cage above water level. Feedwell structural members to be on outside of the feedwell to provide smooth interior.
 5. Feedwell shall project a minimum of 6 IN above water surface.
- E. Center Drive Cage:
 1. Provide all-welded stainless steel box truss construction.

2. Transmit torque from drive unit to rotating components by the drive cage.
 - a. Do not transmit torque to the access bridge.
 3. Design drive cage to encompass center column and support and rotate the solids suction headers and scum skimmer assemblies.
 - a. Drive cage to transmit and/or carry all torques (including stall torque) without over-stressing members.
 - b. Design cage to withstand 200% of design torque.
 4. Design adjustable connection between drive unit and drive cage to provide for proper alignment and allowance for structural tolerance.
 5. Attach truss arms to drive cage.
 - a. Provide adjustment arrangement to allow setting the truss arms symmetrically above the clarifier floor and the center drive cage.
 - b. After the truss arms are adjusted and certified by the manufacturer's representative, weld truss arms to center drive cage.
- F. Solids Suction Header:
1. Provide a rectangular-shaped, fully tapered (two directions) section varying in size from a maximum near the tank center to a minimum at the outer end. Design sections to provide a uniform velocity of solids removal flow in the header.
 2. Provide two headers per clarifier extending from the solids suction header manifold to the tank periphery.
 3. The longitudinal cross sectional axis of the headers shall be oriented to form a 45 DEG angle with the tank floor.
 4. The headers shall be supported from stainless steel truss arms and the center drive cage.
 5. Provide a flanged end connection for bolting the solids suction headers to the header manifold.
 6. Provide inlet orifices at regular intervals along headers.
 - a. Each orifice shall be designed to withdraw a specific flow rate of solids.
 - b. Not to exceed 30 IN spacing along the header.
 - c. Vary the orifice sizes and locations to assure hydraulic balance in the tank and uniform solids withdrawal from the entire tank bottom at all flows specified.
 - d. Size orifices and header such that the velocity through the header shall not be less than 0.5 fps at the lowest RAS rate per clarifier and a maximum headloss of 1 FT at highest RAS rate per clarifier.
 7. Provide a continuous lip flange beneath the orifices that is an integral part of the header to fluidize the solids and facilitate solids flow into the orifices.
 - a. Attach a neoprene squeegee with a backing plate to the lip flange.
 - b. Provide slotted holes for a minimum 1 IN vertical adjustment of the squeegee to allow it to conform to the tank bottom.
 8. Near the solids suction header manifold, provide header with a 1/4 IN plate with neoprene blade to direct solids from center area to the first orifice, or provide first orifice a minimum of 6 IN from solids suction header manifold.
- G. Solids Suction Header Support Truss Arms:
1. Fabricate truss arms capable of supporting both the solids suction header and the scum skimmer assembly.
 2. Connections between the truss and solids suction header and scum skimmer assembly shall be of 1/4 IN stainless steel plate, minimum.
- H. Solids Suction Header Manifold:
1. Provide a solids suction manifold at the bottom of the tank that is supported by and rotates with drive cage. The manifold shall be designed for transfer of solids from the solids suction headers to the outlet RAS pipe.
 2. Provide manifold bottom plate securely anchored to the concrete floor and grouted in place after proper leveling and alignment.
 3. Provide manifold seals to prevent passage of liquid between the tank and the manifold:
 - a. Hold seals in place using a minimum of two stainless steel bands.

- b. The seal assemblies shall be designed so that replacement can be made without disassembling the manifold.
- I. Scum Skimming and Removal:
1. Provide clarifier with two skimming arms consisting of scum blade and hinged wiper assembly.
 - a. The skimming arm shall collect scum the full distance between the influent well or feedwell and the scum baffle. The skimmer arm shall be tangential to the flocculating feedwell and form an angle of at least 12 DEG with the center line of the truss arm at the end of the scum blade. The entire weight of the arm shall be supported by the rotating machine and make allowance for 3 IN vertical adjustment of the skimming arm. Designs which rely on the scum baffle for support will not be acceptable. Scum blade shall have a minimum height of 6 IN.
 - b. Mount a hinged wiper assembly on the end of the scum blade to form a pocket for trapping scum. The wiper assembly shall maintain continual contact and proper alignment between scum blade, outer scum baffle, and scum trough. The wiper blade shall have a wearing strip on its outer end which contacts the scum baffle and neoprene strip on its inner and lower edges which contact the scum trough.
 - c. All springs, pivot points and threaded fasteners shall be constructed of 316 stainless steel. The hinged wiper assembly shall 316L stainless steel. The wiper blade shall be 1/2 IN neoprene with durometer of 60. The wiper assembly shall be the same dimension of the scum trough.
 - d. Provide a manual lockout mechanism on hinged skimmer assembly to allow for flexible independent operation for surface ice. Lockout mechanism shall raise hinged skimmer assembly above water surface without removal.
 2. Provide one (1) scum trough 4 FT wide from scum baffle with inclined beach of 1/4 IN thick 316L stainless steel plate, supported from the tank wall.
 - a. Scum trough shall have a minimum overall length of 4 FT-9 IN along the scum baffle consisting of beach plate, inner radius baffle, hopper, and 6 IN Schedule 40 316L stainless steel plain end discharge pipe.
 - b. Beach plate to slope at a nominal incline of 1-3/4 IN per foot to a point 5 IN below the maximum water elevation. The beach plate shall be provided with a submerged shelf extension spanning an additional 4 FT-0 IN along the scum baffle.
 - c. An inner radius baffle extending 9 IN below and 3 IN above maximum water level shall run from the trough to the end of the submerged shelf.
- J. Drive Mechanism:
1. Provide a drive mechanism, completely factory assembled, consisting of a motor, primary gear reduction unit, an intermediate reduction unit and a final reduction unit.
 2. Enclose all gearing in a cast iron ASTM A48, Class 40B housing. Exposed gearing and fabricated housings are not acceptable.
 3. Provide all bearings of anti-friction type and running in oil.
 4. Fabricate drive components in accordance with AGMA 2001-D04, 2001-C95 and 6034-B92 for 24 HRS continuous duty and 20-year design life based on rated AGMA torque. Design bearings for a B-10 ABMA 9 life of 200,000 HRS.
 5. Provide main drive unit with lifting lugs.
 6. Provide a turntable assembly designed so that the internal gear, balls and strip liners may be removed without raising the access bridge.
 7. Motor:
 - a. Totally enclosed, of ample power for starting and continuously operating the mechanism without overloading.
 - b. Conform to NEMA standards. Name plated for operation on 230/460V, 3 PH, 60 Hz current.
 - c. Minimum of 1-1/2HP and service factor of 1.15.
 - d. Complying with NEMA Design B, and totally enclosed with Class F insulation designed for continuous duty outdoor service.

- e. See Specification Section 01 61 03 for additional requirements.
- 8. Primary reduction unit and chain drive system:
 - a. Provide a primary reduction unit which drives the intermediate worm gear reduction unit through a chain and sprocket arrangement.
 - b. Heavy-duty parallel shaft helical type.
 - c. Conform to AGMA 6013-A06, "Standard for Industrial Enclosed Gear Drives," and shall have a minimum service factor of 1.25.
 - d. Furnish drive chain of #80L self-lubricated roller chain and OSHA-approved removable chain guard.
 - e. The driven sprocket shall include a shear pin overload system to provide overload protection of the drive train. The shear pin assembly shall be easily accessible by removal of the chain guard.
 - f. Provide an adjustable steel base mounted on the intermediate reduction unit for chain tension adjustments.
- 9. Intermediate reduction unit:
 - a. Shall consist of a worm gear driven by an integral straddle mounted worm and shaft, supported by heavy-duty rolling element bearings running in an oil bath.
 - b. Housing shall be cast iron, Class 40B, ASTM A48. Provide with stainless steel oil fill/drain lines and stainless steel oil level sight gauge.
 - c. All bearings shall have a minimum L10 life of 20 years, based on the continuous torque rating.
 - d. Service factor of 1.25.
 - e. Mount the unit on a machined face on the top of the final reduction unit and properly aligned to maintain accurate centers for the final reduction gearing.
 - f. Worm assembly: Worm and shaft of A151 8620 heat treated alloy, integral construction.
 - g. Worm gear: Cast manganese bronze conforming to ASTM B271 and AGMA 2004-C08 or aluminum bronze conforming to ASTM B148.
 - h. Overload protection as described in Paragraph 2.5.
- 10. Final reduction unit and turntable base:
 - a. The final gear reduction unit shall consist of a pinion, split internal spur gear, anti-friction ball bearing assembly and housing/base.
 - b. The pinion shall be single piece, without an intermediate coupling, extending from the worm gear to the spur gear, straddle mounted between anti-friction ball or roller bearings to maintain accurate pinion to spur gear alignment and contact.
 - c. Construct the main pinion of AISI Grade 4140/4142 alloy steel, heat treated to a minimum 321 BHN hardness. The pinion shall be manufactured to have a minimum AGMA quality class 8.
 - d. Provide internal spur gear of ductile iron ASTM A536 and AGMA quality class 6 minimum.
 - e. Provide internal gear design to support center cage, collector, and all other rotating components.
 - f. Provide turntable base with annular raceway to contain balls on which the internal gear rotates.
 - g. Furnish ball race without guide shoes and steady bearings.
 - h. Furnish ball bearings of alloy steel, bearing vertically and horizontally on four removable liner strips pressed into annular raceways in turntable base and internal gear.
 - i. Protect internal gear, pinion and ball race by a seal and dust shield.
 - j. Internal gear, pinion and ball race to run in oil bath.
 - k. Furnish turntable base bolted to the center column and designed to support the internal gear with rotating mechanism, access platform, and one end of the access bridge.
 - l. Provide a pipe attached to bottom of turntable base for condensate removal.
 - m. Furnish plugged or capped oil piping which terminates within the center of the base.
 - 1) Provide stainless steel oil level sight glass and stainless oil fill/drain lines equipped with stainless steel ball valve including handle and hardware.

- n. Provide a turntable assembly designed so that the internal gear, balls, and strip liners may be removed without raising the access bridge.
- o. Underwater bearings carrying any part of the load are not acceptable.

K. Access Platforms:

- 1. Size:
 - a. Provide 3 FT minimum clearance around drive unit assembly for maintenance and service, and access from walkway. Platform shall be a minimum of 8 FT by 8 FT.
- 2. Fabricate for uniform live load of 100 LBS/SF.
- 3. Construct of 1/4 IN aluminum checker plate attached to minimum 1/4 IN structural stainless steel frame, with required stiffeners and supports.
- 4. Include lift-out sections where required for maintenance of equipment.
- 5. Provide access platform in compliance with OSHA standards.
- 6. Provide handrail and toe plate on access platform in compliance of OSHA standards and Specification Section 05 52 02.

L. Bridge and Walkways:

- 1. Provide beam-type access bridge to support walkway. Truss-type access bridge not acceptable.
 - a. Provide 3 FT wide walkways constructed from 1-1/2 IN deep serrated aluminum grating.
- 2. Support walkway and access platform from the center column and the tank wall.
- 3. Provide at locations and orientation shown on Drawings.
- 4. Walkway design:
 - a. Uniform live load of 150 LBS/LF with a maximum deflection of 1/360 of the span with live load and dead loads applied.
 - b. Braced against lateral movement using wind load of 50 LBS/SQ FT.
- 5. Provide handrail and toe plate on walkway in compliance of OSHA standards and Specification Section 05 52 02.
- 6. Provide clarifier access consisting of 3 FT wide self-closing access gate with metal stop plate in walkway handrail, 2 FT wide stainless steel ladder support with tie-off eyelet and ladder stop, and stainless steel permanent pedestal sleeve davit base at locations and orientation shown on Drawings.
 - a. Gate shall open into the walkway a minimum of 90 DEG.
 - b. Gate shall have stop plate to prevent gate from opening into the clarifier.
 - c. Manufacturer and Contractor to coordinate gate, handrail, ladder support, and davit base installation to avoid conflicts when davit crane is installed and used by Owner. Coordinate with Owner and Engineer prior to fabrication.
 - d. Comply with Specification Section 05 52 02.
- 7. Walkway shall extend to center of clarifier.
- 8. Support beams on stainless steel or ultra-high molecular weight (UHMW) slide plates at the tank wall.
- 9. Provide aluminum mounting plate for controls and necessary mounting brackets to support electrical conduit.
- 10. Provide brackets for supporting electrical conduits.

M. Anchorage:

- 1. ASTM A276, 316 stainless steel anchor bolts complete with nuts and washers.
- 2. Bolt diameter: As required by manufacturer's design, but 1 IN minimum.
- 3. Provided by the equipment manufacturer.

N. Fasteners:

- 1. ASTM A276, 316 stainless steel.
- 2. Diameter: As required by manufacturer's design, but 1/2 IN minimum.
- 3. Provided by the equipment manufacturer.

- O. Weir and Scum Baffle.
 - 1. Weir:
 - a. Provide around periphery of tank on launder.
 - b. Weir shall be adjustable to allow for leveling.
 - 1) Level tolerance: ± 0.01 FT.
 - c. Weir shall be 3/16 IN thick by 12 IN deep 304L stainless steel plate.
 - d. Provide with 3 IN deep 90 DEG V-notches at 6 IN intervals.
 - e. Weir shall be curved and fastened to tank launder wall with large washers, adhesive anchor bolts, and nuts to allow vertical adjustment.
 - f. Provide joints between walls and weirs with a sealing coating of suitable waste resistant sealant to prevent leakage.
 - 2. Scum baffle:
 - a. Provide around interior face of effluent launders and mounted on bracket.
 - b. Space the mounting brackets to prevent sagging, deformation or buckling of scum baffle.
 - 1) Not more than 4 FT OC.
 - c. Install mounting bracket as shown on Drawings.
 - d. Baffle shall be 1/8 IN by 18 IN wide 304L stainless steel plate.
 - e. Individual baffle section shall be bolted to the adjacent section to form a continuous baffle around periphery of tank.
- P. Shop or Factory Finishing:
 - 1. Surface preparation and shop painting is required for all ferrous metals, equipment and accessories and shall be as specified under Division 9.
 - 2. All cast iron and steel components of clarifier drive mechanisms shall have surface preparation and finish coating performed in factory.
 - 3. Apply to gears, bearing surfaces, and other unpainted surfaces a heavy application of a rust-resistant coating and maintain coating during storage and until the equipment is placed into operation.
 - 4. All aluminum in contact with dissimilar materials shall be coated as specified in Division 9.

2.5 CONTROLS

- A. Overload Monitoring and Protection System:
 - 1. Furnish an electrical-mechanical overload control system for each clarifier drive mechanism. The overload system shall be actuated by the movement of the worm shaft in the intermediate wormgear speed reducer.
 - a. Amperage and current sensing devices shall not be acceptable for the overload sensing system.
 - 2. Provide factory calibrated torque switches rated 5 amps at 120 VAC minimum.
 - 3. Provide normally open contacts which close at 80% of the design running torque for alarm activation.
 - 4. Provide normally closed contacts which open at 100% of the design running torque for motor shutdown.
 - 5. Provide visual torque indicating device suitable for outdoor mounting calibrated from 0 to 160% of the design running torque to indicate load during operation.
 - a. Oriented so that torque may be read from the platform area around gear.
 - 6. Alarm and motor cutout loads shall be independently field adjustable, with initial setting to be made by manufacturer.
 - 7. Provide time delay relays with timers to prevent alarms on start-up and shutdown.
 - 8. Provide all necessary current transformers, relays and other appurtenances for a complete system.
 - 9. Overload system enclosure constructed to meet NEMA 4X, stainless steel.
 - 10. Shear Pins:
 - a. Provide shear pin device set for 140% of AGMA rated torque.
 - b. Provide straight, non-tapered shear pins with bushings.

- B. Local Control Panel for Operating the Clarifier Mechanisms, including:
 - 1. Each clarifier mechanism shall be provided with a control panel that allows control from the center drive mechanism location. The control panel and components shall comply with Division 26 and section 40 67 00, including:
 - a. 3-pole magnetic starter switch providing overload and under voltage protection for each motor.
 - b. All auxiliary components necessary for a complete and functioning system.
 - c. NEMA 4X, stainless steel, local control panel.
 - 2. The panel shall contain the following face mounted items:
 - a. On-Off selector switch.
 - b. Initial alarm high torque overload indicating light. Contacts for remote alarm indication to PLC shall also be provided.
 - c. Shutdown high torque overload indicating light. Contacts for remote alarm indication to PLC shall also be provided.
 - d. Run indicating light. Contacts for remote run indication to PLC shall also be provided.
 - e. Off indicating light. Contacts for remote off indication shall also be provided.
 - f. Disconnect switch.
 - g. Alarm horn activated by alarm conditions.
 - h. Horn Silence Pushbutton.
 - i. Shutdown Reset Pushbutton.
 - j. Alarm Light Fixture with Red Globe to remain illuminated until alarm condition is cleared.
 - 3. Provide equipment or control panels with Short Circuit Current Rating (SCCR) labeling as required by NFPA 70 and other applicable codes. See Specification Section 01 61 03 for information on how to determine the available fault current, such that, the SCCR rating meets or exceeds the available fault current.
 - 4. Environmental Controls for Outdoor Panels:
 - a. Outdoor temperature range of -30 DEGF through 120 DEGF.
 - b. Thermostat controlled heaters to maintain temperature approximately 10 DEGF above ambient dew point for condensation prevention inside the panels.
 - c. Internal corrosion inhibitors.
 - 5. Environmental control components:
 - a. Panel heaters:
 - 1) Thermostat controlled.
 - 2) Fan driven.
 - 3) Components mounted in an anodized aluminum housing.
 - 4) Designed for sub-panel mounting.
 - 5) Powered internally from a fuse or circuit breaker.
 - 6) Acceptable manufacturers:
 - a) Hoffman Enclosures, Inc.
 - b) Rittal.
 - c) Hammond Manufacturing.
 - d) Or approved equal.

2.6 SOURCE QUALITY CONTROL

- A. Provide evidence of compliance with PART 1 requirements for the following:
 - 1. Referenced standards.
 - 2. Welder certifications.
 - 3. List of similar scope and size projects.
- B. Provide evidence of compliance with PART 2 requirements for the following:
 - 1. Structural members and connections are designed so that unit stresses do not exceed the specified percent of AISC allowable stresses.
 - 2. Compression and tension member slenderness ratios do not exceed the specified ratios.

- C. Provide evidence in the form of field test that the suction header design used by the manufacturer is capable of uniform sludge withdrawal from the entire tank bottom (based on floor area swept).

2.7 MAINTENANCE MATERIALS

- A. Provide the following spare parts:
 - 1. One (1) motor and primary helical gear reducer.
 - 2. Six (6) sets of all seals for spur gear drive units.
 - 3. Two (2) complete sets of gaskets for drive units.
 - 4. Twenty-four (24) shear pins.
 - 5. Twelve (12) sets of neoprene skimmer wipers.
 - 6. Twelve (12) complete sets of manifold seals.
 - 7. Four (4) sets of spare sight glass or oil gage.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install clarifier equipment according to manufacturer's recommendations.
 - 1. Manufacturer's service technician to observe and direct equipment installation.
 - 2. Manufacturer's service technician to certify that mechanism has been installed in accordance with manufacturer's recommendations.
- B. Laser Level:
 - 1. Contractor shall laser level the weirs, baffles, and scum system of each clarifier.
 - 2. Contractor shall provide the services of a licensed surveyor to certify and submit the laser level results for each clarifier to Engineer and Owner.

3.2 FIELD QUALITY CONTROL

- A. See Specification Section 01 61 03 - Equipment - Basic Requirements.
- B. Provide manufacturer's technical representative's time for on-site training of the Owner's personnel in accordance with Specification Section 01 79 23 - Instruction of Operations and Maintenance Personnel.
- C. General:
 - 1. Employ and pay for services of equipment manufacturer's field service representative(s) to:
 - a. Inspect equipment covered by this Specification.
 - b. Supervise adjustments and installation checks.
 - c. Provide test equipment, tools and instruments necessary to accomplish equipment testing.
 - d. Conduct initial startup of equipment, perform operational checks and supervise acceptance testing.
 - e. Provide through Contractor a written statement certifying that manufacturer's equipment has been installed properly, started up and is ready for operation by Owner's personnel.
 - 2. Provide the following:
 - a. For equipment inspections: 4 HRS minimum, or as needed, for each clarifier.
 - b. For equipment startup and testing: 8 HRS minimum for each clarifier.
- D. Torque Test:
 - 1. Load test the entire collector mechanism by anchoring collector arms individually, one at a time. In successive tests, demonstrate the collection mechanism's (including drive unit, cage, gears and structures) capability to withstand not less than 130% of the specified rated running torque.
 - 2. Each clarifier mechanism shall be field torque tested. The testing shall be carried out under the supervision of the equipment manufacturer's representative before the mechanisms are approved and placed into operation.

3. The torque test shall consist of securing the truss arms by cables to anchor bolts installed by the contractor in the tank floor at locations recommended by the manufacturer and acceptable to the Engineer. A torque load shall be applied to the truss arm by means of a ratchet lever and cylinder connected to the cable assembly.
 4. The magnitude of the applied load shall be measured by calculating the torque from the distance of the line of action of each cable to the center line of the mechanism. Readings shall be taken at 100% and 120% of the AGMA rated torque. The test load shall be applied and noted on the torque overload device.
 5. The Manufacturer's Service Representative shall certify that the alarm and motor cutout torque of the drives as calibrated in the manufacturer's shop are in proper operation to shut down the units as specified.
- E. Operation Tests:
1. Following successful completion of the Torque Tests.
 2. Dry Tank Operational Test: Operate the collector mechanism in a dry tank for a minimum of four continuous hours.
 - a. At no time during the test shall the equipment exceed the rated torque or exhibit indications of binding or uneven operation.
 - b. Record torque values as registered on the drive mechanism torque indicator and motor amperage (all three phases) at hourly intervals.
 - c. If the mechanism exceeds rated torque, motor amperages or the mechanism exhibits indications of binding or improper adjustment:
 - 1) Immediately halt the test and remedy the problem.
 - 2) After completion of necessary repairs or adjustments, repeat the tests.
 3. Fully Submerged Operational Test: After successful completion of the Dry Tank Operational Test, fill clarifier with water to its operating level and operate mechanism continuously for 48 HRS.
 - a. At no time during the test shall the equipment exceed the rated torque or exhibit indications of binding or uneven operation.
 - b. Record torque values as registered on the drive mechanism torque indicator and motor amperage (all three phases) at 3 HR intervals.
 - c. If the mechanism exceeds rated torque or the mechanism exhibits indications of binding or improper adjustment:
 - 1) Immediately halt the test and remedy the problem.
 - 2) After completion of necessary repairs or adjustments, repeat the tests.
 - 3) Failure to successfully complete the test in three attempts is sufficient cause for rejection and for Owner to require that the equipment be removed from the Project.
 4. Skimming System Operation Test:
 - a. Following start-up of the clarifier, the Contractor, under the supervision of the manufacturer's representative, shall test and demonstrate the effectiveness of the skimming system to sweep the clarifier surface and remove material.
 - b. Owner will observe test and Contractor shall adjust skimming system as required to obtain Owner acceptance.
- F. Contractor to provide all material testing and inspection reports to the Engineer within 5 days of testing and/or inspections performed by the Contractor.

END OF SECTION

CITY OF DES MOINES GENERAL SUPPLEMENTAL SPECIFICATIONS TO THE SUDAS STANDARD SPECIFICATIONS, 2022 EDITION

Effective Date: March 21, 2022



This project will be constructed in accordance with the SUDAS Standard Specifications, 2022 Edition, which were adopted by the City of Des Moines on March 7, 2022, under Roll Call No. 22-0308, as amended by these City of Des Moines General Supplemental Specifications.

The SUDAS Standard Specifications, 2022 Edition, may be viewed at the Iowa SUDAS website <https://iowasudas.org/manuals/specifications-manual/> , or can be purchased online from the Iowa SUDAS website at: <https://iowasudas.org/order-the-manuals/> .

Said SUDAS Standard Specifications are hereby amended as follows:

SECTION 1010 – DEFINITIONS

1010, 1.03 DEFINITIONS AND TERMS. Add the following new definition:

PRIVATE CONSTRUCTION CONTRACT. A contract awarded by a private agency or individual for construction of a publicly owned or privately-owned improvement, which by agreement of the parties is subject to these specifications.

SECTION 1020 – PROPOSAL REQUIREMENTS AND CONDITIONS

1020, 1.01 QUALIFICATION OF THE BIDDERS: Add the following new E.

**E. The City of Des Moines may disqualify a Contractor from bidding on future work or from participating as a subcontractor for a period of up to 3 years in accordance with Section 94-198 of the Municipal Code of the City of Des Moines.*

1020, 1.03 QUANTITIES AND UNIT PRICES: Delete B. and replace with the following new B.

B. When unit prices are requested in the proposal form, the quantities indicated on the proposal form are approximate only, and do not constitute a warranty or guarantee by the Jurisdiction as to the actual quantities involved in the work. Such quantities are to be used for the purpose of comparison of bids and determining the amount of bid security, contract, and performance, payment, and maintenance bond. In the event of discrepancies between unit prices and unit price extensions listed in a bidder's proposal, unit prices shall govern and unit price extensions shall be corrected, as necessary, for agreement with unit prices; except in the case of an obvious, serious, clerical error where the Engineer is able to determine the bidder's intent from the proposal; in which case, the Jurisdiction may waive irregularities that are in best interest of the Jurisdiction, as long as the integrity of the bid process can be maintained. The Jurisdiction expressly reserves the right to increase or decrease the quantities during construction as outlined in Section 1040, 1.06 - Increase or Decrease of Work, and to make reasonable changes in design, provided such changes do not materially change the intent of the contract. The amount of work to be paid for shall be based upon the actual quantities performed.

**This highlighted language and Section 94-198 of the Municipal Code of the City of Des Moines are not the current law of the State of Iowa and not applicable to the City's current bidding process.*

1020, 1.09 PREPARATION OF THE PROPOSAL: Delete D. and replace with the following D:

- D. When unit prices are requested, they shall be submitted on each and every item of work included for which bids are requested. The format for unit prices will be in dollars and whole cents only. In the case of discrepancy, the unit price shall govern; except in the case of an obvious, serious, clerical error where the Engineer is able to determine the bidder's intent from the proposal; in which case, the Jurisdiction may waive irregularities that are in best interest of the Jurisdiction, as long as the integrity of the bid process can be maintained.

1020, 1.15 LIMITATION ON WITHDRAWAL OF PROPOSALS AFTER OPENING OF PROPOSALS:

Add the following new C:

- C. After bids are opened, if the low bidder claims that it has made a serious error in the preparation of its bid, and can support such a claim with evidence satisfactory to the Jurisdiction, said bidder shall be allowed to withdraw its bid and its bid security shall be returned; **provided however, as a condition for return of its bid security, said bidder shall be required to agree that it will not be allowed to again bid on the project, either as a prime bidder or as a subcontractor, if the project, or a substantial portion of the project, is rebid within six months of the first bid opening.* Under no circumstances should said bidder be permitted to alter or adjust its bid, as this would undermine the entire system of competitive bidding and be an open invitation to abuse.

SECTION 1040 – SCOPE OF WORK

1040, 1.05 PLANS: Delete the 2nd paragraph and replace with the following:

Electronic support files, will not be provided prior to letting and may be provided to the low bidder and are for information only. Should there be a discrepancy between an electronic support file and a contract document, the contract documents shall govern. No guarantee is made that the data systems used by the Engineer will be directly compatible with the systems the Contractor uses.

1040, 1.07 CHANGE ORDERS, B. Written Orders: Add the following to the end of the section:

Formal approval by the Jurisdiction shall be defined as follows:

The authority of the Des Moines City Manager and the Engineer to approve change orders shall be limited to those change orders which will cost \$50,000 or less. Change orders for work to cost more than \$50,000 shall be approved by the City Council prior to the payment of the work provided for under the change order.

**This highlighted language is not the current law of the State of Iowa and not applicable to the City's current bidding process.*

1040, 1.09 CHANGED SITE CONDITIONS, A. Latent or Subsurface Conditions: Delete 1. and 2. in their entirety and replace with the following 1. and 2.; and add the following new 3.

1. If the Contractor encounters latent or subsurface conditions differing materially from those indicated in the contract documents which the Contractor could not have discovered by a reasonable site investigation and examination of the type customarily undertaken by prudent and competent contractors, and if these changed conditions are considered by the Contractor as a basis for compensation in addition to the contract price, the Contractor shall within three working days after discovery thereof notify the Engineer of its claim by written notice as sent

set forth herein. Before disturbing the site at which the latent or subsurface condition is alleged to exist, the Contractor shall give the Engineer the opportunity to inspect the same.

- a. For claims greater than \$50,000 the Contractor shall notify the Engineer by written notice either (i) personally delivered, (ii) sent by certified mail, return receipt requested, or (iii) delivered by a nationally recognized prepaid overnight courier service (receipt requested), to the address below:

City of Des Moines
Engineering Department
400 Robert D. Ray Drive
Des Moines, IA 50309-1891
Attention: Steve Naber, P.E., City Engineer

Under no circumstance will an email, text message, verbal communication or any other informal communication, be considered acceptable or satisfactory written notice required by this section. The written notice shall:

- 1) Expressly state that it is a request for a contract change under Section 1040, 1.09;
- 2) Expressly identify the latent or subsurface conditions that the Contractor alleges differ materially from those indicated in the contract documents which the Contractor could not have discovered by a reasonable site investigation and examination of the type customarily undertaken by prudent and competent contractors;
- 3) Expressly state the reason the Contractor believes extra compensation is due;
- 4) Identify work that Contractor alleges will be impacted.

- b. For claims less than \$50,000 the Contractor shall notify the Project Engineer by written notice sent as set forth above or sent by email providing the same detail as identified in a.1) through 4) above. Under no circumstances will a text message, verbal communication or any other informal communication be considered acceptable or satisfactory written notice required by this section.

2. After inspection by the Engineer, the Jurisdiction may, in its discretion, authorize the Contractor to proceed with or abandon the work. The Contractor shall resume construction operations pending a decision regarding its claim by the Jurisdiction. Failure of the Contractor to give written notice within three working days of discovering the conditions and to give the Engineer full opportunity to inspect the condition before disturbing the site shall be deemed a waiver by the Contractor of all claims for extra compensation arising out of the alleged condition.
3. Latent or subsurface conditions that do not materially differ from those shown on the plans shall not form the basis for additional compensation. No additional compensation or extension of time shall be provided for conditions that do not materially differ, regardless of the nature of the condition encountered.

1040, 1.10 DISPUTED CLAIMS FOR EXTRA COMPENSATION: Delete 1.10 in its entirety and replace with the following:

A. Basis of Claim for Extra Compensation:

1. In any case where the Contractor believes extra compensation is due for work or material beyond the scope of the Work under the contract and not ordered by the Engineer as Extra Work as defined in Section 1010, 1.03, the Contractor shall provide written notice to the Engineer, as set forth herein, of its intention to make claim for such extra compensation within thirty (30) days of discovering the circumstances regarding the claim and before beginning the work on which the claim is based (hereinafter referred to as a "Claim").

- a. For claims greater than \$50,000 the Contractor shall notify the Engineer by written notice either (i) personally delivered, (ii) sent by certified mail, return receipt requested, or (iii) delivered by a nationally recognized prepaid overnight courier service (receipt requested) to the address below:

City of Des Moines
Engineering Department
400 Robert D. Ray Drive
Des Moines, IA 50309-1891
Attention: Steve Naber, P.E., City Engineer

Under no circumstance will an email, text message, verbal communication or any other informal communication, be considered acceptable or satisfactory written notice required by this section. The written notice shall:

- 1) Expressly state that it is a request for a contract change under Section 1040, 1.10;
 - 2) Expressly state the reason the Contractor believes extra compensation is due;
 - 3) Identify the underlying work or material that Contractor claims is beyond the scope of the Work under the contract and not ordered by the Engineer as Extra Work as defined in Section 1010, 1.03;
 - 4) Identify any work that will be impacted.
- b. For claims less than \$50,000 the Contractor shall notify the Project Engineer by written notice sent as set forth above or sent by email providing the same detail as identified in a.1) through 4) above. Under no circumstances will a text message, verbal communication or any other informal communication be considered acceptable or satisfactory written notice required by this section.

The Contractor shall not proceed with that work until the Contractor and the Jurisdiction have executed a change order with respect to the Claim. The Contractor shall have no right to submit a Claim for any matter which is exclusively reserved to authority of the Engineer under the Contract Documents.

2. The Jurisdiction shall not be responsible for damages attributable to the performance, nonperformance, or delay, of any other contractor, governmental agency, utility agency, firm, corporation, or individual authorized to do work on the project, except if such damages result from negligence on the part of the Jurisdiction, its Engineer, or any of its officers or employees.
3. For any Claim, if such written notification is not given, or if after such written notification is given the Engineer is not allowed facilities for keeping strict account of actual costs as defined for force-account construction, the Contractor thereby agrees to waive the Claim for extra compensation for such work. Such written notice by the Contractor, and the fact the Engineer has kept account of the cost as aforesaid, shall not be construed as establishing the validity of the Claim.
4. The Claim, when filed, shall be in writing and in sufficient detail to permit auditing and an evaluation by the Jurisdiction. The Claim shall be supported by such documentary evidence as the Contractor has available and shall be verified by affidavit of the Contractor or other person having knowledge of the facts.

B. Presentation and Consideration of Claim: If the Contractor wishes an opportunity to present its Claim in person, the Claim shall be accompanied by a written request to do so. Where the Contractor asks an opportunity to present its Claim in person, the Jurisdiction, within thirty (30) calendar days of the filing of the Claim, shall fix a time and place for a meeting between the Contractor and the Jurisdiction or its designated representatives or representative. The Jurisdiction shall, within a reasonable time after the filing of the Claim or the meeting above

referred to, whichever is later, rule upon the validity of the Claim and notify the Contractor, in writing, of its ruling together with the reasons therefore. In case the Claim is found to be just, in whole or in part, it shall be allowed and paid to the extent so found.

- C. Request for Claim Review:** In the event a Contractor's Claim as outlined in the above procedure in Sections 1040, 1.10(A) and (B) has been disallowed, in whole or in part, the Contractor may, within thirty (30) calendar days from the date the ruling of the Jurisdiction is mailed, make a written request to the Jurisdiction that its Claim or Claims be submitted to a board of review. The written request shall be either (i) personally delivered, (ii) sent by certified mail, return receipt requested, or (iii) delivered by a nationally recognized prepaid overnight courier service (receipt requested) addressed as follows:

City of Des Moines
Engineering Department
400 Robert D. Ray Drive
Des Moines, IA 50309-1891
Attention: City Engineer

The Jurisdiction shall decide if the matter is subject to further review and shall, within thirty (30) calendar days of the receipt of the request for review, grant or deny the request for review. The Jurisdiction's decision shall be final. In the event the Contractor fails to make a timely written demand for review of its Claim as provided by this Section 1040, 1.10(C), the decision of the Jurisdiction shall be deemed to be final and the Contractor shall have no right to pursue arbitration or litigation of its Claim.

D. Board of Review:

1. The Board shall have jurisdiction to pass upon questions involving compensation to the Contractor for work actually performed or materials furnished and upon claims for extra compensation that have not been allowed by the Jurisdiction. The Board's jurisdiction shall not extend to matters exclusively reserved to the Engineer, to a determination of quality of workmanship or materials furnished, or to an interpretation of the intent of the Plans and Specifications except as to matters of compensation. Jurisdiction of the Board shall not extend to setting aside or modifying the terms or requirements of the contract.
2. Following the timely written demand for review of the Claim and the decision of the Jurisdiction to grant the request, a board of review shall be appointed to review the Claim. The board of review shall consist of three (3) members as follows: the Engineer, or designated representative; and two persons to be appointed by the Engineer (hereinafter the "Board").
3. The Board shall set a date for the Contractor to present its Claim for review within sixty (60) days of the date the Jurisdiction issued its decision granting the Contractor's request for review. The presentation before the Board shall not be in accordance with the Iowa rules of civil procedure and the Contractor shall not have the right to conduct discovery or compel the testimony of witnesses as part of the presentation. The Contractor shall submit three (3) copies of a written Claim summary and all documents it considers to be relevant to its Claim at least fourteen (14) days prior to the date set for the presentation before the Board. The presentation before the Board is intended to be an informal process to allow the Contractor to further explain its Claim and why it believes it is entitled to additional compensation. The Board reserves the right to impose such rules as it deems reasonably necessary to allow for a fair and efficient presentation.
4. Following the presentation before the Board, the Board shall render a written decision regarding the Claim within twenty (20) days of the presentation. In the event the Board renders a decision in favor of the Contractor for some or all of the Claim, the Contractor and the Jurisdiction shall promptly proceed in good faith to prepare a change order consistent with the decision of the Board. If the Board denies the Claim, in part or in full, the Contractor's

sole and exclusive remedy is to demand final resolution of the Claim that has been denied subject to the procedure provided below.

- E. Final Resolution by Binding Arbitration or Litigation:** For any Claim denied by the Board, the Jurisdiction shall have the sole and exclusive right to determine whether final resolution of the Claim shall be through Binding Arbitration or litigation. The Contractor shall not have the right to pursue final resolution of any Claim that the Contractor did not submit to the Board. The Contractor must make a written demand for final resolution of the Claim upon the Jurisdiction within thirty (30) days of the date when the Board rendered its decision or it will be deemed to have waived this right and the decision of the Board will be final. The written demand shall be either (i) personally delivered, (ii) sent by certified mail, return receipt requested, or (iii) delivered by a nationally recognized prepaid overnight courier service (receipt requested) addressed as follows:

City of Des Moines
Engineering Department
400 Robert D. Ray Drive
Des Moines, IA 50309-1891
Attention: Steve Naber, P.E., City Engineer

The Jurisdiction shall notify the Contractor within thirty (30) days of the date of receiving the Contractor's written demand for final resolution of the Claim, whether the Jurisdiction will elect to use binding arbitration or litigation to reach a final resolution of the Claim. The decision to pursue binding arbitration or litigation, shall be the sole and exclusive decision of the Jurisdiction. The decision of the Jurisdiction on whether to pursue binding arbitration or litigation is final.

1. Arbitration.

- (a) If the Jurisdiction elects to use binding arbitration for final resolution of the Claim, the sole and exclusive remedy for final resolution of the Claim shall be binding arbitration (the "Arbitration"). The Arbitration shall be submitted to a single arbitrator as is mutually agreed upon by the Contractor and Jurisdiction. If the Contractor and Jurisdiction cannot agree upon a single arbitrator within twenty-one (21) days of the date of the Jurisdiction's notification to the Contractor of the Jurisdiction's decision to pursue binding arbitration, the Arbitration shall be submitted to a three (3) member panel appointed as follows: the Contractor shall appoint one arbitrator; the Jurisdiction shall appoint one arbitrator; and the third arbitrator shall be chosen by the first two appointed arbitrators (for the sake of convenience, the arbitrator, or arbitrators as the case may be, shall be referred to hereinafter as the "Arbitrator"). The parties agree to work toward appointment of a three (3) member Arbitration panel within twenty-one (21) days after not being able to agree on a single arbitrator. The Arbitration shall be conducted in general accord with the Construction Industry Arbitration Rules of the American Arbitration Association then in effect. The parties reserve the right to alter and amend the rules for the Arbitration as they may mutually agree in writing.
- (b) The Arbitrator shall have jurisdiction to pass upon questions involving compensation to the Contractor for work actually performed or materials furnished and upon claims for extra compensation that have not been allowed by the Jurisdiction. The Arbitrator's jurisdiction shall not extend to matters exclusively reserved to the Engineer, to a determination of quality of workmanship or materials furnished, or to an interpretation of the intent of the Plans and Specifications, except as to matters of compensation. Jurisdiction of the Arbitrator shall not extend to setting aside or modifying the terms or requirements of the contract.

- (c) Subject to agreement of the parties and the Arbitrator, the parties shall work in good faith to schedule the Arbitration and allow for the decision of the Arbitrator within two hundred forty (240) days after appointment of the Arbitrator.
- (d) The Arbitrator shall render a written decision within twenty (20) days after the Claim has been fully submitted. For Arbitrations before more than one arbitrator, the decision of a majority of the panel shall govern. The Arbitrator's decision shall provide a basis for the findings and legal conclusions and shall determine how the cost of the proceedings shall be borne by the parties.
- (e) The decision of the Arbitrator shall be binding and final. There shall be no further appeal or judicial review, except under the limited circumstances as allowed by Iowa law.

2. Litigation.

- (a) If the Jurisdiction elects not to use arbitration as the means to reach final resolution of the claim, then the sole and exclusive remedy for final resolution of the Claim shall be litigation which must be brought in Iowa District Court in and for the County where the Jurisdiction is located or in the United States District Court in and for the District where the Jurisdiction is located.
- (b) To the fullest extent permitted by law, Contractor and Jurisdiction hereto waive any right each may have to a trial by jury in respect of litigation directly or indirectly arising out of or in connection with this Agreement.

SECTION 1050 – CONTROL OF WORK

1050, 1.10 PROTECTION OF LINE AND GRADE STAKES: Add the following new D.

- D. The Jurisdiction shall provide all construction survey staking on projects funded by the Jurisdiction unless otherwise indicated on the plans or in the Contract Documents. On Private Construction Contracts, the Owner, in accordance with the Private Construction Contract, shall hire a Licensed Surveyor for all survey work.

SECTION 1060 – CONTROL OF MATERIALS

1060, 1.03 SAMPLES AND TESTING: Add the following new D.

- D. All on-site inspection and testing, as well as testing of materials, will be provided by the Jurisdiction unless otherwise indicated on the plans or by special provisions.

SECTION 1070 – LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

1070, 1.03 PERMITS AND LICENSES: Delete and replace with the following:

The Contractor shall procure and pay for all necessary permits and licenses for the construction of the work and for temporary excavations, obstructions, enclosures, and street openings arising from the construction and completion of the work described in the Contract Documents. The Contractor shall be responsible for all violations of the law for any cause in connection with the construction of the work or caused by the obstruction of roads, streets, highways or sidewalks, and shall give all requisite notices to the Jurisdiction or other public authorities in connection therewith.

1070, 2.02 CONVENIENCE AND SAFETY: E. Project Area or Work Site Safety: Add the following new 6.

6. The City of Des Moines, Engineering Department, Master Construction Safety Packet is available in the Forms and Documents section at the Engineering page on the City of Des Moines website at:
https://www.dsm.city/document_center/Engineering%20and%20Traffic%20Forms%20and%20Documents/ENG-Publications/MasterConstructionSafetyPacket.pdf?pdf=Master%20Construction%20Safety%20Packet&t=1580921434169 and is also available upon request from the Engineering Department. The Engineering Department will make available a copy of the City of Des Moines Master Construction Safety Plan to the Contractor when the contract is awarded. Said Safety Plan is for the Contractor's information only and it is the Contractor's sole responsibility to provide, or make available, this safety information to all its Subcontractors.

1070, 1.12, CONSENT TO JURISDICTION OF IOWA DISTRICT COURT OR FEDERAL DISTRICT COURT: Delete 1.12 in its entirety and replace with the following new 1.12:

1070, 1.12 DISPUTE RESOLUTION AND CONSENT TO JURISDICTION OF IOWA DISTRICT COURT OR FEDERAL DISTRICT COURT IN IOWA

- A. The Contractor agrees any claims, disputes, causes of action that accrue to it, or which by subrogation or assignment accrue to its sureties or insurers, arising out of or connected with this contract, and that the Jurisdiction has determined in writing is not subject to Section 1040, 1.10, shall be resolved by arbitration or litigation as elected by the Jurisdiction. As to any such causes of action, Contractor shall provide written notice to Jurisdiction requesting that Jurisdiction make its election as to whether the dispute shall be settled by arbitration or litigation. The written notice shall be either (i) personally delivered, (ii) sent by certified mail, return receipt requested, or (iii) delivered by a nationally recognized prepaid overnight courier service (receipt requested) addressed as follows:

City of Des Moines
Engineering Department
400 Robert D. Ray Drive
Des Moines, IA 50309-1891
Attention: Steve Naber, P.E., City Engineer

Jurisdiction shall notify Contractor in writing as to its election within thirty (30) days of receipt of Contractor's written notice requesting a determination by Jurisdiction.

1. Arbitration

- (a) If the Jurisdiction elects to use binding arbitration for final resolution, the sole and exclusive remedy for final resolution of the dispute shall be binding arbitration (the "Arbitration"). The Arbitration shall be submitted to a single arbitrator as is mutually agreed upon by the Contractor and Jurisdiction. If the Contractor and Jurisdiction cannot agree upon a single arbitrator within twenty-one (21) days of the date of the Jurisdiction's notification to the Contractor of the Jurisdiction's decision to pursue binding arbitration, the Arbitration shall be submitted to a three (3) member panel appointed as follows: the Contractor shall appoint one arbitrator; the Jurisdiction shall appoint one arbitrator; and the third arbitrator shall be chosen by the first two appointed arbitrators (for the sake of convenience, the arbitrator, or arbitrators as the case may be, shall be referred to hereinafter as the "Arbitrator"). The parties agree to work toward appointment of a three (3) member Arbitration panel within twenty-one (21) days after not being able to agree on a single arbitrator. The Arbitration shall be conducted in general accord with the Construction Industry Arbitration Rules of the American Arbitration Association then in effect. The parties reserve the right to alter and amend the rules for the Arbitration as they may mutually agree in writing.

- (b) Jurisdiction of the Arbitrator shall not extend to setting aside or modifying the terms or requirements of the contract.
- (c) Subject to agreement of the parties and the Arbitrator, the parties shall work in good faith to schedule the Arbitration and allow for the decision of the Arbitrator within two hundred forty (240) days after appointment of the Arbitrator.
- (d) The Arbitrator shall render a written decision within twenty (20) days after the matter has been fully submitted. For Arbitrations before more than one arbitrator, the decision of a majority of the panel shall govern. The Arbitrator's decision shall provide a basis for the findings and legal conclusions and shall determine how the cost of the proceedings shall be borne by the parties.
- (e) The decision of the Arbitrator shall be binding and final. There shall be no further appeal or judicial review, except under the limited circumstances as allowed by Iowa law.

2. Litigation.

- (a) If the Jurisdiction elects not to use arbitration as the means to reach final resolution of the claim or fails to notify Contractor in writing within thirty (30) days of its election, then the sole and exclusive remedy for final resolution of the Claim shall be litigation which must be brought in Iowa District Court in and for the County where the Jurisdiction is located or in the United States District Court in and for the District where the Jurisdiction is located.
- (b) To the fullest extent permitted by law, Contractor and Jurisdiction hereto waive any right each may have to a trial by jury in respect of litigation directly or indirectly arising out of or in connection with this Agreement.

- B. Contractor further consents that it will require its subrogees and assigns to enter into an agreement to comply with the terms of Section, 1.12, and consent to the jurisdiction of either the Iowa District Court in and for the County where the Jurisdiction is located or the United States District Court in and for the District where the Jurisdiction is located, as to any causes of action brought against it arising out of this contract or any work performed under it by Contractor or its subcontractors, and further agrees, on behalf of itself, its subrogees and assigns, to waive any and all objections to the jurisdiction of said court as to any such cause of action. Contractor shall make such consent a condition of the retention of subrogees and assigns.

1070, 2.10 DUST CONTROL: Add the following paragraph:

The Contractor shall be responsible to remove any project-related construction materials deposited on a public street as well as related dust control measures. The Contractor shall employ all means necessary to prevent tracking soil, or loss of material, onto public streets; including but not limited to, rocking private access roads and removing excess material from equipment before leaving the construction site. The Contractor shall promptly remove any material deposited on a public street utilizing mechanical scraping and street sweeping, or other means as required by the Jurisdictional Engineer.

1070, 3.02 INSURANCE REQUIREMENTS, A.: Delete A and replace them with the following A.

- A. The contractor shall not purchase liability insurance in the name of the jurisdiction unless such purchase is allowed by special provision.

1070, 3.02 INSURANCE REQUIREMENTS, C. 2. Commercial General Liability Insurance: Revise the following limits on the Commercial General Liability Insurance:

- The Each Occurrence Limit shall be changed from \$1,000,000 to \$2,000,000.
- The Personal and Advertising Injury Limit, under Commercial General Liability, changed from \$1,000,000 to \$2,000,000.
- All other limits shall remain unchanged.

1070, 3.02 INSURANCE REQUIREMENTS, C. 3. Automobile Liability Insurance: Revise the following limits on the Automobile Liability Insurance:

- Minimum combined single limit per accident shall be changed from \$1,000,000 to \$2,000,000.

1070, 3.02 INSURANCE REQUIREMENTS, C.: Add the following sentence at the end of 1, 2, 3, and 5: “Waiver of Subrogation in favor of Jurisdiction is required.”

1070, 3.02 INSURANCE REQUIREMENTS, C., 6. Additional Insured Endorsements: Replace “Except for Workers Compensation, the insurance specified shall:”, with “Except for Workers Compensation and Railroad Protective Liability Insurance, the insurance specified shall:”.

1070, 3.02 INSURANCE REQUIREMENTS, C: Add the following new 8.

8. **WAIVER OF SUBROGATION:** To the fullest extent permitted by law, Contractor hereby releases the Jurisdiction, including their respective elected and appointed officials, agents, employees and volunteers and others working on their behalf from and against any and all liability or responsibility to the Contractor or anyone claiming through or under the Contractor by way of subrogation or otherwise, for any loss arising out of liability or occupational injury without regard to the fault of the Jurisdiction or the type of loss involved. This provision shall be applicable and in full force and effect only with respect to loss or damage occurring during the time of this Agreement. The Contractor’s policies of insurance shall contain a clause or endorsement to the effect that such releases shall not adversely affect or impair such policies or prejudice the right of the Contractor to recover thereunder.

1070, 3.03 CONTRACTOR’S INDEMNITY – CONTRACTUAL LIABILITY INSURANCE: Delete B.; and replace with the following B.

- B. Except to the extent caused by or resulting from the negligent act or omission of the Jurisdiction or the Jurisdiction’s employees, consultants, agents or other for whom the Jurisdiction is responsible, to the fullest extent permitted by law, the Contractor shall defend, indemnify, and hold harmless the Jurisdiction and its officers, agents, employees, and consultants from and against all claims, damages, losses, and expenses, including but not limited to, attorney’s fees, arising out of or resulting from the performance or prosecution of the work by the Contractor, its subcontractors, agents, or employees; or arising from any neglect, default, or mismanagement or omissions by the Contractor, its subcontractors or consultants, suppliers, third parties, or the agents, officers, or employees of any of them in the performance of any duties imposed by the contract or by law; provided any such claim, damage, loss, or expense:
 1. is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the work itself) including economic damages and the loss of use resulting therefrom, and
 2. is caused in whole or in part by any act or omission of the Contractor, its subcontractors or consultants, suppliers, third parties, or the agents, officers, or employees of any of them, or anyone for whose acts any of them may be liable.

Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity that would otherwise exist as to any party or person described in this subsection.

1070, 3.04 CONTRACTORS INSURANCE FOR OTHER LOSSES; WAIVER OF SUBROGATION, B.:

Delete B. and replace with the following B.

- B. Contractor shall cause each of its subcontractors, consultants, suppliers, third parties, or the agents of any of them, to carry insurance sufficient to cover all loss to such materials, tools, motor vehicles, and equipment. All insurance carried by the Contractor, or its subcontractors, consultants, suppliers, third parties or the agents of any of them, covering risk of loss or damage to materials, tools, motor vehicles, and equipment used in the performance of the Work, shall provide a waiver of subrogation against the Jurisdiction, as specified in Section 1070, 3.02 Insurance Requirements, C.8. To the extent that any subcontractors, consultants, suppliers, third parties or the agents of any of them, do not provide such coverage, any uninsured loss shall be the sole responsibility of the Contractor.

1070, 3.05 PROPERTY INSURANCE: Delete A, D, and M; and replace them with the following A, D, and M.

- A. Property Insurance Required: The Contractor shall purchase and maintain property insurance, being either Builder's Risk Insurance or an Installation Floater, for the period of the contract until final acceptance of the work by the Jurisdiction, on all construction contracts where a building, electrical, mechanical, or plumbing permit is required by the permitting entity.
1. Builder's Risk Insurance by Contractor: On contracts for construction of new buildings or on contracts when Builder's Risk Insurance is applicable to the contract by definition, the Contractor shall purchase and maintain Builder's Risk Insurance for the duration of the contract; unless the Jurisdiction states by special provision that the Jurisdiction shall purchase and maintain the Builder's Risk Insurance. This property insurance, Builder's Risk Insurance, provided by the Contractor shall be in the amount of the initial bid amount, or in an amount equal to the estimated value of actual building construction, whichever is less, as well as applicable modifications thereto for the entire work at the site on a replacement cost basis. Such property insurance shall be maintained, unless otherwise provided in the contract documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final acceptance of the work by the Jurisdiction. The insurance shall include interests of the Jurisdiction, the Contractor, subcontractors, and sub-subcontractors in the work. If the Contractor's property insurance covering the work has any deductible, the Contractor shall be responsible to pay the cost associated with the deductible. Flood and Earthquake Insurance shall be required as part of the Builder's Risk Policy, and the minimum required policy limits shall be not less than 10% of the full amount of the contract. If Boiler and Machinery Insurance is required by the contract documents or by law, the Contractor shall purchase the Boiler and Machinery Insurance if the Contractor is required to purchase the Builder's Risk Insurance. If Boiler and Machinery Insurance coverage is included in the Contractor's Builders Risk Insurance policy, it may be used to satisfy the Boiler and Machinery Insurance requirement to the extent such coverage specifically covers such objects during installation, testing, and until final acceptance by the Jurisdiction.
 2. Builder's Risk Insurance by the Jurisdiction: When stated in the special provisions, the Jurisdiction shall purchase and maintain property insurance, a.k.a. Builder's Risk Insurance in the amount of the initial bid amount, or in an amount equal to the estimated value of actual building construction, whichever is less, as well as applicable modifications thereto for the entire work at the site on a replacement cost basis. Such property insurance shall be maintained, unless otherwise provided in the contract documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final acceptance of the work by the Jurisdiction. The insurance shall include interests of the Jurisdiction, the Contractor, subcontractors, and sub-subcontractors in the work. The Jurisdiction will determine an appropriate deductible for the property insurance covering the

work, however, the Contractor will be responsible for paying a deductible of up to \$5,000 for each occurrence. Flood and Earthquake Insurance shall be required as part of the Builder's Risk Policy, and the minimum required policy limits shall be not less than 10% of the full amount of the contract. If Boiler and Machinery Insurance is required by the contract documents or by law, the Jurisdiction shall purchase the Boiler and Machinery Insurance if the Jurisdiction is required to purchase the Builder's Risk Insurance. If Boiler and Machinery Insurance coverage is included in the Jurisdiction's Builders Risk Insurance policy, it may be used to satisfy the Boiler and Machinery Insurance requirement to the extent such coverage specifically covers such objects during installation, testing, and until final acceptance by the Jurisdiction.

3. Installation Floater: On the remainder of these contracts where Builder's Risk Insurance is not applicable to a contract by definition and an Installation Floater is applicable by definition, the Contractor shall purchase and maintain an Installation Floater for the duration of the contract. This Installation Floater shall cover all materials, fixtures, equipment, and supplies provided for the job. Such insurance shall be on an "*all risk*" form in an amount equal to the maximum value of such materials, equipment, or supplies covered on the job site, off-premises at any temporary storage location, or in transit, and shall include coverage for hoisting and rigging. The Installation Floater shall be maintained until final acceptance of the work by the Jurisdiction. If the Contractor's Installation Floater covering the equipment and work has any deductible, the Contractor shall be responsible to pay the cost associated with the deductible. If Boiler and Machinery Insurance is required by the contract or by law, the Contractor shall purchase the Boiler and Machinery Insurance; the Installation Floater may be used to satisfy this requirement to the extent the Boiler and Machinery Insurance coverage specifically covers such objects during installation, testing, and until final acceptance by the Jurisdiction.

D. Boiler and Machinery Insurance: When required by the contract documents or by law, Boiler and Machinery Insurance shall specifically cover such insured objects during installation, testing, and until final acceptance by the Jurisdiction; this insurance shall include interest of the Jurisdiction, Contractor, subcontractors, and sub-subcontractors in the work, and the Jurisdiction and Contractor shall be named insureds. A Builders Risk Insurance policy or an Installation Floater, when also required by the contract documents or by law, may satisfy this requirement as indicated in 1070, 3.05 A.1, 2. and 3. above. If Boiler and Machinery Insurance is required by the contract documents or by law, the Contractor shall purchase the Boiler and Machinery Insurance. However, if the contract, requires the Jurisdiction to purchase the Builder's Risk Insurance, the Jurisdiction shall also purchase the Boiler and Machinery Insurance.

M. Installation Floater: See Section 1070, 3.05, A.3 above.

1070, 3.06 ENDORSEMENT NAMING JURISDICTION AS AN ADDITIONAL INSURED / CANCELLATION AND MATERIAL CHANGE/ GOVERNMENTAL IMMUNITIES

ENDORSEMENT: Under C. delete the first full paragraph regarding the Cancellation and Material Change Endorsement language and replace it with the following:

Thirty (30) days Advance Written Notice of Cancellation, ten (10) days Written Notification of Cancellation due to non-payment of premium and forty-five (45) days Advance Written Notification of Non-Renewal shall be sent to the Jurisdiction at the office and attention of the Certificate Holder. This endorsement supersedes the standard cancellation statement on the Certificate of Insurance to which this endorsement is attached.

1070, 3.06 ENDORSEMENT NAMING JURISDICTION AS AN ADDITIONAL INSURED / CANCELLATION AND MATERIAL CHANGE/ GOVERNMENTAL IMMUNITIES

ENDORSEMENT: Replace first sentence under E. with the following: If allowed, as specified in Section 1070, 3.02 Insurance Requirements A., all liability policies purchased in the Jurisdiction’s name shall include a Governmental Immunities Endorsement, pursuant to Iowa Code Section 670.4, which endorsement shall include the following provisions:

1070, 3.07 PROOF OF INSURANCE: Add the following sentence at the end of A: “Mail Certificate of Insurance to: Engineering Department, City of Des Moines, City Hall, 400 Robert D. Ray Drive, Des Moines, Iowa 50309.”

SECTION 1080 – PROSECUTION AND PROGRESS

1080, 1.03 WORK PROGRESS AND SCHEDULE: Add the following new D:

- D. No person shall operate or permit the operation of any tools or equipment in construction, drilling or demolition work or in preventive maintenance work for public service utilities between the hours of 10:00 p.m. and 7:00 a.m. without the written permission of the Engineer.

1080, 1.09 EXTENSION OF TIME, B. – Request for Extension of Time: Add the following sentence before the last sentence in the first paragraph: “The request for an extension of time is the sole and exclusive remedy of the Contractor for the events listed below.

SECTION 1090 – MEASUREMENT AND PAYMENT

1090, 1.02 SCOPE OF PAYMENT, Add the following D.

- D. If the Contractor fails to notify the Engineer or the Engineers representative prior to commencing work on various stages of work on the project, the work completed without notifying the City may not be compensated.

1090, 1.04 PAYMENT FOR CHANGE ORDERS, C.: Replace with the following:

- C. The percentage markup to be allowed to the Contractor for extra work performed by a subcontractor shall include all overhead, profit, bond, and all subcontractor markups for changes in work and shall be in accordance with the following:
 - 1. 10% of the first \$50,000 with a \$100 minimum.
5% of the portion over \$50,000.

To include the markup on the change order, the Contractor shall, at the request of the Engineer, furnish evidence satisfactory to the Engineer of the cost (rate or rates) paid for such bond, insurance, and tax. This may include, at the request of the Engineer, a bond rider for the performance bond.

1090, 1.05 PROGRESS PAYMENTS, B. Retainage: Delete B. in its entirety and replace with the following B.

- B. Retainage: The Jurisdiction shall retain from each monthly progress payment 3% of the amount determined to be due according to the estimate of the Engineer. Early release of retained funds may be requested by the Contractor according to Iowa Code Section 573.28.

SECTION 2010 – EARTHWORK, SUBGRADE, AND SUBBASE

2010, 3.06 SUBGRADE PREPARATION, A. Uniform Composition: 1. Subgrade Compaction in Fill Sections: Add the following new e.

- e. Proof roll subgrade as specified in Section 3.06, B. to locate soft or yielding areas prior to placement of top six-inch lift.

2010, 3.06 SUBGRADE PREPARATION, A. Uniform Composition: 2. Subgrade Compaction in Cut Sections: Add the following new d.

- d. Prior to scarify, mix, and re-compact the bottom six inches of subgrade (paragraph 2.b above), proof roll subgrade as specified in Section 3.06, B to locate soft or yielding areas.

2010, 3.07 SUBGRADE TREATMENT, A. Lime, Cement, Fly Ash, or Asphalt: Add the following new 3.

- 3. The Contractor shall comply with the following conditions when incorporating the subgrade treatments.
 - a. The Contractor shall not begin stabilization work if the following weather conditions are to happen within 24 hours after stabilization:

Temperature expected to drop below 40°F within the first 24 hours of incorporation unless approved by the Engineer.

Rain.

Wind speeds of 15 mph or greater unless approved by the Engineer prior to stabilization work.

- b. The subgrade treatment shall not be incorporated into frozen subgrade conditions.
- c. The deviation from target range will not exceed 0.5% ± the approved mix design rate.
- d. Contractor shall use a reclaimer machine with computerized water proportioning system that measures and applies the water directly into the mixing chamber when the machine is in motion. The treatment chemicals will be distributed via computerized vane feeder on the subgrade prior to mixing to minimize loss of treatment chemicals as dust. Dumping or blowing of treatment chemicals onto the subgrade will not be allowed.
- e. During the compaction operation, no section shall be left undisturbed for longer than 30 minutes during compaction operations.

SECTION 3010 – TRENCH EXCAVATION AND BACKFILL

3010, 3.02 ROCK OR UNSTABLE SOILS IN TRENCH BOTTOM: Delete B. and replace with the following new B.

- B. The Engineer will review the contractor's request for the need for over-excavation and trench foundation stabilization and authorize the work prior to installation of pipes and structures.

3010, 3.05 PIPE BEDDING AND BACKFILL, E. Final Trench Backfill: 3. Class I and Class II Backfill Material: Delete a. and replace with the following new a.

- a. Compact to at least 65% relative density within right-of-way or under any paved surface or within two feet thereof.

3010, 3.05 PIPE BEDDING AND BACKFILL, E. Final Trench Backfill: 4. Class III and Class IVA Backfill Material: Delete a. and replace with the following new a.

- a. Compact to at least 95% of Standard Proctor Density within right-of-way or under any paved surface or within two feet thereof.

SECTION 4010 – SANITARY SEWERS

4010, 3.06 SANITARY SEWER SERVICE STUBS, C: Add the following new 7:

7. Mark the location of all sanitary sewer service stubs at the time of installation by a two-inch wide detectable marking tape installed at a depth of 18 inches to 24 inches below finished grade, directly over the service stub, for its entire length and brought up to the surface at the end of the service stub adjacent to the post marking the stub location. The tape shall be green in color and marked “Sanitary Sewer Service Stub Buried Below”.

4010, 3.10 SANITARY SEWER CLEANOUT: Delete in its entirety and replace with the following:

Cleanouts are not allowed on sanitary sewer mains in the City of Des Moines. Figure 4010.203 shall apply to services only.

SECTION 4020 – STORM SEWERS

4020, 2.01 STORM SEWERS, Parts A-L: Reinforced Concrete Pipe or Polypropylene Pipe shall be required for storm sewer construction in the Right-Of-Way or Public Easement areas. Minimum size of storm sewer pipe in the Right-Of-Way and Public Easement areas shall be 15-inch minimum diameter.

SECTION 4030 – PIPE CULVERTS

4030, 2.01 Pipe Culverts, Parts A-D: Reinforced Concrete Pipe shall be required for pipe culvert construction in the Right-Of-Way or Public Easement areas. Minimum size of pipe culverts in the Right-Of-Way and Public Easement areas shall be 15-inch minimum diameter.

SECTION 4040 – SUBDRAINS AND FOOTING DRAIN COLLECTORS

4040, 2.01 FOOTING DRAIN COLLECTORS: Use material for pipe and fittings complying with the current Adopted Edition of the Uniform Plumbing Code (UPC). In addition to the materials identified in the UPC, the pipe shall comply with ASTM D 3034, SDR 23.5 pipe will be allowed.

4040, 2.02 TYPE 1 SUBDRAINS (LONGITUDINAL SUBDRAIN), C. Corrugated Polyethylene Tubing and Fittings (Corrugated PE): Delete Type C and Type CP. Only Type S or Type SP are allowed in the City of Des Moines.

4040, 2.03 TYPE 2 SUBDRAINS (COMBINATION SUBDRAIN/FOOTING DRAIN COLLECTOR), B.3. HDPE Pipe: Delete Type CP. Only Type SP is allowed in the City of Des Moines.

4040, 2.09 FOOTING DRAIN SERVICE STUBS - Add this new 2.09 and the following note: Use material for pipe and fittings complying with the current Adopted Edition of the Uniform Plumbing Code (UPC). In addition to the materials identified in the UPC, the use of SDR 23.5 pipe will be allowed.

4040, 3.02 FOOTING DRAIN COLLECTORS, C: Add the following new 3:

3. Type B cleanouts should be used for footing drain collectors less than 5 feet in depth in the City of Des Moines. Footing drain collectors greater than 5 feet deep, a Type A cleanout shall be used.

4040, 3.03 FOOTING DRAIN SERVICE STUBS: Add the following new D and E.

- D. Mark the location of all footing drain service stubs at the time of installation by a two-inch wide detectable marking tape installed at a depth of 18 inches to 24 inches below finished grade, directly over the service stub, for its entire length and brought up to the surface at the end of the service stub adjacent to the post marking the stub location. The tape shall be green in color and marked "Footing Drain Service Stub Buried Below".
- E. ABS, PVC and SDR 23.5 pipe shall be installed with a minimum bedding of 4" below and up all side with 3/8" clean smooth gravel or a bedding product approved by the Engineer.

4040, FIGURE 4040.232, SUBDRAIN CLEANOUTS: Add the following new Note 7 to Figure 4040.232.

7. Type B cleanouts should be used for footing drain collectors or combination subdrain/footing drain collectors less than 5 feet in depth in the City of Des Moines. Footing drain collectors greater than 5 feet deep, a Type A cleanout shall be used.

SECTION 4060 – CLEANING, INSPECTION, AND TESTING OF SEWERS

4060, 3.03 VIDEO INSPECTION, A. General: Delete 1. and replace with the following new 1.

1. Conduct video inspection of all new and rehabilitated sanitary sewers, storm sewers, pipe culverts, and footing drain collectors after all backfill and compaction operations are completed, but prior to paving, unless otherwise specified in the contract documents.

SECTION 6010 – STRUCTURES FOR SANITARY AND STORM SEWERS

6010, PARTS 1, 2, 3, and Figures: Unless specifically noted as precast construction on the construction drawings, all square or rectangular shaped intakes and manholes shall be cast-in-place. Circular precast intakes and manholes are allowed in the City of Des Moines.

6010, 2.03, B. REINFORCEMENT: Add the following second sentence: All reinforcement for cast-in-place structures shall be epoxy coated.

6010, 2.09 MANHOLE OR INTAKE ADJUSTMENT RINGS (Grade Rings): Add the following new C.

- C. Manhole adjustment rings are not required to have pre-formed or pre-drilled holes for the anchor bolts.

6010, 2.10 CASTINGS (Ring, Cover, Grate, and Extensions), D. Casting Types: 2. - Intakes: Delete b. and replace it with the following b.

- b. Castings shall include design shown in this General Supplemental for lids on Type E, F, and G storm sewer castings shown for Figure 6101.602. The casting design is shown in the figure titled Storm Sewer Lid For the City of Des Moines.

6010, 2.13 STEPS: Delete entire Section as manhole steps are not allowed in the City of Des Moines.

6010, 2.15 ANCHOR BOLTS AND WASHERS, B. Diameter: Delete B. and replace it with the following B.: Provide bolts and washers 1/8 inch smaller than hole or slot in the casting frame but not less than 7/8 inch diameter.

6010, 3.01 GENERAL REQUIREMENTS FOR INSTALLATION OF MANHOLES AND INTAKES, J. Castings: Delete J. and replace with the following J.: Install the type of casting specified in the contract documents and adjust to proper grade. Where a manhole or intake is to be in a paved area, adjust the casting to match the slope of the finished surface. When castings with a bolt down cover (Type C or D) are specified, attach casting frame to the structure with four anchor bolts.

6010, 3.03 ADDITIONAL REQUIREMENTS FOR PRECAST CONCRETE STRUCTURES, Add new F. following:

F. Field Modification of Precast Structures: Significant modifications to precast structures to adjust elevations to field conditions will not be allowed. Significant modifications include, but are not limited to, excessive saw cutting of precast structures. Any field modifications to the precast structure shall be approved by the Engineer, or the Engineer's representative, or the precast structure will not be accepted.

SECTION 7010 – PORTLAND CEMENT CONCRETE PAVEMENT

7010, 1.08 MEASUREMENT AND PAYMENT, Add new N. following:

N. Cold Weather Protection: When any type of additional protection described in 7010.3.04.A is necessary, additional payment will be made as extra work at the rate of \$1.00 per square yard of surface protected. Payment will be limited to protection within the contract period. Protection necessary after November 15 will be paid only when the Engineer authorizes the work.

7010, 3.01 EQUIPMENT, A. Batching and Mixing Equipment, 2. Batching, Add new d. following:

d. Volumetric batching for Portland Cement Concrete will not be allowed unless authorized by the Engineer.

7010, 3.01 EQUIPMENT, C. Concrete Placement Equipment, 7. Concrete Saws, Add the following new 1:

1. Saw cutting operations shall be dustless in accordance with OSHA regulations.

7010, 3.02 PAVEMENT CONSTRUCTION, E. Bar and Reinforcement Placement: Add the following new 5:

5. PCC pavement slabs with manhole castings, with or without boxouts, shall have reinforcement similar to PV-103 around the castings.

7010, 3.07 QUALITY CONTROL, D. Pavement Thickness: Add the following as the first sentences under 1: Coring of pavement will not be required by the City of Des Moines if depth checks of the plastic thickness of the pavement are within one-half inch of the design thickness. If the variance exceeds one-half inch this section shall apply.

7010, FIGURE 7010.101, JOINTS: On Sheet 2 of 8 under 'C' Joint in Curb add the following: The entire curb shall be sealed with Joint Sealant Material.

7010, FIGURE 7010.101, JOINTS: On Sheet 3 of 8 delete Note 11 and replace with the following Note 11.

11. Sawing and sealing of the joint is required. See Detail D-2. On Sheet 3 of 8 Joint Types KT-1, KT-2, and KT-3 shall not be used.

7010, FIGURE 7010.901, PCC PAVEMENT JOINTING: Add Note 6 with the following:

6. All new roadway pavements shall be a minimum width of 27 feet back to back with parking on one side and 33 feet with parking on two sides.

SECTION 7020 – HOT MIX ASPHALT PAVEMENT

7020, 3.01 HMA PAVEMENT, Add the following new H.:

- H. The paver shall be capable of paving a minimum continuous width of twenty (20) foot wide strip without seam. Pavers in tandem will be acceptable; however, an adequate number of personnel shall be available to operate both pavers simultaneously.

7020, FIGURE 7020.901, HMA PAVEMENT: Add Note 3 with the following:

3. All new roadway pavements shall be a minimum width of 27 feet back to back with parking on one side and 33 feet with parking on two sides.

SECTION 7021 – HOT MIX ASPHALT OVERLAYS

7020, 3.01 HMA PAVEMENT, Add the following new C.:

- C. The paver shall be capable of paving a minimum continuous width of twenty (20) foot wide strip without seam. Pavers in tandem will be acceptable; however, an adequate number of personnel shall be available to operate both pavers simultaneously.

SECTION 7030 – SIDEWALKS, SHARED USE PATHS, AND DRIVEWAYS

7030, 1.08 MEASUREMENT AND PAYMENT, Add new J. following:

- J. Cold Weather Protection:** When any type of additional protection described in 7010.3.04.A is necessary, additional payment will be made as extra work at the rate of \$1.00 per square yard of surface protected. Payment will be limited to protection within the contract period. Protection necessary after November 15 will be paid only when the Engineer authorizes the work.

7030, 2.07 DETECTABLE WARNINGS: Add the following sentence at the end: Only cast iron detectable warnings are allowed in the City of Des Moines.

7030, 3.04 PCC SIDEWALKS, SHARED USE PATHS, AND DRIVEWAYS, A. Form Setting: Add the following new 6:

6. The turning space for a sidewalk or shared use path shall be formed separately from the adjoining ramps and sidewalk or shared use path.

7030, 3.04 PCC SIDEWALKS, SHARED USE PATHS, AND DRIVEWAYS, B. Concrete Pavement Placement, 1. Shared Use Path: Add the following sentence at the end: “When the Portland Cement Concrete is delivered to the project on the prepared subgrade or subbase, the loads shall be limited to 5 tons for single axle vehicles or 10 tons for tandem axle or larger vehicles.”

Add the following new 4:

4. Volumetric batching for Portland Cement Concrete will not be allowed unless authorized by the Engineer.

7030, 3.04 PCC, SIDEWALKS, SHARED USE PATHS, AND DRIVEWAYS, B. Concrete Pavement Placement, 2. Sidewalk: Add the following new g:

- g. The turning space for a sidewalk or shared use path shall be placed separately from the adjoining ramps and sidewalk or shared use path.

7030, 3.04 PCC SIDEWALKS, SHARED USE PATHS, AND DRIVEWAYS, F. Jointing: 4. Isolation Joints: Delete b. and replace it with the following new b.

- b. For a sidewalk constructed with a driveway, install a ½” expansion joint on the property side of the sidewalk and a ½” expansion joint on the street side of the sidewalk.

7030, 3.05 HMA SHARED USE PATHS AND DRIVEWAYS: Add the following second sentence: When Hot Mix Asphalt is delivered to the project on the prepared subgrade or subbase, the loads shall be limited to 5 tons for single axle vehicles or 10 tons for tandem axle or larger vehicles.

7030, FIGURE 7030.101, CONCRETE DRIVEWAY, TYPE A: Delete the references to “E Joint” on the property side of the sidewalk and “C or E Joint” on the street side of the sidewalk, and replace with “install a ½” expansion joint on the property side of the sidewalk and a ½” expansion joint on the street side of the sidewalk”. In addition, install a ½” expansion joint in the sidewalk at the extension of both edges of the driveway. Delete 7 and replace with the following 7; “Install a ½” expansion joint at the back of curb.”

7030, FIGURE 7030.102, CONCRETE DRIVEWAY, TYPE B: Delete the references to “E Joint” on the property side of the sidewalk and “C or E Joint” on the street side of the sidewalk, and replace with “install a ½” expansion joint on the property side of the sidewalk and a ½” expansion joint on the street side of the sidewalk”. In addition, install a ½” expansion joint in the sidewalk at the extension of both edges of the driveway.

7030, FIGURE 7030.201, CLASSES OF SIDEWALKS: The detail for CLASS A SIDEWALK shall be revised to delete the “4” min.” thickness dimension of the sidewalk and replace with “5” min.”.

7030, FIGURE 7030.202, CURB DETAILS FOR CLASS A SIDEWALK: On Detail 3 delete the note “Sealed ‘E’ joint” and replace it with the following note “Sealed ‘B’ joint”. On Detail 1, 2, and 3 delete the “4 min.” thickness dimension of the sidewalk and replace with “5” min.”.

SECTION 8030 – TEMPORARY TRAFFIC CONTROL

8030, Add new 3.04.A – Traffic Control Deficiency Deduction

A. Traffic Control Deficiency Deduction. When the Engineer is notified, or determines a traffic control deficiency exists, he/she will notify and direct the Contractor to correct the deficiency within a specified time. The specified time, which begins upon notification to the Contractor, will be from ½ hour to 12 hours based upon the urgency of the situation and nature of the deficiency as determined by the Engineer.

A traffic control deficiency may be any lack of repair, maintenance, or non-compliance with the traffic control plan. A traffic control deficiency may also be applied to situations where corrective action is not an option such as the use of non-certified flaggers for short term operations; working with lane closures beyond the time allowed in the contract; or failure to perform required contract obligations such as traffic control surveillance.

If a Contractor fails to correct a traffic control deficiency within the specified time, a daily monetary deduction from the pay item for Traffic Control will be imposed for each calendar day or fraction thereof the deficiency exists. The calendar days(s) will begin with the notification to the Contractor and end with the Engineer's acceptance of the correction. The daily monetary deduction will be \$2,500. For those deficiencies where corrective action was not an option, this monetary deduction will be immediate.

SECTION 9010 – SEEDING

9010, 3.02 – AREA OF SEEDING: Add A. and B.

A. Mobilize within 72 hours of a written order with sufficient labor, equipment, and materials to seeding work as ordered or approved by Engineer. Complete work within 7 calendar days of a written order.

B. Failure to mobilize and complete work within such time period, will result in a deduction of \$750.00 per calendar day from payment due under the contract, except when Engineer extends such time period.

SECTION 9020 – SODDING

9020, 3.03 – SOD INSTALLATION: Delete A. and replace it with the following new A.

A. Do not install sod between the dates of June 1 and August 31, unless authorized by the Engineer.

B. Mobilize within 72 hours of a written order with sufficient labor, equipment, and materials to sod installation as ordered or approved by Engineer. Complete work within 7 calendar days of a written order.

C. Failure to mobilize and complete work within such time period, will result in a deduction of \$750.00 per calendar day from payment due under the contract, except when Engineer extends such time period.

SECTION 9040 – EROSION AND SEDIMENT CONTROL

9040, 1.03 – SUBMITTALS: Add the following sentences: The Jurisdiction will not approve the contractor's Stormwater Pollution Prevention Plan (SWPPP) or revisions to the SWPPP; instead, the Jurisdiction will only review and comment on the SWPPP and any revisions. The contractor shall submit to the Engineer a copy of the Iowa Department of Natural Resources authorization prior to the Jurisdiction's issuance of the Notice to Proceed for the work.

9040, 1.08 – MEASUREMENT FOR PAYMENT, A. Stormwater Pollution Prevention Plan (SWPPP): Delete A. in its entirety and replace with the following A.

A. **Stormwater Pollution Prevention:** Item will be paid for as a lump sum for the project based on the following formula: 30% of the bid amount after review of the SWPPP by the Engineer and filing a Notice of Intent by the contractor, an additional 20% of the bid amount when 25% of the total original contract amount is earned, an additional 20% of the bid amount when 50% of the total original contract amount is earned, an additional 20% of the bid amount when 75% of the total original contract amount is earned, and the remaining 10% of the bid amount upon filing the Notice of Discontinuation by the contractor. Item shall include the following activities and work:

- 1. Stormwater Pollution Prevention Plan (SWPPP) Preparation:** Item includes reviewing and preparation of any modifications necessary to the general SWPPP provided by the Jurisdiction based on the Contractor's proposed scheduling and construction methods, filing a Notice of Intent for coverage of the project under the Iowa DNR NPDES General Permit No. 2, and

payment of associated NPDES permit fees. The Jurisdiction will publish the Public Notice of Storm Water Discharge and provide an affidavit of publication to the contractor.

2. **Management:** Item includes all work required to comply with the administrative provisions of the Iowa DNR NPDES General Permit No. 2; including record keeping, documentation, updating the SWPPP, filing the Notice of Discontinuation, etc. Item also includes weekly inspections required to satisfy the provisions of General Permit No. 2, unless otherwise stated in the contract documents.
3. **Inspection:** Item includes inspection of the disturbed areas, and erosion and sediment control measures performed by the contractor, at least once every seven (7) calendar days until the disturbed areas have been stabilized with a perennial vegetative cover of sufficient density to preclude erosion.
4. **Additional Erosion and Sediment Control Measures:** Item includes the cost of erosion and sediment control measures included in the contractor's modifications to the general SWPPP provided by the Jurisdiction that are either not included as bid items on the proposal or exceed 20% of the proposal unit quantity for the measure, as well as replacement of these measures if needed. The contractor will be paid at the unit bid price for additional erosion and sediment control measures constructed that are included in the contractor's modifications to the general SWPPP provided by the Jurisdiction when the quantity of these additional measures is less than or equal to 20% of the contract quantity for the measure.

9040, 3.01 – SWPPP PREPARATION: Delete in its entirety and replace with the following.

- A. Review and prepare any modifications necessary to the general SWPPP provided by the Jurisdiction based on the Contractor's proposed scheduling and construction methods. Prepare a Stormwater Pollution Prevention Plan (SWPPP) according to the requirements of the Iowa DNR NPDES General Permit No. 2.
- B. Have the SWPPP prepared by an individual experienced in erosion and sediment control.
- C. Ensure that controls utilized in the SWPPP conform to the type and quantity of erosion and sediment controls shown in the contract documents. See 9040,1.08, 4 above for measurement for payment of any erosion and sediment control measure used that is not shown in the contract documents or exceeds 20% of the contract quantity for the measure.
- D. Submit the completed SWPPP to the Engineer for review and comment prior to filing the Notice of Intent.
- E. The Jurisdiction will publish the Public Notice of Storm Water Discharge, as required by the NPDES General Permit No. 2 and provide an affidavit of publication to the contractor.
- F. File the Notice of Intent and fee, as required by the NPDES General Permit No. 2.
- G. Prior to beginning grading, excavation, or clearing and grubbing operations, all erosion and sediment control measures identified in the SWPPP shall be installed or constructed.

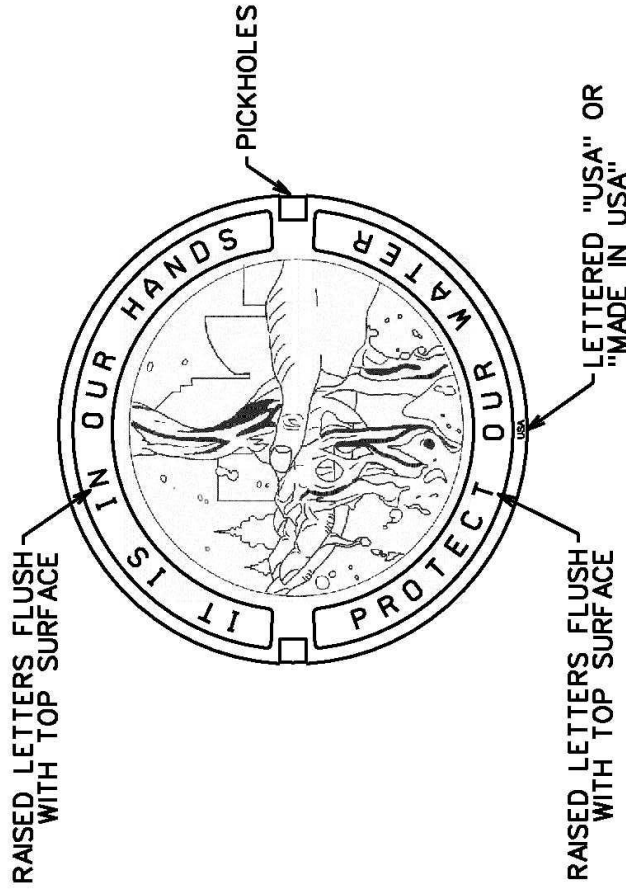
9040, 3.02 – SWPPP MANAGEMENT: Delete C. in its entirety and replace with the following C.

- C. Submit all SWPPP revisions to the Engineer for review and comment.

SECTION 9080 – CONCRETE STEPS AND HANDRAIL

9080, 2.01 – MATERIALS, B. Reinforcing Steel: Add the following sentence at the end: "All reinforcement shall be epoxy coated."

LID SHALL BE USED FOR TYPE E, TYPE F, AND TYPE G APPLICATIONS AS REFERENCED BY SUDAS FIGURE 6010.602.



MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B
FINISH: NO PAINT

TITLE:
FOR THE CITY OF DES MOINES, IOWA

**WRA General Supplemental Specifications to the
SUDAS Standard Specifications, 2022 Edition**



Effective Date: April 19, 2022

This project will be constructed in accordance with the SUDAS Standard Specifications, 2022 Edition, which were adopted by the Des Moines Metropolitan Wastewater Reclamation Authority on April 19, 2022 by Resolution No. 22-52, as amended by the City of Des Moines General Supplemental Specifications to the SUDAS Standard Specifications, 2022 Edition, effective March 21, 2022, by the City of Des Moines, Iowa, and as further amended by these WRA General Supplemental Specifications.

These WRA Supplemental Specifications shall take priority over the City of Des Moines General Supplemental Specifications. Said SUDAS Standard Specifications, 2022 Edition, and City of Des Moines General Supplemental Specifications, 2022 Edition, are hereby amended as follows:

1020, 1.04 EXAMINATION OF THE CONTRACT DOCUMENTS AND SITE OF

WORK: Delete A. and E. in their entirety and replace with the following A. and E:

- A. By submission of a proposal on the work, the bidder represents that it has carefully examined the site of the proposed work; the plans, specifications, and all other Contract Documents; and that the bidder is fully informed concerning the requirements of the contract, the physical conditions to be encountered in the work, and the character, quality, and the quantity of work to be performed, as well as materials to be furnished. The Contractor will not be entitled to additional compensation if it subsequently finds that conditions require methods or equipment other than that anticipated by the Contractor in making its proposal.

(Note: Subsections B., C., and D. of 1020, 1.04 shall remain as-is without any revision)

- E. The Jurisdiction does not warrant, impliedly or explicitly, the nature of the work, the conditions that will be encountered by the bidder, the adequacy of the Contract Documents for the Contractor to perform the work, or the conditions or structures to be encountered under any surface. Any such data supplied on the plans or other Contract Documents, or interpretation thereof by the Engineer, are merely for the convenience of the prospective bidders, who are to rely upon their own explorations of latent or subsurface site conditions, before completing and filing their proposal.

SECTION 1040 – SCOPE OF WORK

1040, 1.06 INCREASE OR DECREASE OF WORK: Delete A. and B. in their entirety and replace with the following new A:

- A. The Jurisdiction reserves the right to make such alterations in the plans or in the quantities of Work as may be considered necessary. Such alterations shall be in writing by the Engineer and shall not be considered as a waiver of any conditions of the Contract Documents or to invalidate any of the provisions thereof.

1040, 1.07 CHANGE ORDERS, B. Written Orders: Delete the formal approval definition as added by the City of Des Moines General Supplemental Specifications and add the following new WRA formal approval definition:

Formal approval by the Jurisdiction shall be defined as follows:

The WRA Director and the Engineer have authority to approve change orders to contract documents in an amount up to \$10,000 or 10% of the original contract price, or such other contingency amount or percentage established by the WRA Board, whichever is greater; provided that any change order in excess of \$100,000 shall require approval by the WRA Board. Change orders shall be approved prior to the payment of the work provided for under the change order.

1040, 1.08 SITE CONDITIONS: Delete 1.08 in its entirety and replace with the following new A:

- A. The Contractor is required by Section 1020 1.04 Examination of the Contract Documents and Site of Work to make reasonable investigation and examination to determine latent and subsurface conditions at the site of the work prior to preparing its proposal. The Jurisdiction makes no guarantee of any conditions, latent or subsurface, at the site of the work. The Jurisdiction shall not be obligated to make any payments to Contractor by reason of any latent or subsurface conditions.

1040, 1.09 CHANGED SITE CONDITIONS: Delete 1.09 in its entirety, and also delete in its entirety the revision made to 1.09 under the City of Des Moines General Supplemental Specifications.

1040, 1.10 DISPUTED CLAIMS FOR EXTRA COMPENSATION: Delete 1.10 in its entirety, and also delete in its entirety the revision made to 1040, 1.10 under the City of Des Moines General Supplemental Specifications, and replace with the following:

A. Basis of Claim for Extra Compensation:

1. In any case where the Contractor believes extra compensation is due for work or material beyond the scope of the Work under the contract and not ordered by the Engineer as Extra Work as defined in Section 1010 1.03 herein, the Contractor shall provide written notice to the Engineer, as set forth herein, of its intention to make claim for such extra compensation within thirty (30) days of discovering the circumstances regarding the claim and before beginning the work on which the claim is based (hereinafter referred to as a "Claim").

a. For claims greater than \$50,000 the Contractor shall notify the Engineer and WRA Director by written notice either (i) personally delivered, (ii) sent by certified mail, return receipt requested, or (iii) delivered by a nationally recognized prepaid overnight courier service (receipt requested) to the addresses below:

Engineer:

City of Des Moines
Engineering Department
400 Robert D. Ray Drive
Des Moines, Iowa 50309-1891
Attention: City Engineer

WRA Director:

Des Moines Metropolitan Wastewater Reclamation Authority
3000 Vandalia Road
Des Moines, Iowa 50317
Attention: WRA Director

Under no circumstances will an email, text message, verbal communication or any other informal communication, be considered acceptable or satisfactory notice required by this section.

The written notice shall:

- 1) Expressly state that it is a request for a contract change under Section 1040, 1.10
- 2) Expressly state the reason the Contractor believes extra compensation is due;
- 3) Identify the underlying work or material that Contractor claims is beyond the scope of the Work under the contract and not ordered by the Engineer as Extra Work as defined in Section 1010,1.03;
- 4) Identify any work that will be impacted.

b. For claims less than \$50,000 the Contractor shall notify the Project Engineer by written notice sent as set forth above or sent by email providing the same detail as identified in a. 1) through 4) above. Under no circumstances will a text message, verbal communication or any other informal communication be considered acceptable or satisfactory written notice required by this section.

The Contractor shall not proceed with that work until the Contractor and the Jurisdiction have executed a change order with respect to the Claim. The Contractor shall have no right to submit a Claim for any matter which is exclusively reserved to authority of the Engineer under the Contract Documents.

2. The Jurisdiction shall not be responsible for damages attributable to the performance, nonperformance, or delay, of any other contractor, governmental agency, utility agency, firm, corporation, or individual

authorized to do work on the project, except if such damages result from negligence on the part of the Jurisdiction, its Engineer, or any of its officers or employees.

3. For any Claim, if such written notification is not given, or if after such written notification is given, the Engineer is not allowed facilities for keeping strict account of actual costs as defined for force-account construction, the Contractor thereby agrees to waive the Claim for extra compensation for such work. Such written notice by the Contractor, and the fact the Engineer has kept account of the cost as aforesaid, shall not be construed as establishing the validity of the Claim.
4. The Claim, when filed, shall be in writing and in sufficient detail to permit auditing and an evaluation by the Jurisdiction. The Claim shall be supported by such documentary evidence as the Contractor has available and shall be verified by affidavit of the Contractor or other person having knowledge of the facts.

B. Presentation and Consideration of Claim: If the Contractor wishes an opportunity to present its Claim in person, the Claim shall be accompanied by a written request to do so. Where the Contractor asks an opportunity to present its Claim in person, the Jurisdiction, within thirty (30) calendar days of the filing of the Claim, shall fix a time and place for a meeting between the Contractor and the Jurisdiction or its designated representatives or representative. The Jurisdiction shall, within a reasonable time after the filing of the Claim or the meeting above referred to, whichever is later, rule upon the validity of the Claim and notify the Contractor, in writing, of its ruling together with the reasons therefore. In case the Claim is found to be just, in whole or in part, it shall be allowed and paid to the extent so found.

C. Request for Claim Review: In the event a Contractor's Claim as outlined in the above procedure in Sections 1040 1.10(A) and (B) has been disallowed, in whole or in part, the Contractor may, within thirty (30) calendar days from the date the ruling of the Jurisdiction is mailed, make a written request to the Jurisdiction that its Claim or Claims be submitted to a board of review. The written request shall be either (i) personally delivered, (ii) sent by certified mail, return receipt requested, or (iii) delivered by a nationally recognized prepaid overnight courier service (receipt requested) addressed as follows:

To the Engineer:

City of Des Moines
Engineering Department
400 Robert D. Ray Drive
Des Moines, Iowa 50309-1891
Attention: City Engineer

To the WRA Director:

Des Moines Metropolitan Wastewater Reclamation Authority
3000 Vandalia Road
Des Moines, Iowa 50317
Attention: WRA Director

The Jurisdiction shall decide if the matter is subject to further review and shall, within thirty (30) calendar days of the receipt of the request for review, grant or deny the request for review. The Jurisdiction's decision shall be final. In the event the Contractor fails to make a timely written demand for review of its Claim as provided by this Section 1040 1.10(C), the decision of the Jurisdiction shall be deemed to be final and the Contractor shall have no right to pursue arbitration of its Claim.

D. Board of Review:

1. The Board shall have jurisdiction to pass upon questions involving compensation to the Contractor for work actually performed or materials furnished and upon claims for extra compensation that have not been allowed by the Jurisdiction. The Board's jurisdiction shall not extend to matters exclusively reserved to the Engineer, to a determination of quality of workmanship or materials furnished, or to an interpretation of the intent of the Plans and Specifications except as to matters of compensation. Jurisdiction of the Board shall not extend to setting aside or modifying the terms or requirements of the contract.
2. Following the timely written demand for review of the Claim and the decision of the Jurisdiction to grant the request, a board of review shall be appointed to review the Claim. The board of review shall consist of three (3) members as follows: the WRA Director; the Engineer, or his designated representative; and a third person to be appointed by the WRA Director (hereinafter the "Board").
3. The Board shall set a date for the Contractor to present its Claim for review within sixty (60) days of the date the Jurisdiction issued its decision granting the Contractor's request for review. The presentation before the Board shall not be in accordance with the Iowa rules of civil procedure and the Contractor shall not have the right to conduct discovery or compel the testimony of witnesses as part of the presentation. The Contractor shall submit three (3) copies of a written Claim summary and all documents it considers to be relevant to its Claim at least fourteen (14) days prior to the date set for the presentation before the Board. The presentation before the Board is intended to be an informal process to allow the Contractor to further explain its Claim and why it believes it is entitled to additional compensation. The Board reserves the right to impose such rules as it deems reasonably necessary to allow for a fair and efficient presentation.
4. Following the presentation before the Board, the Board shall render a written decision regarding the Claim within ten (10) days of the presentation. In the event the Board renders a decision in favor of the

Contractor for some or all of the Claim, the Contractor and the Jurisdiction shall promptly proceed in good faith to prepare a change order consistent with the decision of the Board. If the Board denies the Claim, in part or in full, the Contractor's sole and exclusive remedy is to demand binding arbitration of the Claim that has been denied subject to the procedure provided below.

E. Binding Arbitration:

1. For any Claim denied by the Board, the Jurisdiction shall have the sole and exclusive right to determine whether final resolution shall be through Binding Arbitration (the "Arbitration") or litigation. The Contractor shall not have the right to pursue final resolution of any Claim that the Contractor did not submit to the Board. The Contractor must make a written demand for final resolution of the Claim upon the Jurisdiction within thirty (30) days of the date when the Board rendered its decision or it will be deemed to have waived this right and the decision of the Board will be final. The written demand shall be either (i) personally delivered, (ii) sent by certified mail, return receipt requested, or (iii) delivered by a nationally recognized prepaid overnight courier service (receipt requested) addressed as follows:

To the Engineer:

City of Des Moines
Engineering Department
400 Robert D. Ray Drive
Des Moines, IA 50309-1891
Attention: City Engineer

To the WRA Director:

Des Moines Metropolitan Wastewater Reclamation Authority
3000 Vandalia Road
Des Moines, Iowa 50317
Attention: WRA Director

The Jurisdiction shall notify the Contractor within thirty (30) days of the date of receiving the Contractor's written demand for final resolution of the Claim, whether the Jurisdiction will elect to use binding arbitration or litigation to reach a final resolution of the Claim. The decision to pursue binding arbitration or litigation, shall be the sole and exclusive decision of the Jurisdiction. The decision on whether to pursue binding arbitration or litigation is final.

1. Arbitration

- (a) If the Jurisdiction elects to use binding arbitration for final resolution of the Claim the sole and exclusive remedy for resolution of the Claim shall be binding arbitration. The Arbitration shall be submitted to a single arbitrator as is mutually agreed upon by the

Contractor and Jurisdiction. If the Contractor and Jurisdiction cannot agree upon a single arbitrator within twenty-one (21) days of the date of the Contractor's demand for Arbitration, the Arbitration shall be submitted to a three (3) member panel appointed as follows: the Contractor shall appoint one arbitrator; the Jurisdiction shall appoint one arbitrator; and the third arbitrator shall be chosen by the first two appointed arbitrators (for the sake of convenience, the arbitrator, or arbitrators as the case may be, shall be referred to hereinafter as the "Arbitrator"). The parties agree to work toward appointment of a three (3) member Arbitration panel within twenty-one (21) days after not being able to agree on a single arbitrator. The Arbitration shall be conducted in general accord with the Construction Industry Arbitration Rules of the American Arbitration Association then in effect. The parties reserve the right to alter and amend the rules for the Arbitration as they may mutually agree in writing.

- (b) The Arbitrator shall have jurisdiction to pass upon questions involving compensation to the Contractor for work actually performed or materials furnished and upon claims for extra compensation that have not been allowed by the Jurisdiction. The Arbitrator's jurisdiction shall not extend to matters exclusively reserved to the Engineer, to a determination of quality of workmanship or materials furnished, or to an interpretation of the intent of the Plans and Specifications, except as to matters of compensation. Jurisdiction of the Arbitrator shall not extend to setting aside or modifying the terms or requirements of the contract.
 - (c) Subject to agreement of the parties and the Arbitrator, the parties shall work in good faith to schedule the Arbitration and allow for the decision of the Arbitrator within two hundred forty (240) days after appointment of the Arbitrator.
 - (d). The Arbitrator shall render a written decision within twenty (20) days after the Claim has been fully submitted. For Arbitrations before more than one arbitrator, the decision of a majority of the panel shall govern. The Arbitrator's decision shall provide a basis for the findings and legal conclusions and shall determine how the cost of the proceedings shall be borne by the parties.
 - (e). The decision of the Arbitrator shall be binding and final. There shall be no further appeal or judicial review, except under the limited circumstances as allowed by Iowa law.
2. Litigation. If the Jurisdiction elects not to use arbitration as the means to reach final resolution of the claim, then the sole and exclusive remedy for final resolution of the Claim shall be litigation which must be brought in Iowa District Court in and for the County where the Jurisdiction is located or in the United States District Court in and for the District where the Jurisdiction is located.

SECTION 1050 – CONTROL OF WORK

1050, 1.01 AUTHORITY OF THE ENGINEER: Delete A., B., and C. in their entirety and replace with the following A., B., and C., and add the following new E regarding survey, inspection, and testing:

- A. The work included in the contract is to be done under the direct supervision and to the complete satisfaction of the Engineer, and the decision of the Engineer as to the true construction and meaning of the Contract Documents, plans, specifications, estimates, and as to all questions arising as to proper performance of the work, shall be final.
- B. The Engineer shall determine the unit quantities and the classification of all work done and materials furnished under the provisions of the Contract Documents, and the Engineer's determination thereof shall be final.
- C. The Engineer shall decide any and all questions which may arise as to the quality or acceptability of materials furnished and work performed, as to the rate of progress of the work, including cleanup and restoration, as to acceptable fulfillment and performance of the contract on the part of the Contractor, and as to compensation. The decision of the Engineer in such matters shall be final.

(Note: Subsection D. of 1050, 1.01 shall remain as-is without any revision)

- E. The Jurisdiction will provide construction staking, on-site inspection, and materials, compaction, and other field testing unless otherwise indicated on the plans or stated in the special provision.

SECTION 1070 – LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

1070, 1.12, DISPUTE RESOLUTION AND CONSENT TO JURISDICTION OF IOWA DISTRICT COURT OR FEDERAL DISTRICT COURT IN IOWA: Delete 1.12 in its entirety and also delete in its entirety the revision made to 1070, 1.12 under the City of Des Moines General Supplemental Specifications and replace with the following new 1.12:

1070, 1.12 DISPUTE RESOLUTION AND CONSENT TO JURISDICTION OF IOWA DISTRICT COURT OR FEDERAL DISTRICT COURT IN IOWA

- A. The Contractor agrees any claims, disputes, causes of action that accrue to it, or which by subrogation or assignment accrue to its sureties or insurers, arising out of or connected with this contract, and that the Jurisdiction has determined in writing is not subject to Section 1040, 1.10, shall be resolved by arbitration or litigation as elected by the Jurisdiction. As to any such causes of action, Contractor shall provide written notice to Jurisdiction requesting that Jurisdiction make its election as to whether the dispute shall be settled by arbitration or litigation. The written notice shall be either (i) personally delivered, (ii) sent by certified mail, return receipt requested, or (iii) delivered by a nationally recognized prepaid overnight courier service (receipt requested) addressed as follows:

City of Des Moines
Engineering Department
400 Robert D. Ray Drive
Des Moines, IA 50309-1891
Attention: City Engineer

Des Moines Metropolitan Wastewater Reclamation Authority
3000 Vandalia Road
Des Moines, Iowa 50317
Attention: WRA Director

Jurisdiction shall notify Contractor in writing as to its election within thirty (30) days of receipt of Contractor's written notice requesting a determination by Jurisdiction.

1. Arbitration

- (a) If the Jurisdiction elects to use binding arbitration for final resolution, the sole and exclusive remedy for final resolution of the dispute shall be binding arbitration (the "Arbitration"). The Arbitration shall be submitted to a single arbitrator as is mutually agreed upon by the Contractor and Jurisdiction. If the Contractor and Jurisdiction cannot agree upon a single arbitrator within twenty-one (21) days of the date of the Jurisdiction's notification to the Contractor of the Jurisdiction's decision to pursue binding arbitration, the Arbitration shall be submitted to a three (3) member panel appointed as follows: the Contractor shall appoint one arbitrator; the Jurisdiction shall appoint one arbitrator; and the third arbitrator shall be chosen by the first two appointed arbitrators (for the sake of convenience, the arbitrator, or arbitrators as the case may be, shall be referred to hereinafter as the "Arbitrator"). The parties agree to work toward appointment of a three (3) member Arbitration panel within twenty-one (21) days after not being able to agree on a single arbitrator. The Arbitration shall be conducted in general accord with the Construction Industry Arbitration Rules of the American Arbitration Association then in effect. The parties reserve the right to alter and amend the rules for the Arbitration as they may mutually agree in writing.
- (b) Jurisdiction of the Arbitrator shall not extend to setting aside or modifying the terms or requirements of the contract.
- (c) Subject to agreement of the parties and the Arbitrator, the parties shall work in good faith to schedule the Arbitration and allow for the decision of the Arbitrator within two hundred forty (240) days after appointment of the Arbitrator.
- (d) The Arbitrator shall render a written decision within twenty (20) days after the matter has been fully submitted. For Arbitrations before more than one arbitrator, the decision of a majority of the panel shall govern. The Arbitrator's decision shall provide a basis for the findings and legal conclusions and shall determine how the cost of the proceedings shall be borne by the parties.

(e) The decision of the Arbitrator shall be binding and final. There shall be no further appeal or judicial review, except under the limited circumstances as allowed by Iowa law.

2. Litigation. If the Jurisdiction elects not to use arbitration as the means to reach final resolution of the claim or fails to notify Contractor in writing within thirty (30) days of its election, then the sole and exclusive remedy for final resolution of the Claim shall be litigation which must be brought in Iowa District Court in and for the County where the Jurisdiction is located or in the United States District Court in and for the District where the Jurisdiction is located.

B. Contractor further consents that it will require its subrogees and assigns to enter into an agreement to comply with the terms of Section, 1.12, and consent to the jurisdiction of either the Iowa District Court in and for the County where the Jurisdiction is located or the United States District Court in and for the District where the Jurisdiction is located, as to any causes of action brought against it arising out of this contract or any work performed under it by Contractor or its subcontractors, and further agrees, on behalf of itself, its subrogees and assigns, to waive any and all objections to the jurisdiction of said court as to any such cause of action. Contractor shall make such consent a condition of the retention of subrogees and assigns.

1070, 2.03 WORK AREA: Add the following new C. regarding encroachment beyond the construction limits:

C. Encroachment Beyond the Construction Limits:

1. The Contractor may negotiate with individual property owners for approval to use areas beyond the designated construction limits as shown in the Contract Documents. Any such negotiated agreement with individual property owners shall be in writing and designate the rate of payment and the basis of calculating the area on which payment shall be made. A copy of any written agreement shall be submitted to the Jurisdiction.
2. Prior to final acceptance the Jurisdiction will contact each property owner for which there is a written agreement. The Jurisdiction may, at its discretion, delay final acceptance of the project until all property owners with a written agreement indicate to the Jurisdiction that the Contractor has satisfied the terms and conditions of the agreement.
3. If the Contractor's activities extend beyond the designated construction limits and there is no written agreement, such activities shall be considered an encroachment. In the event of an encroachment, the Jurisdiction will notify the Contractor to reach agreement with the affected property owner regarding damages or compensation as the result of the encroachment. The Contractor will be provided a reasonable time to reach agreement.
4. In the event the Contractor is unable, or unwilling, to reach agreement with a property owner on which an encroachment by the Contractor occurred, the Jurisdiction will negotiate a settlement of compensation relating to the

encroachment including compensation for additional temporary easement, crop damages and other appropriate compensation. The Jurisdiction will make its best efforts to limit the payment for encroachment to a rate no greater than the original easement compensation rate.

5. In the event the Jurisdiction is required to compensate a property owner for an encroachment by the Contractor, the amount paid by the Jurisdiction to a property owner for resolution of an encroachment shall be deducted from the compensation due the Contractor.
6. The Jurisdiction will make available information on the rate of easement compensation for each property owner. Such information will be made available upon request during the bidding phase and during the construction phase of the project.

1070, 3.02 INSURANCE REQUIREMENTS: Add the following at the end of A:

For purposes under 1070, 3.02 - 3.09 inclusive only, “Jurisdiction” shall be defined as “Des Moines Metropolitan Wastewater Reclamation Authority and the City of Des Moines”, and all references to “Jurisdiction” shall be replaced with “Des Moines Metropolitan Wastewater Reclamation Authority and the City of Des Moines”.

SECTION 3010 – TRENCH AND BACKFILL

3010, 1.08 MEASUREMENT FOR PAYMENT, B. ROCK EXCAVATION: Delete in its entirety.

3010, 1.08 MEASUREMENT FOR PAYMENT, C. TRENCH FOUNDATION: Add new subsections 3010, 1.08 (C)(4)(a) and (b) as follows:

4. Stabilizing material over-excavation and trench bottom stabilization:
 - a. Stabilizing material will be authorized only if the Contractor provides a dewatering operation in accordance with the requirements of Section 3010 3.05. Stabilizing material will not be authorized when only localized dewatering is used at the location of the pipe laying unless prior to such dewatering it is approved in writing by the Engineer.
 - b. No adjustment of unit price for stabilizing material will be negotiated regardless of quantity of stabilizing material used on the project.

3010, 2.01 MATERIALS EXCAVATED FROM A TRENCH, A. Standard Trench Excavation: Delete in its entirety and replace with the following:

- A. Standard Trench Excavation:** All materials excavated during trench excavation, except over-excavation.

3010, 2.01 MATERIALS EXCAVATED FROM A TRENCH, B. Rock Excavation: Delete B. Rock Excavation in its entirety.