A pre-letting conference will be held at 1:00 p.m., July 25, 2022, at the Wastewater Reclamation Facility, 3000 Vandalia Road, Des Moines, Iowa.

PUBLIC IMPROVEMENTS
CONTRACT DOCUMENTS

WRF DIGESTER REPAIRS AND IMPROVEMENTS

ACTIVITY ID
042022020

PLAN FILE NO.
643-115/127

WRA APPROVAL

APPROVAL DATE
August 16, 2022

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 WR074
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
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 042022020
Project Name WRF Digester Repairs and Improvements
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:

<table>
<thead>
<tr>
<th>ITEM NO.</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Reciprocal Resident Bidder and Labor Force</td>
</tr>
<tr>
<td>2.</td>
<td>General</td>
</tr>
</tbody>
</table>

- 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 has 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 August 2, 2022, 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 August 2, 2022, 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 August 16, 2022. 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 June 21, 2022, 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 Digester Repairs and Improvements, 042022020

The improvement includes hydro-demolition and replacement of a portion of the concrete lid for anaerobic digester No. 3, pre-cast concrete panel and joint repairs and cleaning to the exterior of anaerobic digesters No. 1-6, concrete crack repairs to the lid of anaerobic digesters No. 2-6, installation of new water level sensors and associated work for anaerobic digesters No. 2-6, and all other associated work and incidental items; all in accordance with the contract documents, including Plan File No. 643-115/127, located at the Wastewater Reclamation Facility, 3000 Vandalia Road, Des Moines, Iowa.

This project shall be fully completed not later than July 31, 2023.

Engineer's Construction Estimate. $1,410,000.00

Preletting Conference. A pre-letting conference will be held at 1:00 p.m., July 25, 2022, at the Wastewater Reclamation Facility, 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 August 16, 2022, at 1:30 p.m., in the Des Moines Metropolitan Wastewater Reclamation Facility, 3000 Vandalia Road, Des Moines, Iowa. Please check the posted agenda in advance of the August 16, 2022 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 Digester Repairs and Improvements, 042022020

The improvement includes hydro-demolition and replacement of a portion of the concrete lid for anaerobic digester No. 3, pre-cast concrete panel and joint repairs and cleaning to the exterior of anaerobic digesters No. 1-6, concrete crack repairs to the lid of anaerobic digesters No. 2-6, installation of new water level sensors and associated work for anaerobic digesters No. 2-6, and all other associated work and incidental items; all in accordance with the contract documents, including Plan File No. 643-115/127, located at the Wastewater Reclamation Facility, 3000 Vandalia Road, Des Moines, Iowa

Published in the Des Moines Register
July 27, 2022
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 Digester Repairs and Improvements, 042022020

The improvement includes hydro-demolition and replacement of a portion of the concrete lid for anaerobic digester No. 3, pre-cast concrete panel and joint repairs and cleaning to the exterior of anaerobic digesters No. 1-6, concrete crack repairs to the lid of anaerobic digesters No. 2-6, installation of new water level sensors and associated work for anaerobic digesters No. 2-6, and all other associated work and incidental items; all in accordance with the contract documents, including Plan File No. 643-115/127, 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 July 31, 2023; 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, conpired, 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:

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<td>Reciprocal Resident Bidder and Labor Force</td>
</tr>
<tr>
<td>2.</td>
<td>General</td>
</tr>
</tbody>
</table>
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

By

Bidder

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.
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-altamtes 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-altamtes shall be used for determining the sufficiency of the bid security.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>UNITS</th>
<th>QUANTITY</th>
<th>UNIT PRICE</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Digester Number Three Lid Repair, Complete as Specified and Described in Contract Documents</td>
<td>LS</td>
<td>1</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Precast Concrete Connection Repair, Complete as Specified and Described in Contract Documents</td>
<td>EA</td>
<td>60</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Concrete Crack Repair, Complete as Specified and Described in Contract Documents</td>
<td>LF</td>
<td>1500</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>All Remaining Work Not Included in Items 1-3, Complete as Specified and Described in Contract Documents</td>
<td>LS</td>
<td>1</td>
<td>$</td>
<td></td>
</tr>
</tbody>
</table>

TOTAL CONSTRUCTION COST $ 

NOTE: It is understood that the above quantities are estimated for the purpose of this bid. All quantities are subject to revision by the City. 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: WRF Digester Repairs and Improvements
Activity ID 042022020

RETURN WITH BID
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> 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/>.
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 Digester Repairs and Improvements, 042022020

The improvement includes hydro-demolition and replacement of a portion of the concrete lid for anaerobic
digester No. 3, pre-cast concrete panel and joint repairs and cleaning to the exterior of anaerobic digesters
No. 1-6, concrete crack repairs to the lid of anaerobic digesters No. 2-6, installation of new water level
sensors and associated work for anaerobic digesters No. 2-6, and all other associated work and incidental
items; all in accordance with the contract documents, including Plan File No. 643-115/127, 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.

DSM Urban 04/20/1998
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________

SURETY:

______________________________
Surety Company

By ______________________________
Signature Attorney-in-Fact/Officer

______________________________
Name of Attorney-in-Fact/Officer

______________________________
Company Name

______________________________
Company Address

______________________________
City, State  Zip Code

______________________________
Company Telephone Number

PRINCIPAL:

______________________________
Bidder

By ______________________________
Signature

______________________________
Name

______________________________
Title

______________________________
Address

______________________________
City, State  Zip Code

______________________________
Telephone Number

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  8/16/2022

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 Digester Repairs and Improvements, 042022020

The improvement includes hydro-demolition and replacement of a portion of the concrete lid for anaerobic digester No. 3, pre-cast concrete panel and joint repairs and cleaning to the exterior of anaerobic digesters No. 1-6, concrete crack repairs to the lid of anaerobic digesters No. 2-6, installation of new water level sensors and associated work for anaerobic digesters No. 2-6, and all other associated work and incidental items; all in accordance with the contract documents, including Plan File No. 643-115/127, 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 July 31, 2023; and to pay liquidated damages for noncompliance with completion provision 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.

JURISDICTION:

By __________________________________________
Sara Kurovski, WRA Board Chair

(Seal)
ATTEST:

Chelsea Huisman, Board Secretary

CONTRACTOR:

By __________________________________________
Contractor

________________________________________
Signature

________________________________________
Title

________________________________________
Street Address

City, State - Zip Code

/ ____________________________
Telephone Number / Email Address

FORM APPROVED BY:

Kathleen Vanderpool, Deputy City Attorney

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 __________________________
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> 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.
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.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>UNITS</th>
<th>QUANTITY</th>
<th>PRICE</th>
<th>AMOUNT</th>
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<tr>
<td>1</td>
<td>Digester Number Three Lid Repair, Complete as Specified and Described in Contract Documents</td>
<td>LS</td>
<td>1</td>
<td>$</td>
<td></td>
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<tr>
<td>2</td>
<td>Precast Concrete Connection Repair, Complete as Specified and Described in Contract Documents</td>
<td>EA</td>
<td>60</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Concrete Crack Repair, Complete as Specified and Described in Contract Documents</td>
<td>LF</td>
<td>1500</td>
<td>$</td>
<td></td>
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<tr>
<td>4</td>
<td>All Remaining Work Not Included in Items 1-3, Complete as Specified and Described in Contract Documents</td>
<td>LS</td>
<td>1</td>
<td>$</td>
<td></td>
</tr>
</tbody>
</table>

TOTAL CONSTRUCTION COST $__

NOTE: It is understood that the above quantities are estimated for the purpose of this bid. All quantities are subject to revision by the City. Quantity changes which amount to twenty (20) percent or less of the total bid shall not affect the unit bid price of that item.
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 Digester Repairs and Improvements, 042022020

The improvement includes hydro-demolition and replacement of a portion of the concrete lid for anaerobic digester No. 3, pre-cast concrete panel and joint repairs and cleaning to the exterior of anaerobic digesters No. 1-6, concrete crack repairs to the lid of anaerobic digesters No. 2-6, installation of new water level sensors and associated work for anaerobic digesters No. 2-6, and all other associated work and incidental items; all in accordance with the contract documents, including Plan File No. 643-115/127, 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________

<table>
<thead>
<tr>
<th>PRINCIPAL:</th>
<th>SURETY:</th>
</tr>
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<tbody>
<tr>
<td>________________</td>
<td>Surety Company</td>
</tr>
<tr>
<td>Contractor</td>
<td>By</td>
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<tr>
<td>By</td>
<td>Signature Attorney-in-Fact/Officer</td>
</tr>
<tr>
<td>Signature</td>
<td>Name of Attorney-in-Fact/Officer</td>
</tr>
<tr>
<td>________________</td>
<td>Company Name</td>
</tr>
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<td>Company Address</td>
</tr>
<tr>
<td>FORM APPROVED BY:</td>
<td>City, State Zip Code</td>
</tr>
<tr>
<td>________________</td>
<td>Company Telephone Number</td>
</tr>
</tbody>
</table>

Kathleen Vanderpool
Deputy City Attorney

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 DIGESTER REPAIRS AND IMPROVEMENTS  
ACTIVITY ID 04-2021-020

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, August 12, 2022. 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, August 16, 2022. 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, August 12, 2022; 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.
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).
<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>1</td>
<td>Construction Documents Project Manual</td>
</tr>
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Des Moines-IA Metro WRA

WRF Digester Repairs and Improvements

Construction Documents
Project Manual

Issued for Bid

05/27/2022

HDR Project No. 10229519
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40 72 00 - LEVEL INSTRUMENTATION
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I hereby certify that the portion of the Specifications described below was prepared by me or under my direct supervision and that I am a duly registered Professional Engineer under the laws of the State of Iowa.

Brian Hoagland, E-23618  
05/27/2022

Pages or Specifications divisions or sections covered by this seal:

Divisions: 01, 02, 03, 05, 07

I hereby certify that the portion of the Specifications described below was prepared by me or under my direct supervision and that I am a duly registered Professional Engineer under the laws of the State of Iowa.

Adam A. Smith, E-26134  
05/27/2022

Pages or Specifications divisions or sections covered by this seal:

Sections: 40 05 23, 40 05 63

I hereby certify that the portion of the Specifications described below was prepared by me or under my direct supervision and that I am a duly registered Professional Engineer under the laws of the State of Iowa.

Kevin K. Thernes, E-15212  
05/27/2022

Pages or Specifications divisions or sections covered by this seal:

Divisions: 26, 40 (Except Sections 40 05 23 & 40 05 63)

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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 Anerobic Digester Number 03 Concrete Lid Repair:** 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 Anerobic Digester Number 03 Concrete Lid Repair and watertightness testing, excluding the unit price bid items listed on the Bid Form. This work includes all work noted on Sheets 85U101, 85U102, and 85U501 and their referenced and related specifications.

2. **Item 2, Unit Price for Precast Concrete Connection Surface Repair:** Unit Price Bid for a base bid quantity of precast concrete connection surface repair in existing concrete of 60 EACH. This bid item is for precast concrete repairs identified in Detail 7/85U502 and is applicable to all 6 digesters. Payment for this item shall be made on the basis of the actual repairs of precast concrete connection surface repairs 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 number of repairs of precast concrete connection surface repairs 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 300 linear feet per digester applicable to Anaerobic Digesters No. 2 through 6 for a total of 1500 linear feet. This bid item is for concrete crack repairs identified on Sheets 00C101 and 85U502 and in specification section 03 64 23, 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 for the entire project as a whole. 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. **Item 4, Base Bid Price for remaining work for the Des Moines Wastewater Reclamation Facility Digester Complex Repairs and Renovations:** 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 Digester Complex Repairs and Renovations project, excluding the other lump sum and unit price bid items listed on the bid form. All work not included in other bid items explicitly shall be included in this item.

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

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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: with copy to:
```
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:

e. "Logs for 13 Borings", Terracon Project No. 08085036-02, (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.
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 July 1992 entitled ‘Des Moines ICA Plans for Phase 1 Regional Wastewater Treatment Plant, Des Moines, Iowa, Segment 5, Intermediate Treatment and Anaerobic Digestion Facilities.’
   b. Record Drawings to Construction Records Drawings dated October 2014 entitled ‘City of Des Moines Iowa, Des Moines Metropolitan Wastewater Reclamation Authority WRF Digester Improvements.’
   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, expediters, 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 be 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 giving 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. 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
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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. Anaerobic Digester No. 3 Structural Lid Repairs:
      a. Hydro-demolition and replacement of edge of concrete lid and associated accessories such as water stops, joint material, and joint sealant.
      b. Removal and re-installation of existing railing around perimeter of lid.
      c. Watertightness testing as described in Specification Section 01 45 25.
   2. Digester Complex Exterior Repairs:
      a. Cleaning of exterior precast concrete of all six digesters.
      b. Repair of precast concrete connection damage on all six digesters.
      c. Replacement of precast concrete joint sealant on all six digesters.
      d. Concrete cover crack injection on Anaerobic Digesters Nos. 2 through 6.
   3. Digester Complex Level Instrumentation Installation:
      a. Installation of new level instrumentation at the central dome of Anerobic Digesters Nos. 2 through 6.
      b. Connection of these instruments to electrical and controls panels in adjacent digester control buildings.

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 complete by 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 closures and/or detours.

2. WRF Flood Improvements:
   a. This project is currently under construction and anticipated to be complete by Spring 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 closures and/or detours.

3. WRF Phosphorus Recovery Facility:
   a. This project is currently in design and construction is tentatively scheduled to begin in 2023 and be complete in 2025.
   b. This project includes construction of a new concrete structure north of Building 70, two new buildings east of the existing Maintenance Building 92, new internal plant East-West roadway south of Electrical Switchgear and Generator Facility Building 73 and immediately adjacent to the digester complex, and site utility work immediately adjacent to the digester complex. It may require coordination of road/site access and cause temporary lane closures and/or detours.

4. WRF Site Entrance and Security Improvements:
   a. This project is currently in design and construction is tentatively scheduled to begin in 2023 and be complete in 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 closures and/or detours.

5. WRF Effluent Pump Station:
   a. This project is currently in design and construction is tentatively scheduled to begin in 2023 and complete in 2025.
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. WRF Blended Sludge Mixer and Electrical Room Expansion Project:
   a. This project is currently in design and construction is tentatively scheduled to begin in late 2022 and complete in early 2024.
   b. This project includes new equipment for the blended sludge and hauled waste tanks south of Building 70, electrical room and HVAC improvements in Building 75 and may require coordination of road/site access to/from the digester complex, and cause temporary lane closures and/or detours.

7. City of Des Moines Levee Improvements Project:
   a. This project is currently in design and construction is tentatively scheduled to begin in 2023 or 2024 and complete in 2026.
   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.

8. 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, and cause temporary road closures and/or detours, and temporary utility shutdowns.

9. WRF Clarifier Improvements Phase 1:
   a. This project is currently under construction and anticipated to be complete by Fall 2023.
   b. This project includes replacement of all primary clarifier mechanisms south of Building 05. The Clarifier Project Contractor will require access around the primary clarifiers. This project also includes improvements to Buildings 20, 21, 26, 27, and 28 which may require coordination of road/site access and cause temporary road closure and/or detours.

10. 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.
      2. Owner will fill digester No. 3 with water at the completion of the repair work associated with digester No. 3 to test watertightness of repairs.
      3. Owner will take digesters No’s. 2, 4, 5, and 6 out of active gas production for a limited duration for contractor to install new instruments on cover. Digester will not be drained, cleaned, or otherwise emptied. Digester will still be actively producing methane when out of active gas production. Owner will remove gas to equalize pressure to allow for existing cover plate to be removed and new plate installed.

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
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.
   a. Unless defined elsewhere in the Contract Documents, regular working hours are Monday through Friday, 7:00AM to 3:30PM.
   b. Requests for additional working hours will be considered on a case-by-case basis by the Owner. All requests for additional working hours must be submitted in writing to the Owner for review and approval at least 72 HRS before additional working hours are intended to begin.

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.
   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 72 HRS in advance of each shutdown.

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. Operational Access: Owner’s personnel shall have access to equipment and areas of the facility that remain in operation.
   2. 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.
   3. 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.
   4. 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.
5. Owner will assist Contractor in dewatering process tanks, basins, conduits, and other work areas to be dewatered for shutdowns. Maintain clean, dry work area by pumping and properly disposing of fluid and other material that accumulates in work areas.

6. 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. 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 digester 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 five Primary Digesters numbered 2 through 6 and one Secondary Digester numbered 1. Each set of digesters includes a common control building built integrally with digesters 1 and 2, 3 and 4, and 5 and 6 respectively. Digester No. 3 is currently out of service due to damage to the cover seal that is to be repaired as a part of this project. Because of this outage no more than one additional primary digester may be taken out of service at a time. Digesters No. 2, 4, 5, and 6 will need to be taken out of service to install cover plate and instruments on digester cover dome. Remainder of work on top of the cover will need to be completed while the digesters are in service.
      a. Contractor’s work to install instruments and cover plate shall last no longer than 8 hours consecutively. Contractor shall complete submittals and equipment procurement prior to requesting digester to be taken out of service.
      b. Contractor shall give Owner minimum of 7 day notice of anticipated digester work so Owner can isolate and vent the digester.
      c. Owner will take up to 3 days to shut down and vent digester gas. Sludge will not be drained.
      d. No more than one digester may be taken out of service within the same week.
2. Digester No. 3 is currently out of service and will not be placed back into service until the work identified in this contract is completed and substantial completion is achieved on that portion of the work.
3. It is not anticipated that digester No. 1 will need to be taken out of service at all during this project.

1.7 SHUTDOWNS
A. 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.

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:
   1. Diversion of flows around treatment processes is not allowed.

D. Requirements for temporary pumping associated with specific shutdowns are indicated in this Specifications Section.

E. Performing the Work of this section constitutes Contractor’s approval of underlying work and field conditions prevailing at the time of the Work.

F. Utility/Service Shutdowns:
   1. Contractor shall coordinate in advance with WRA when any construction activities will require shut down of wastewater flows, electrical, communications, water, natural gas, or other utilities or services. Contractor shall provide notice to WRA of planned shutdown ten (10) days prior to work and shall confirm the time of the shutdown three (3) days prior to work.
   2. If a wet weather event or situation occurs resulting in high flow rates at the treatment plant, the WRA may direct the Contractor to delay or stop work that could adversely impact treatment plant operations until conditions at the treatment plant are acceptable work to proceed.
   3. Contractor shall limit the downtime of WRA utilities, operations, and industrial processes.

G. Prior to starting work on site, all Contractor and any Sub-contractor employees working on site at WRF must complete WRF site orientation training (approximately 30-minute session). The contractor shall coordinate with WRA staff to schedule the training.

3.3 PREPARATION

A. Coordinate preparations for removals with requirements of Specification Section 01 73 29 - Cutting and Patching and Specification Section 02 41 00 - Demolition, 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
### Table 01 14 16-A
#### Schedule of Tie-Ins

<table>
<thead>
<tr>
<th>Tie-In No.</th>
<th>New Line Size and Service</th>
<th>Existing (Connecting) Line Size &amp; Service</th>
<th>Tie-In Building/Location</th>
<th>Construction Stage</th>
<th>Remarks</th>
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### Table 01 14 16-B
Schedule of Shutdowns

<table>
<thead>
<tr>
<th>Shutdown No.</th>
<th>Process Equipment and Service Lines Out-of-Service During Shutdown</th>
<th>Process Equipment In Operation During Shutdown</th>
<th>Tie-In Nos.</th>
<th>Maximum Duration</th>
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### 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).
## EXHIBIT A  
**Substitution Request Form**

(One Item per each Form)

<table>
<thead>
<tr>
<th>Project:</th>
<th>Date:</th>
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<tr>
<th>Substitution Requestor:</th>
<th>Contractor:</th>
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<tr>
<th>Specification Section No:</th>
<th>Paragraph No. (i.e. 2.1.A.1.c):</th>
<th>Specified Item:</th>
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<tr>
<th>Proposed Substitution:</th>
<th>Provide Product Data Sheets, Manufacturer’s written installation instructions, drawings, diagrams, or any other information as an attached to this Form that will demonstrate the proposed substitution is an Approved Equal.</th>
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State differences between proposed substitutions and specified item. Differences include but are not limited to interrelationship with other items; materials, equipment, function, utility, life cycle costs, applied finished, appearances, and quality.

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Document how the proposed substitution is compatible with or modifies other systems, parts, equipment or components of the Project and Work under the Contract

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Describe what effect the proposed substitution has on dimensions indicated on the Drawings and previously reviewed Shop Drawings?

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Describe what effect the proposed substitution has on the Construction Schedule and Contract Time.

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Describe what effect the proposed substitution has on the Contract Price. This includes all direct, indirect, impact and delay costs.

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Manufacturer’s guarantees of the proposed and specified items are:

- ☐ Same
- ☐ Different (explain on attachment)

The undersigned state that the function, utility, life cycle costs, applied finishes, appearance and quality of the proposed substitution are equal or superior to those of the specified item.

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<th>For use by Engineer:</th>
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<td>Accepted – eligible for approval via Change Order</td>
<td>Accepted as Noted – approval via Change Order</td>
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<td>(Contractor’s Firm)</td>
<td>(Firms Address)</td>
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<td>Signature of PE, RA, or PG in Responsible Charge</td>
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Comments:

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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. RFI s are intended to provide clarifications and interpretations of the Contract Documents and maintain progress of Work.
D. RFI s 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 RFIs 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 proceeded 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. Bid Item No. 1 – Digester No. 3 Concrete Lid Repair.
      b. Bid Item No. 2 – Unit Price for Concrete Connection Surface Repair.
      c. Bid Item No. 3 – Unit Price for Concrete Crack Repair by Injection.
3. Organization in Accordance with Specification Sections:
   a. Within each work area, organize the Schedule of Values by the various Specifications sections 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.
4. Include “Site Overhead” and Administrative Cost Elements as defined in this specification section in Bid Items No. 1 and No. 4 proportionally to amount of work attributable to that Bid Item.

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 delivering supplies and materials.
   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) Invoices, 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. Temporary sanitary facilities.
      c. Project signs.
      d. Drawings and Contract Documents for Contractor use.
      e. Project photographic documentation.
      f. Special considerations related to adjacent properties and facilities.
      g. 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.

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.

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.

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 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.
      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.

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 or Owner shall preside at the progress meetings, compile minutes of each progress meeting, and furnish electronic copies to the Contractor and Owner or Engineer.

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:
   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.


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.
   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.

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. Time Impact Analyses: Submit in accordance with this Section.

7. 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.

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
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.
   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.

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.
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:

<table>
<thead>
<tr>
<th>Submittal Section</th>
<th>Submittal Description</th>
<th>Planned Submittal Date</th>
<th>Submittal Needed Date</th>
<th>Actual Submittal Date</th>
<th>Actual Return Date</th>
<th>Disposition</th>
</tr>
</thead>
</table>

### 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 07 92 00 - Joint Sealants, would be as follows:
      1) “07 92 00-02 - Joint Sealant Product Data.”
   b. Second (first resubmittal) review cycle of the third Submittal furnished under Specification Section 07 92 00 - Joint Sealants, would be as follows:
      1) “07 92 00-02A - Resubmittal of Joint Sealant Product Data.”
   c. Third (second resubmittal) review cycle of the third Submittal furnished under Specification Section 07 92 00 - Joint Sealants, would be as follows:
      1) “07 92 00-02B - Resubmittal 2 of Joint Sealant Product Data.”

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 ShopDrawing 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 remediying 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 or 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 approachable 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. ________-____**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Submittal No.</th>
<th>Description</th>
<th>Manufacturer</th>
<th>Supplier Dwg or Data No.</th>
<th>Engineer’s Disposition (Action Code) *</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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</table>

**Contractor’s Remarks (insert text):**

**Engineer’s Remarks (insert text):**

* **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 **not** 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:**

<table>
<thead>
<tr>
<th>Distribution</th>
<th>Date of Engineer’s Review</th>
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<tbody>
<tr>
<td>Contractor</td>
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<td>File</td>
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<td>Field</td>
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<td>Owner</td>
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<td>Other</td>
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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, rocked 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 rocked 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
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 25
TESTING CONCRETE STRUCTURES FOR WATERTIGHTNESS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Requirements for furnishing all labor, materials, tools, equipment, and services, for all testing of concrete structures for watertightness, in accord with provisions of the Contract Documents.
   2. Completely coordinate with work of all other trades.
   3. 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 and complete leak test.
   5. Gas Pressure Testing.

B. Related Sections include but are not necessarily limited to:
   1. Section 03 35 00 - Concrete Finishing and Repair of Surface Defects.

C. Payment:
   1. Contractor to pay all costs required for testing, retesting, patching, repair and work required to provide access for repair as required to meet watertightness requirements specified or indicated. Owner will provide water for test and fill tank.

1.2 QUALITY ASSURANCE

A. Reference Standards:
   1. American Concrete Institute (ACI):
   2. NSF International (NSF).
   3. Underwriters Laboratories, Inc. (UL).
   4. United States Department of Agriculture (USDA).
   5. Water Quality Association (WQA).

1.3 SUBMITTALS

A. Shop Drawings:
   1. Watertightness testing plan:
      a. Plan shall include:
         1) Schedule for testing.
         2) Description of testing apparatus for measuring water level in structure and evaporation pan.
            a) Include Drawings (Plans, Sections, and details), sketch, or photos as appropriate to fully describe apparatus.
         3) Location plan showing measurement location and evaporation pan location.
         4) Procedures for isolation of tank or compartments to assure a constant volume during testing.
         5) Narrative describing testing procedure.
         6) Calculations showing:
            a) Total structure volume at water elevation for commencement of test period.
            b) Maximum water leakage allowed.
            c) Test period: See ACI 350.1.
         7) Plan shall be in accordance with ACI 350.1, Chapters 1 and 2.
2. If structure has running water leaks or otherwise fails watertightness test, submit repair and patching plan. Include with plan:
   a. Location and areas of leaks.
   b. Repair material and procedures proposed for repair.
   c. Photographs of all visible leaks and damp areas.
      1) Include distant photos and close-ups to document conditions.

B. Informational Submittals:
   1. Results of watertightness testing indicating the following:
      a. Level of water in structure and in evaporation pan and water temperature at commencement of test period.
      b. Level of water in structure and in evaporation pan and water temperature at end of test period.
      c. Net leakage in percent of total volume during test period (gross leakage minus that due to evaporation).
      d. Results of retesting required due to leakage exceeding specified percentages allowed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. Non-shrink grout: See Section 03 31 30 - Concrete, Materials and Proportioning.
   2. Epoxy grout: See Section 03 31 30 - Concrete, Materials and Proportioning.
   3. Instant setting waterstop:
      a. Sikaset Plug by Sika Corporation.
      b. Sikafix HH LV by Sika Corporation.
      c. MasterSeal 590 by BASF.
   4. Injectable polyurethane sealant, see specification section 03 64 23.
   5. Epoxy adhesive:
      a. Sikadur-35 Hi-Mod LV by Sika Corporation.

2.2 MATERIALS

A. Water for Testing:
   1. See ACI 350.1.
   2. Wastewater plant: Owner will provide water for testing.

PART 3 - EXECUTION

3.1 PREPARATION BEFORE TESTING

A. General:
   1. Verify the specified 28-day concrete strength has been achieved prior to testing.
   2. Contractor to furnish all necessary materials (such as gaskets and flange cover plates).
   3. Testing to be performed after completion of concrete repairs to Digester No. 3.
   4. Test the following tanks:
      a. Anaerobic Digester No. 3.

A. Source of water:
   1. Coordinate use and delivery of test water test with Owner.
   2. The source of water will be Owner determined, W3 plant water.
   3. The cost of providing water will be paid by the Owner.
   4. Fill concrete structures to the maximum operating water surface level and maintain the water at that level for at least 72 HRS prior to beginning watertightness tests to minimize water absorption by the concrete during testing.
5. The water that is used for the hydrostatic leak testing shall remain in the tank throughout the gas-pressure testing procedure. The water surface elevation shall be lowered to approximately 4 FT below the underside of the roof slab prior to commencing the testing.

B. Cleaning:
1. Thoroughly clean interior of structure to be tested of all debris and dirt and hose down surfaces of all walls and slabs.
2. Cleaning may be required after satisfactory test completion.
3. See Section 01 74 00.

C. Patching and Finishing:
1. Prepare new concrete surfaces in accordance with ACI 350.1 and Section 03 35 00 - Concrete Finishing and Repair of Surface Defects.
   a. Fill all holes, voids, and honeycombed areas per Section 03 35 00 - Concrete Finishing and Repair of Surface Defects. Cracks suspected to cause leakage to be filled and sealed.
   b. Review tank for areas of potential leakage before filling.

3.2 WATERTIGHTNESS TESTING

A. Provide watertightness testing for the following structures in accordance with the specified criteria:

<table>
<thead>
<tr>
<th>STRUCTURE NAME or TYPE</th>
<th>WATER ELEVATION AT COMMENCEMENT OF TEST PERIOD</th>
<th>MAXIMUM WATER LEAKAGE ALLOWED IN TEST PERIOD (PERCENT OF TOTAL VOLUME)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaerobic Digester No. 3</td>
<td>40.25</td>
<td>0.10%</td>
</tr>
</tbody>
</table>

B. Perform a watertightness test as required by Engineer on any additional structure when in the opinion of the Engineer the structure contains sufficient concrete defects that could impair the watertightness of the structure.
1. Testing to conform to requirements of this Section with allowable leakage and other criteria as established by Engineer.

C. Duration of the test shall not be less than that required for a drop in the water surface of 1/2 IN based on the calculated maximum allowable leakage rate nor 3 days.

D. Loss of volume measurements shall be taken at 24 HR intervals. Loss of volume is usually determined by measuring the drop in water surface elevation and computing the change in volume of the contained water. Measure water surface elevation at not less than two locations at 180 DEG apart and preferably at four locations 90 DEG apart. Record water temperature 18 IN below water surface when taking the first and last sets of measurements.

E. Repeat procedure until hydrostatic test has been completed and approved by Engineer prior to commencing the gas-pressure test.

F. Test for leakage in accordance with ACI 350.1, latest edition, Chapters 1 and 2, and this Section.
1. Isolate sections of structures that can be isolated during operation.
   a. Test each section separately.
2. Allow Engineer and Owner’s Representative to witness testing for watertightness and review accompanying results.

G. Place evaporation pan in an easily accessible location.

H. Record level of water in structure and evaporation pan and water temperature at commencement of the test period.

I. During testing period, inspect structure for areas indicating leakage.
1. Any areas evidencing running water to be repaired and patched.
2. Patching or repair of leaks as defined above shall be completed independent of the watertightness test.
   a. Passing watertightness test does not relieve Contractor from repairing running water leaks.

J. Record level of water surface in the structure and evaporation pan and temperature every 24 HRS until end of test period.
   1. Test periods defined per ACI 350.1.

K. If leakage is greater than that allowed, repair and patch areas suspected of causing the leakage.
   1. Re-test structure using the same procedure until leakage is equal to or less than that allowed.
   2. Provide repair plan to Engineer for approval prior to repair of tank.
   3. Cracks suspected to cause leakage to be filled and sealed to prevent leakage.
      a. Patching to be performed after defective concrete area is cleaned of all loose material to surface of sound concrete.
   4. Prior to patching activities, Contractor to submit patching materials and procedures for review and approval by Engineer.

L. Owner will dispose of water used for testing.

3.3 GAS-PRESSURE TESTING:

A. After hydrostatic testing has been completed and approved by the Engineer, coordinate with Owner on temporarily sealing or bulk heading all inlet and outlet pipes and overflow lines not required to be operational for the test prior to testing. Coordinate with Owner to close all valves except the designated pressure relief valves. Install Manometer on gas line or in opening on top of tank prior to testing.

B. Water surface level shall be lowered to 4 FT below the underside of the roof slab.

C. Test Length. Maintain pneumatic test pressure continuously for a minimum of 4 HRS and for such additional time as necessary to conduct soap bubble examination for leakage, unless otherwise noted. At conclusion of soap testing, maintain pneumatic pressure test for an additional 2 HRS to observe any loss of manometer pressures. Air compressor shall be disconnected from the digester during the test.

D. Exact test method, if planned deviations occur from that discussed herein, shall be proposed in writing by the Contractor.

E. Apply a preliminary pneumatic test pressure equal to the normal PRV relief factory setting of 14-inches water column (i.e., pressure until relief pops off) maximum prior to final pneumatic leak testing to locate any apparent or visible leaks and to test relief valve assembly. Apply soapy water mixture to new construction joints and roof penetrations and any other potential leakage points and examine for leakage.

F. If leaks are found during the preliminary test, the tank shall be relieved of pressure, purged if necessary, and repaired. Tests shall be repeated until results are satisfactory.

G. Vacuum/pressure relief valves on digester tank roof used for the testing shall be temporarily re-set (above typical setting) to 17 IN of water column for the final pressure test. Coordinate with Owner on existing pressure relief valve settings.

H. Test pressure shall be 12 to 15 IN of water column, but not to exceed 16 IN of water column pressure. Note: Test pressures shall be closely monitored and shall not exceed 19 IN of water column pressure at any time during the testing so care must be taken to accurately measure the test pressure under the cover at all times during and throughout the testing process.

I. After preliminary testing has been successfully completed, gradually increase pressure in system to the specified test pressure of 12 to 15 IN of water column. Increase the pressure in steps of approximately 1 IN of water column pressure of specified test pressure until required test pressure is reached. Leaks in the digester gas roof structure shall be located by applying soapy
water to the entire exterior roof structure of the digester tank when the tank is under the required test pressure. If a leak is present, the soapy solution will bubble.

J. Visual inspections shall also be made at 1 IN water column intervals until the test pressure is reached, any drop in indicated pressure as shown by the manometer will signify a leak. When the specified test pressure is reached, shut off the valve in the supply line from the compressor and disconnect compressor completely from supply line.

K. Allowable Leakage: Exclusive of possible localized instances at relief valve packing (which shall be as acceptable to the Engineer and RPR), no visual evidence of gas leakage shall occur. Tank shall hold pressure constant for a minimum 6 HR test period with zero leakage.

### 3.4 WATERTIGHTNESS TEST ACCEPTANCE

A. The following conditions shall be considered as NOT meeting the criteria for acceptance regardless of the actual loss of water volume from the structure:
   1. Structures that exhibit flowing water from joints, cracks, expansion joints, or construction joints.
   2. Concrete structures on which moisture can be picked up by a dry hand from the exterior surface of the walls.

B. The watertightness of concrete tanks and structures shall be considered acceptable when loss of water volume is within the criteria listed in the table above.

### 3.5 GAS-PRESSURE TEST ACCEPTANCE

A. The gas tightness test of the digester tank shall be considered acceptable when no visible leakage occurs (by soap bubbles) in the digester roof and no visible loss in pressure occurs based on the visual water levels in the manometer.

### 3.6 TEST FAILURE

A. If the digester tank fails either watertightness or gas pressure testing, the structure shall be repaired and re-tested at no additional cost to the Owner.

END OF SECTION
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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. This information 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 is not required for this project. Attachment A will not be used. 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.

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.


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 reinspected 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.

H. Special Inspection is intended to be an independent quality assurance. 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 Section 01 30 00.
   1. The meeting is to be attended by:
      a. Owner.
      b. Engineer.
      c. Testing Agency and Special Inspectors.
      d. General Contractor.
      e. 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 USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION
ATTACHMENT A TO SECTION 01 45 33
NOT USED

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. Division 00 - Procurement and Contracting Requirements.
   2. Division 01 - General Requirements.
   3. Section 03 05 05 - Concrete Testing and Inspection.
   4. Section 05 50 00 - Metal Fabrications.

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. Concrete and steel 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 concrete and steel 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. 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.
   4. Steel and aluminum related work:
      a. Frame and material verification IBC Section 1705.2:
      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.
   5. 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 2018 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) 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 Owner.
      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.

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 CONCRETE

A. Special Inspection and testing will be provided per IBC Table 17050. 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 05 05 and
   are indicated as the work to be done by the Special Inspector or Testing Agency.

1.6 STEEL

A. Special Inspection will be provided for structural steel and aluminum per IBC Section 1705.2.
   Inspection is required for material verification, high-strength bolting, welding and other work
   noted on the Contract Documents.

B. Inspection/testing requirements are listed in Section 05 50 00 and are indicated as the work to be
   done by the Special Inspector.
PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF ATTACHMENT B
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.
2. 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.
4. Do not use existing toilet facilities in occupied areas or new toilet facilities in construction area without Owner’s written consent.
5. Provide facilities complying with local, State and Federal sanitary laws and regulations.

F. Temporary Sanitary Facilities:
1. Provide temporary sanitary facilities in accordance with Section 01 30 00 - Special Conditions.
2. 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.
3. Refer to Paragraph 1.2.E of this Specification Section for requirements for temporary water service intended for human consumption during construction.
4. Do not use existing toilet facilities in occupied areas or new toilet facilities in construction area without Owner’s written consent.
5. Provide facilities complying with local, State and Federal sanitary laws and regulations.
6. Follow facility provider's minimum maintenance frequency or service more frequently to keep in clean and sanitary condition.
7. 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 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 31 30 - Concrete, Materials and Proportioning.
   6. Section 07 92 00 - Joint Sealants.
   7. Section 40 61 13 - Process Control System General Requirements.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Bearing Manufacturers Association (ABMA).
   3. ASTM International (ASTM):
   4. Hydraulic Institute (HI):
      a. 9.6.4, Rotodynamic Pumps for Vibration Measurements and Allowable Values.
   6. Institute of Electrical and Electronics Engineers, Inc. (IEEE).
   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. 70, National Electrical Code (NEC).
   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. 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) Copies of equipment data plates.
3. 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. Qualifications for:
   a. Electrical equipment and connections testing firm and personnel.
5. 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. Preliminary field quality control testing format to be used as a basis for final field quality control reporting.
      c. 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.
      d. Certification prior to Project closeout that Electrical Panel Drawings for manufacturer-supplied control panels truly represent panel wiring including any field-made modifications.
      e. 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 ACCESSORIES

A. Anchorage:
   1. Cast-in-place anchorage:
      a. Provide ASTM F593, Type 316 stainless steel anchorage for all equipment.
2. Drilled anchorage:
   a. Adhesive anchors per Specification Section 03 15 19.
   b. Epoxy grout per Specification Section 03 31 30.
   c. Threaded rods same as cast-in-place.

B. 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.

C. 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.

2.2 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.

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. 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 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.

3.4 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:
      b. Related construction change documentation.
      c. Approved Shop Drawings.
      d. Approved Operation and Maintenance Manuals.
      e. Other pertinent information as required.
B. Other Testing:
   1. Perform tests and inspections not specifically listed but required to assure equipment is safe to energize and operate.

3.5 DEMONSTRATION

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

3.6 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

<table>
<thead>
<tr>
<th>Item</th>
<th>Acceptable (Yes/No)</th>
<th>Readings/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bearings (1)</td>
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<td></td>
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<tr>
<td>Belts (tension reading)</td>
<td></td>
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<tr>
<td>Lubrication Levels</td>
<td></td>
<td></td>
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<tr>
<td>Vibration (1) (2) (MILS/SEC)</td>
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<td></td>
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<tr>
<td>Infrared Thermography (1) (2)</td>
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<td>Starting AMPS</td>
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<td>Full Load AMPS</td>
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<td>Volts</td>
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<td>Rotation</td>
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<tr>
<td>Jacket Temperature (DEGF)</td>
<td></td>
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<tr>
<td>Seal Water Flow Rate (GPH or GPM)</td>
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<td></td>
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<tr>
<td>Seal Water Pressure (PSI)</td>
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<tr>
<td>O-rings/Packing</td>
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<tr>
<td>Alignment (1)</td>
<td></td>
<td></td>
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<tr>
<td>Anchor Bolts</td>
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<tr>
<td>Grout</td>
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<tr>
<td>Item</td>
<td>Acceptable (Yes/No)</td>
<td>Readings/Comments</td>
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<tr>
<td>--------------------------------------------------</td>
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<tr>
<td>Substrate Approval</td>
<td></td>
<td></td>
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<tr>
<td>Sound level (4 FT from unit) (1) (dB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(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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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
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 on-site 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
         on-site, 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 on-site, 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:
      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.
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.

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
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
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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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 07 92 00 - Joint Sealants.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. ASTM International (ASTM):
      e. A351, Standard Specification for Castings, Austenitic, for Pressure-Containing Parts.
      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 I 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 bibs.

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.
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 316L.
      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 316L.
   2. All other areas: Galvanized steel: ASTM A653, G90.
   3. Minimum 12 GA.

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 05 50 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. Do not cut into or core drill any beams, joists, or columns.

H. Do not install sleeves in beams, joists, or columns.

I. Do not install recesses in beams, joists, columns, or slabs.

J. 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.

K. 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.

L. Where alterations are necessary or where new and old work join, restore adjacent surfaces to their condition existing prior to start of work.

M. 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.

N. For interior wall applications where backer rod and sealant are specified, provide backer rod and sealant at each side of wall.

O. Use full depth expanding foam sealant for seal applications where single or multiple pipes, conduits, etc., pass through a single sleeve.

P. Do not make duct or conduit penetrations below high water levels when entering or leaving tankage, wet wells, or other water holding structures.
Q. 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.

R. 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 - NOT USED.
      b. Type B - Saw cut or line-drill opening. Place new concrete with integrally cast sheet metal or pipe sleeve.
      c. Type C - NOT USED.
      d. Type D - NOT USED.
      e. Type E - Saw cut or line-drill opening. Place new concrete with integrally cast pipe, duct or conduit spools.
      f. Type F - NOT USED.
      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 - NOT USED.
      j. Type J - NOT USED.
   2. Provide seals of material and method described as follows.
      a. Category 1 - Modular Mechanical Seal.
      b. Category 2 - NOT USED.
      c. Category 3 - NOT USED.
      d. Category 4 - NOT USED.
      e. Category 5 - Full depth expanding foam sealant with escutcheons on both sides of opening.
      f. Category 6 - Full depth expanding foam 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 expanding foam sealant and finish sealant.
      h. Category 8 - NOT USED.
   3. 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 B. OPENINGS AND PENETRATIONS SCHEDULE FOR EXISTING CONSTRUCTION

<table>
<thead>
<tr>
<th>APPLICATIONS</th>
<th>DUCTS</th>
<th>PIPING</th>
<th>CONDUIT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OPENING TYPE</td>
<td>SEAL CATEGORY</td>
<td>OPENING TYPE</td>
</tr>
<tr>
<td>Through walls where one side is a hazardous area</td>
<td>B E</td>
<td>7 Not Req</td>
<td>B (1) E (3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E (2)</td>
</tr>
<tr>
<td>Through exterior wall above grade</td>
<td>G</td>
<td>6</td>
<td>G (1) (3) H (2)</td>
</tr>
</tbody>
</table>

(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 31 30 - Concrete, Materials and Proportioning.
   5. Section 03 35 00 - Concrete Finishing and Repair of Surface Defects.

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:
   b. Or approved equal.

C. Grout Materials:
   1. Comply with Specification Section 03 31 30 - Concrete, Materials and Proportioning.

D. Epoxy Bonding Adhesive:
   1. Provide two-component, moister-insensitive adhesive manufactured for the purpose of bonding fresh concrete to hardened concrete.
   2. Comply with Section 03 31 30 - Concrete, Materials and Proportioning.
   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 one inch 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 manufacturer’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 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.
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.

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 scheduling planning portion of the meeting and furnishes 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.

   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 structural repairs, 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: Concrete Lid Repair work for Anerobic Digester No. 3.
      a. Hydro-demolition and replacement of edge of concrete lid and associated accessories
         such as water stops, joint material, and joint sealant.
b. Removal and re-installation of existing railing around perimeter of lid.
c. Watertightness testing as described in Specification Section 01 45 25.

2. PCS No. 2: All remaining work.
   a. Cleaning of exterior precast concrete of all six digesters.
   b. Repair of precast concrete connection damage on all six digesters.
   c. Replacement of precast concrete joint sealant on all six digesters.
   d. Concrete cover crack injection on Anerobic Digesters Nos. 2 through 6.
   e. Installation of new level instrumentation at the central dome of Anerobic Digesters Nos. 2 through 6.
   f. Connection of these instruments to electrical and controls panels in adjacent digester control buildings.

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 activates.
      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) Instrumentation and control signal generation, transmission, reception, and response.
            a) Comply with Section 40 61 13 - Process Control System General Requirements.
         11) Tagging and identification systems.
         12) Proper connections, alignment, calibration and adjustment.
      b. Calibrate safety equipment.
      c. Manually rotate or move moving parts to assure freedom of movement.
      d. Perform other tests, checks, and activities required to make the Work ready for Demonstration Period.
      e. 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.
3.3 DEMONSTRATION PERIOD

A. General:
1. Demonstrate the operation and performance of structural repairs, electrical, instrumentation, and control interfaces of the Work undergoing the Demonstration Period, in accordance with the Contract Documents.
2. Duration of Demonstration Period: 72 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.

B. Required Demonstration Periods:
1. PCS No. 1:
   a. Watertightness testing as described in Specification Section 01 45 25 for Anaerobic Digester No. 3.
2. PCS No. 2:
   a. Level instrumentation and controls in Anaerobic Digester Nos. 2 through 6.

END OF SECTION
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.
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;
      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:** ____________________________

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<th>Item No./Description</th>
<th>Completed/Date</th>
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<th>Not Started</th>
<th>Not Applicable</th>
<th>Target Date</th>
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<td>1. Final services completed by Suppliers, including submittal of “Manufacturer Field Service Report” in Section 01 61 03 Equipment - Basic Requirements</td>
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<td>4. All outstanding change issues are addressed and all Change Proposals submitted</td>
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<td>6. All defective Work of which Contractor is aware has been corrected in accordance with the Contract Documents</td>
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<td>7. Issues related to Constituents of Concern and potential Hazardous Environmental Condition have been fully addressed</td>
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<td>8. All spare parts, tools, and extra materials have been furnished in accordance with the Contract Documents, and documentation thereof submitted to Engineer</td>
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<td>13. All field engineering Submittals, including survey data, furnished</td>
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<td>14. All Work on “punch list” is complete in accordance with the Contract Documents</td>
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<td>15. All record documents submitted to and accepted by Engineer</td>
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<td>16. Contractor is fully demobilized from the Site</td>
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<td>17. All Site restoration is complete</td>
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<td>18. Final cleaning of all work areas is complete</td>
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<td>19. Releases of Liens and waivers of Lien rights (or acceptable)</td>
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<td>alternative) obtained from Subcontractors and Suppliers</td>
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Remarks:

20. Evidence of Contractor liability insurance furnished for correction period

Remarks:

21. All other required Contract closeout documents obtained

Remarks:

22. All other Work and documentation required prior to final payment is complete and provided in accordance with the Contract Documents

Remarks:
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 searchable 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.
   b. Recommended schedule for each routine and preventive maintenance task.
   c. 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:
      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:
   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:

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 Record

## Equipment Data and Spare Parts Summary

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Specification Section</th>
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### MECHANICAL NAMEPLATE DATA

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### SPARE PARTS PROVIDED PER CONTRACT

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### RECOMMENDED SPARE PARTS

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## Recommended Maintenance Summary

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### Recommended Break-In Maintenance (First Oil Changes, Etc.)

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### Recommended Preventive Maintenance

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* D = Daily W = Weekly M = Monthly Q = Quarterly S = Semiannual A = Annual Hours = Run Time Interval

# Lubrication Summary

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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 Digester Complex Improvements. 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.
   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
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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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.

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 preventive 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 four hours; sessions longer than four hours 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>
<thead>
<tr>
<th>Material or Equipment</th>
<th>Specification Division or Section(s)</th>
<th>Total Training (HRS)</th>
<th>Training Sessions and Hours Required</th>
</tr>
</thead>
<tbody>
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<td>Instrumentation and Controls</td>
<td>Division 40</td>
<td>8</td>
<td>Operations: 2 sessions, 2 HRS each</td>
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<td></td>
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<td>Mechanical Maintenance: 0</td>
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<td>Instrumentation/Controls &amp; Electrical Maintenance: 2 sessions, 2 HRS each</td>
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</tbody>
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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
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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
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**SECTION 03 05 05**

**CONCRETE TESTING AND INSPECTION**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes:
   1. Contractor requirements for testing of concrete and grout.
   2. Definition of Owner provided testing.
   3. Acceptance criteria for concrete.

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 21 00 - Reinforcement.
   5. Section 03 31 30 - Concrete, Materials and Proportioning.
   6. Section 03 31 31 - Concrete Mixing, Placing, Jointing and Curing.

**1.2 RESPONSIBILITY AND PAYMENT**

A. Owner will hire an independent Testing Agency/Service Provider to perform the following testing and inspection and provide test results to the Engineer and Contractor.
   1. Testing and inspection of concrete and grout produced for incorporation into the work during the construction of the Project for compliance with the Contract Documents.
   2. Additional testing or retesting of materials occasioned by their failure, by test or inspection, to meet requirements of the Contract Documents.
   3. Strength testing on concrete required by the Engineer or Special Inspector when the water-cement ratio exceeds the water-cement ratio of the typical test cylinders.
   4. In-place testing of concrete as may be required by Engineer when strength of structure is considered potentially deficient.
   5. Other testing services needed or required by Contractor such as field curing of test specimens and testing of additional specimens for determining when forms, form shoring or reshoring may re-removed.
   6. Owner will pay for services defined in Paragraph 1.2A.1.
   7. See Specification Section 01 30 00.

B. Hire a qualified testing agency to perform the following testing and provide test results to the Engineer.
   1. Testing of materials and mixes proposed by the Contractor for compliance with the Contract Documents and retesting in the event of changes.
   2. Additional testing and inspection required because of changes in materials or proportions requested by Contractor.
   3. Pay for services defined in Paragraphs 1.2B.1. and 1.2B.2.
   4. Reimburse Owner for testing services defined in Paragraphs 1.2A.2., 1.2A.3., 1.2A.4. and 1.2A.5.
   5. See Specification Section 01 30 00.

C. Duties and Authorities of Testing Agency/Service Provider:
   1. Any Testing Agency/Service Provider or agencies and their representatives retained by Contractor or Owner for any reason are not authorized to revoke, alter, relax, enlarge, or release any requirement of Contract Documents, nor to reject, approve or accept any portion of the Work.
   2. Testing Agency/Service Provider shall inform the Contractor and Engineer regarding acceptability of or deficiencies in the work including materials furnished and work performed by Contractor that fails to fulfill requirements of the Contract Documents.
3. Testing Agency to submit test reports and inspection reports to Engineer and Contractor immediately after they are performed.
   a. All test reports to include exact location in the work at which batch represented by a test was deposited.
   b. Reports of strength tests to include detailed information on storage and curing of specimens prior to testing.
4. Owner retains the responsibility for ultimate rejection or approval of any portion of the Work.

1.3 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Concrete Institute (ACI):
      a. 318, Building Code Requirements for Structural Concrete.
   2. ASTM International (ASTM):
      a. ASTM Cement and Concrete Reference Laboratory (CCRL).
      b. C31, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
      d. C42, Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
      g. C172, Standard Practice for Sampling Freshly Mixed Concrete.
      i. C1218, Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.

B. Qualifications:
   1. Contractor’s Testing Agency:
      a. Meeting requirements of ASTM E329 and ASTM C94.
      b. Provide evidence of recent inspection by CCRL of NBS, and correction of deficiencies noted.

C. Use of Testing Agency and approval by Engineer of proposed concrete mix design shall in no way relieve Contractor of responsibility to furnish materials and construction in full compliance with Contract Documents.

1.4 DEFINITIONS

A. Testing Agency/Service Provider: An independent professional testing/inspection firm or service hired by Contractor or by Owner to perform testing, inspection or analysis services as directed, and as provided in the Contract Documents.

1.5 SUBMITTALS

A. Shop Drawings:
   1. Product technical data including:
      a. Concrete materials and concrete mix designs proposed for use.
         1) Include results of all testing performed to qualify materials and to establish mix designs.
         2) Place no concrete until approval of mix designs has been received in writing.
         3) Submittal for each concrete mix design to include:
            a) Sieve analysis and source of fine and coarse aggregates.
            b) Test for aggregate organic impurities.
            c) Proportioning of all materials.
            d) Type of cement with mill certificate for the cement.
e) Brand, quantity and class of fly ash proposed for use along with other submittal data as required for fly ash by Specification Section 03 31 30.

f) Slump.

g) Brand, type and quantity of air entrainment and any other proposed admixtures.

h) Shrinkage test results.

i) Total water soluble chloride ion concentration in hardened concrete from all ingredients determined per ASTM C1218.

j) 28-day compression test results and any other data required by Specification Section 03 31 30 to establish concrete mix design.


PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 TESTING SERVICES TO BE PERFORMED SERVICE PROVIDER/TESTING AGENCY

A. The following concrete testing will be performed by the Service Provider/Testing Agency:

1. Concrete strength testing:

   a. Secure concrete samples in accordance with ASTM C172.
      1) Obtain each sample from a different batch of concrete on a random basis, avoiding
         selection of test batch other than by a number selected at random before commencement of concrete placement.

   b. For each strength test, mold and cure cylinders from each sample in accordance with
      ASTM C31.
      1) Record any deviations from requirements on test report.
         a) 4 IN cylinders shall not be used for concrete mixes with maximum aggregate
            size larger than 1 IN.
         b) Use the same size cylinder for all tests for each concrete mix.

   3) Quantity:
      a) 6 IN DIA by 12 IN high: Five cylinders.
      b) 4 IN DIA by 8 IN high: Six cylinders.

   c. Field cure one cylinder for the seven day test.
      1) Laboratory cure the remaining.

   d. 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 field cured
            cylinder at seven days for information.
         b) Hold remaining cylinders in reserve.

   e. 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.
f. Frequency of tests:
   1) All other 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 testing:
   a. Determine slump of concrete sample for each strength test.
      1) Determine slump in accordance with ASTM C143.
      b. If consistency of concrete appears to vary, the Engineer or Owner’s Representative shall be authorized to require a slump test for each concrete truck.
         1) This practice shall continue until three consecutive batches are determined to be consistent and meet the slump requirements specified.

3. Air content testing: Determine air content of concrete sample for each strength test in accordance with ASTM C231, ASTM C173, or ASTM C138.

4. Temperature testing: Determine temperature of concrete sample for each strength test.

5. In-place concrete testing (if required).

3.2 SPECIAL INSPECTIONS

A. See Section 01 45 33.
   1. Special Inspections listed are for the Contractor reference only and is not part of the Contract Documents.
   2. 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.

B. Formwork Special Inspections:
   1. Shape, location, and dimensions.
      a. Inspect in accordance with dimensions and details on Drawings.
      b. Frequency: Inspect prior to each concrete pour.

C. Reinforcing Special Inspections:
   1. Reinforcing size, spacing, lap length and concrete cover.
      a. Inspect in accordance with Drawings and Specification.
      b. Frequency: Inspect prior to each concrete pour.
   2. Reinforcing adhesive anchoring system:
      a. Inspect in accordance with ICC-ES report.
      b. Frequency:
         1) Inspect all adhesive anchors for the first 4 HRS of installation.
         2) Inspect approximately 25% of adhesive anchors thereafter.
         3) Additional inspection will be required for different installer or if the quality of installation appears to vary.
   3. Mechanical splices:
      a. Inspect in accordance with ICC-ES report.
      b. Frequency:
         1) Inspect all mechanical splices prior to placing concrete.
         2) Inspect approximately 25% of mechanical splices thereafter.
         3) Additional inspection will be required for different installer or if the quality of installation appears to vary.

D. Mixing, Placing, Jointing, and Curing Special Inspections:
   1. Perform concrete tests per the requirements of this Specification Section.
   2. Verification of proper mix design.
      a. Frequency: Periodically, prior to each concrete pour.
3. Proper concrete placement techniques.
   a. Inspect per requirements of Section 03 31 31.
   b. Frequency: During each concrete pour.
4. Proper curing temperature and techniques.
   a. Inspect per requirements of Section 03 31 31.
   b. Frequency: Periodically, but not less than every third day.
5. Joints:
   a. Inspect joints for proper joint type, dimensions, reinforcing, dowel alignment, surface preparation and location.
   b. Frequency: Prior to each concrete pour.
6. 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.

E. Anchorage to Concrete Special Inspection:
   1. Post installed anchors as required by the building code, ICC-ES Evaluation Reports, and as specified by the Engineer.
   2. Cast-in-place concrete anchors, including anchor size, embedment, material and location.
      a. Frequency: Prior to each concrete pour.

3.3 SAMPLING ASSISTANCE AND NOTIFICATION FOR OWNER

A. To facilitate testing and inspection, perform the following:
   1. Furnish any necessary labor to assist Testing Agency in obtaining and handling samples at site.
   2. Provide and maintain for sole use of Testing Agency adequate facilities for safe storage and proper curing of test specimens on site for first 24 HRS as required by ASTM C31.
   3. Take samples at point of placement into concrete member.

B. Notify Engineer and Owner's Testing Agency sufficiently in advance of operations (minimum of 24 HRS) to allow for assignment of personnel and for scheduled completion of quality tests.

3.4 ACCEPTANCE

A. Completed concrete work which meets applicable requirements will be accepted without qualification.

B. Completed concrete work which fails to meet one or more requirements, but which has been repaired to bring it into compliance will be accepted without qualification.

C. Completed concrete work which fails to meet one or more requirements, and which cannot be brought into compliance may be accepted or rejected as provided in these Contract Documents.
   1. In this event, modifications may be required to assure that concrete work complies with requirements.
   2. Modifications, as directed by Engineer, to be made at no additional cost to Owner.

D. Dimensional Tolerances:
   1. Formed surfaces resulting in concrete outlines smaller than permitted by tolerances shall be considered potentially deficient in strength and subject to modifications required by Engineer.
   2. Formed surfaces resulting in concrete outlines larger than permitted by tolerances may be rejected and excess material subject to removal.
      a. If removal of excess material is permitted, accomplish in such a manner as to maintain strength of section and to meet all other applicable requirements of function and appearance.
   3. Concrete members cast in wrong location may be rejected if strength, appearance or function of structure is adversely affected or misplaced items interfere with other construction.
4. Inaccurately formed concrete surfaces exceeding limits of tolerances and which are exposed to view, may be rejected.
   a. Repair or remove and replace if required.
5. Finished slabs exceeding tolerances may be required to be repaired provided that strength or appearance is not adversely affected.
   a. High spots may be removed with a grinder, low spots filled with a patching compound, or other remedial measures performed as permitted or required.

E. Appearance:
1. Concrete surfaces exposed to view with defects which, in opinion of Engineer, adversely affect appearance as required by specified finish shall be repaired by approved methods.
2. Concrete not exposed to view is not subject to rejection for defective appearance unless, in the opinion of the Engineer, the defects impair the long-term strength or function of the member.

F. High Water-Cement Ratio:
1. Concrete with water in excess of the specified maximum water-cement ratio will be rejected.
2. Remove and replace concrete with high water-cement ratio or make other corrections as directed by Engineer.

G. Strength of Structure:
1. Strength of structure in place will be considered potentially deficient if it fails to comply with any requirements which control strength of structure, including but not necessarily limited to following:
   a. Low concrete strength:
      1) Test results for standard molded and cured test cylinders to be evaluated separately for each mix design.
         a) Such evaluation shall be valid only if tests have been conducted in accordance with specified quality standards.
         b) For evaluation of potential strength and uniformity, each mix design shall be represented by at least three strength tests.
         c) A strength test shall be the average of two, 6 IN DIA cylinders or three, 4 IN DIA cylinders from the same sample tested at 28 days.
      2) Acceptance:
         a) Strength level of each specified compressive strength shall be considered satisfactory if both of the following requirements are met:
            (1) Average of all sets of three consecutive strength tests equal or exceed the required specified 28 day compressive strength.
            (2) No individual strength test falls below the required specified 28 day compressive strength by more than 500 PSI.
         b. Reinforcing steel size, configuration, quantity, strength, position, or arrangement at variance with requirements in Specification Section 03 21 00 or requirements of the Contract Drawings or approved Shop Drawings.
         c. Concrete which differs from required dimensions or location in such a manner as to reduce strength.
         d. Curing time and procedure not meeting requirements of this Specification Section.
         e. Inadequate protection of concrete from extremes of temperature during early stages of hardening and strength development.
         f. Mechanical injury, construction fires, accidents or premature removal of formwork likely to result in deficient strength.
         g. Concrete defects such as voids, honeycomb, cold joints, spalling, cracking, etc., likely to result in deficient strength or durability.
   2. Structural analysis and/or additional testing may be required when strength of structure is considered potentially deficient.
3. In-place testing of concrete may be required when strength of concrete in place is considered potentially deficient.
   a. Testing by impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer to determine relative strengths at various locations in the structure or for selecting areas to be cored.
      1) Such tests shall not be used as a basis for acceptance or rejection.
   b. Core tests:
      1) Where required, test cores will be obtained in accordance with ASTM C42.
         a) If concrete in structure will be dry under service conditions, air dry cores (temperature 60 to 80 DEGF, relative humidity less than 60%) for seven days before test then test dry.
         b) If concrete in structure will be wet or subjected to high moisture atmosphere under service conditions, test cores after immersion in water for at least 40 HRS and test wet.
         c) Testing wet or dry to be determined by Engineer.
      2) Three representative cores may be taken from each member or area of concrete in place that is considered potentially deficient.
         a) Location of cores shall be determined by Engineer so as least to impair strength of structure.
         b) If, before testing, one or more of cores shows evidence of having been damaged subsequent to or during removal from structure, damaged core shall be replaced.
      3) Concrete in area represented by a core test will be considered adequate if average strength of three cores is equal to at least 85% of specified strength and no single core is less than 75% of specified strength.
      4) Fill core holes with non-shrink grout and finish to match surrounding surface when exposed in a finished area.
4. If core tests are inconclusive or impractical to obtain or if structural analysis does not confirm safety of structure, load tests may be required and their results evaluated in accordance with ACI 318, Chapter 20.
5. Correct or replace concrete work judged inadequate by structural analysis or by results of core tests or load tests with additional construction, as directed by Engineer, at Contractor's expense.
6. Contractor to pay all costs incurred in providing additional testing and/or structural analysis required.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Formwork requirements for concrete construction.

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 05 05 - Concrete Testing and Inspection.
   5. Section 03 31 31 - Concrete Mixing, Placing, Jointing, and Curing.
   6. Section 03 35 00 - Concrete Finishing and Repair of Surface Defects.

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. 347R, Guide to Formwork for Concrete.

B. Qualifications:
   1. Formwork, shoring and reshoring to be designed by a licensed professional engineer
currently registered or having a minimum of three years of experience in this type of design
   work.
      a. Above qualifications apply to slabs and beams not cast on the ground.

C. Miscellaneous:
   1. Design and engineering of formwork, shoring and reshoring as well as its construction is the
   responsibility of the Contractor.
   2. Design requirements:
      a. Design formwork for loads, lateral pressures and allowable stresses outlined in
         ACI 347R and for design considerations, wind loads, allowable stresses and other
         applicable requirements of the controlling local building code.
         1) Where conflicts occur between the above two standards, the more stringent
            requirements shall govern.
      b. Design formwork to limit maximum deflection of form facing materials reflected in
         concrete surfaces exposed to view to 1/240 of span between structural members.
   3. For slabs and beams not cast on the ground, develop a procedure and schedule for removal
      of shores and installation of reshores and for calculating the loads transferred to the
      structure during this process in accordance with ACI 347R.
      a. 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. Calculations shall be
         performed by a licensed professional engineer.
      b. When developing procedure, schedule and structural calculations, consider the
         following at each stage of construction:
            1) The structural system that exists.
            2) Effects of all loads during construction.
            3) Strength of concrete.
            4) The influence of deformations of the structure and shoring system on the
               distribution of dead loads and construction loads.
5) The strength and spacing of shores or shoring systems used, as well as the method of shoring, bracing, shore removal, and reshoring including the minimum time intervals between the various operations.

6) Any other loading or condition that affects the safety or serviceability of the structure during construction.

1.3 DEFINITIONS
A. Words and terms used in these Specifications are defined in ACI CT-13.
B. SCC: Self-Consolidating Concrete.

1.4 SUBMITTALS
A. Shop Drawings:
   1. See Specification Section 01 33 00 for the requirements for the mechanics and administration of the submittal process.
   2. Product technical data including:
      a. Manufacturer and type of proposed form ties.
B. Samples: A 12 IN SQ sample of each of the following form finishes.

PART 2 - PRODUCTS

2.1 MATERIALS
A. Forms for Surfaces Exposed to View:
   1. Wood forms:
      a. 5/8 or 3/4 IN 5-ply faced structural plywood of concrete form grade.
      b. Built-in-place or prefabricated type panel.
   2. 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.
B. Forms for Surfaces Not Exposed to View:
   1. Wood or metal sufficiently tight to prevent leakage.
   2. Do not use aluminum forms.

2.2 ACCESSORIES
A. Form Ties:
      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. Embedded portion of ties to be not less than 1-1/2 IN from face of concrete after ends have been removed.
   4. Cone size:
      a. 3/4 IN minimum diameter cones on both ends.
      b. Depth of cone not to exceed the concrete reinforcing cover.
   5. Provide ties with built-in waterstops in all walls that will be in contact with process liquid during plant operation
   6. Through-wall ties that are designed to be entirely removed are not allowed in all walls that will be in contact with liquids during plant operation.
B. Form Release Material:
   1. If project contains self-consolidating concrete, provide reactive, vegetable based product, not barrier type.
PART 3 - EXECUTION

3.1 PREPARATION

A. Form Surface Treatment:
   1. Before placing of reinforcing steel or concrete, cover surfaces of forms with an approved release material that will effectively prevent absorption of moisture and prevent bond with concrete, will not stain concrete or prevent bonding of future finishes.
      a. A field applied form release agent or sealer of approved type or a factory applied nonabsorptive liner may be used.
   2. Do not allow excess form release material to stand in puddles in forms nor in contact with hardened concrete against which fresh concrete is to be placed.

B. Apply form release material to minimize bugholes and pinholes. Follow manufacturer’s printed installation instructions specific to the form facing material.

C. Clean surfaces of forms, reinforcing steel and other embedded materials of any accumulated mortar or grout from previous concreting and of all other foreign material before concrete is placed.

3.2 ERECTION

A. Install products in accordance with manufacturer's instructions.

B. Tolerances:
   1. Conform to ACI 117.
   2. Variation from plumb:
      a. In lines and surfaces of columns, piers, walls, and in risers.
         1) Maximum in any 10 FT of height: 1/4 IN.
         2) Maximum for entire height: 1/2 IN.
      b. For exposed corner columns, control-joint grooves, and other exposed to view lines:
         1) Maximum in any 20 FT length: 1/4 IN.
         2) Maximum for entire length: 1/2 IN.
   3. Variation from level or from grades specified:
      a. In slab soffits, ceilings, beam soffits and in arises, measured before removal of supporting shores.
         1) Maximum in any 10 FT of length: 1/4 IN.
         2) Maximum in any bay or in any 20 FT length: 3/8 IN.
         3) Maximum for entire length: 3/4 IN.
      b. In exposed lintels, sills, parapets, horizontal grooves, and other exposed to view lines:
         1) Maximum in any bay or in 20 FT length: 1/4 IN.
         2) Maximum for entire length: 1/2 IN.
   4. Variation of linear structure lines from established position in plan and related position of columns, walls, and partitions:
      a. Maximum in any bay: 1/2 IN.
      b. Maximum in any 20 FT of length: 1/2 IN.
      c. Maximum for entire length: 1 IN.
   5. Variation in sizes and location of sleeves, floor openings, and wall openings: Maximum of +1/2 IN.
   6. Variation in horizontal plan location of beam, column and wall centerlines from required location: Maximum of +1/2 IN.
   7. Variation in cross sectional dimensions of columns and beams and in thickness of slabs and walls: Maximum of -1/4 IN, +1/2 IN.
   8. Establish and maintain in an undisturbed condition and until final completion and acceptance of Project, sufficient control points and benchmarks to be used for reference purposes to check tolerances.
   9. Regardless of tolerances listed allow no portion of structure to extend beyond legal boundary of Project.
10. To maintain specified tolerances, camber formwork to compensate for anticipated deflections in formwork prior to hardening of concrete.

C. Make forms sufficiently tight to prevent loss of mortar from concrete.

D. Place 3/4 IN chamfer strips in exposed to view corners of forms to produce 3/4 IN wide beveled edges.

E. At construction joints, overlap contact surface of form sheathing for flush surfaces exposed to view over hardened concrete in previous placement by at least 1 IN.
   1. Hold forms against hardened concrete to prevent offsets or loss of mortar at construction joint and to maintain a true surface.
   2. Where possible, locate juncture of built-in-place wood or metal forms at architectural lines, control joints or at construction joints.

F. Where circular walls are to be formed and forms made up of straight sections are proposed for use, provide straight lengths not exceeding 2 FT wide.
   1. Brace and tie formwork to maintain correct position and shape of members.

G. Construct wood forms for wall openings to facilitate loosening, if necessary, to counteract swelling.

H. Anchor formwork to shores or other supporting surfaces or members so that movement of any part of formwork system is prevented during concrete placement.

I. Provide runways for moving equipment with struts or legs, supported directly on formwork or structural member without resting on reinforcing steel.

J. Provide positive means of adjustment (wedges or jacks) of shores and struts and take up all settlement during concrete placing operation.
   1. Securely brace forms against lateral deflection.
   2. Fasten wedges used for final adjustment of forms prior to concrete placement in position after final check.

3.3 REMOVAL OF FORMS

A. No construction loads shall be supported on, nor any shoring removed from, any part of the structure under construction except when that portion of the structure in combination with remaining forming and shoring system has sufficient strength to safely support its weight and loads places thereon.

B. When required for concrete curing in hot weather, required for repair of surface defects or when finishing is required at an early age, remove forms as soon as concrete has hardened sufficiently to resist damage from removal operations or lack of support.

C. Remove top forms on sloping surfaces of concrete as soon as concrete has attained sufficient stiffness to prevent sagging.
   1. Perform any needed repairs or treatment required on such sloping surfaces at once, followed by curing specified in Specification Section 03 31 31.

D. Loosen wood forms for wall openings as soon as this can be accomplished without damage to concrete.

E. Formwork for columns, walls, sides of beams, and other parts not supporting weight of concrete may be removed as soon as concrete has hardened sufficiently to resist damage from removal.

F. Where no reshoring is planned, leave forms and shoring used to support weight of concrete in place until concrete has attained its specified 28-day compressive strength.
   1. Where a reshoring procedure is planned, supporting formwork may be removed when concrete has reached the concrete strength required by the formwork designer's structural calculations.
G. When shores and other vertical supports are so arranged that non-load-carrying form facing material may be removed without loosening or disturbing shores and supports, facing material may be removed when concrete has sufficiently hardened to resist damage from removal.

3.4 RESHORING

A. No construction loads shall be supported on, nor any shoring removed from, any part of the structure under construction except when that portion of the structure in combination with remaining forming and shoring system has sufficient strength to safely support its weight and loads placed thereon.

B. While reshoring is underway, no superimposed dead or live loads shall be permitted on the new construction.

C. During reshoring do not subject concrete in structural members to combined dead and construction loads in excess of loads that structural members can adequately support.

D. Place reshores as soon as practicable after stripping operations are complete but in no case later than end of working day on which stripping occurs.

E. Tighten reshores to carry their required loads without overstressing.

F. Shoring, reshoring and supporting formwork may be removed when concrete has reached the concrete strength required by the formwork designer's structural calculations.

G. For floors supporting shores under newly placed concrete leave original supporting shores in place or reshore.
   1. Reshoring system shall have a capacity sufficient to resist anticipated loads.
   2. Locate reshores directly under a shore position above.

H. In multi-story buildings, extend reshoring over a sufficient number of stories to distribute weight of newly placed concrete, forms, and construction live loads in such a manner that design superimposed loads of floors supporting shores are not exceeded.

3.5 FIELD QUALITY CONTROL

A. Special Inspection:
   1. See Section 01 45 33.
   2. See Section 03 05 05.

END OF SECTION
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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 anchorage
         adhesive, 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 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 05 05 - Concrete Testing and Inspection.

1.2 QUALITY ASSURANCE
   A. Referenced Standards:
      1. American Concrete Institute (ACI):
         a. 318, Building Code Requirements for Structural Concrete and Commentary.
      2. American Concrete Institute/Concrete Reinforcing Steel Institute (ACI-CRSI):
      3. American Institute of Steel Construction (AISC):
         b. 355.2, Seismic Testing of Post-Installed Concrete and Masonry Anchors in Cracked Concrete.
         c. 355.4, Qualification of Post-Installed Adhesive Anchors in Concrete.
      4. ASTM International (ASTM):
         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.
         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.

B. Qualifications:
   1. Anchor designer for Contractor-designed post-installed anchors shall be a Professional 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 non-ICC ES approved 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. 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 318, Appendix D, 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 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.

B. Samples:
   1. Representative samples of concrete anchors may be requested by Engineer. Review will be
      for type and finish only. Compliance with all other requirements is exclusively the
      responsibility of the Contractor.

C. Informational Submittals:
   1. Certification of qualifications for each installer of post-installed anchors.
      a. Indicate successful completion or certification for each type of approved post-installed
         anchor as required by the Contract Documents.

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. All 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 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 316.

C. Reinforcement: See Section 03 21 00.

D. Washers:
1. ASTM F436 unless noted otherwise, finish to match bolt.
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 1/2IN thick fabricated ASTM A36 square plates as specified or required.
4. Follow manufacturer’s requirements for all post-installed anchorage.

E. 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.

F. 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."

G. Coat surfaces in contact with dissimilar material.
1. Tnemec Series L69.
2. 5 MILS DFT.

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.

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 318, Appendix D, 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).
   3. Adhesive Concrete Anchors:
      a. Hilti:
         1) HIT RE 500 V3 (ICC ESR-3814).
   4. Concrete Screw Anchors:
      a. Hilti:
         1) Kwik HUS-EZ Screw (ICC-ES ESR-3027).
         b. 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.
         c. 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 approval when anchors will not be installed in compliance with MPII.

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. Chase threads as required and 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 this Specification Section.
   2. Provide washers for all anchorage.
   3. Where exposed, extend threaded anchorage 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 beyond snug tight 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 MPII.

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 and fasteners will not be overstressed from expansion, contraction, or installation.

F. Coat aluminum surfaces in contact with dissimilar materials in accordance with this specification section.
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:
   1. See Section 01 45 33.
   2. See Section 03 05 05.

B. Field Inspection and Testing
   1. Owner reserves the right to inspect and test completed anchorage at a minimum of 10% (for large quantity) to 25% (smaller quantity) to 100% (very small project quantity).
   2. Such testing shall conform to requirements of ACI 355.2 and/or ACI 355.4 as applicable.
   3. Failed anchors shall be satisfactorily replaced at no cost to Owner.

3.5 CLEANING

A. After concrete has been placed, remove protection and clean all anchorage of all concrete, dirt, and other foreign matter.

END OF SECTION
**PART 1 - GENERAL**

**1.1 SUMMARY**

A. Section Includes: Reinforcing bar requirements for concrete construction.

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 05 05 - Concrete Testing and Inspection.
   5. Section 03 15 19 - Anchorage to Concrete.

**1.2 QUALITY ASSURANCE**

A. Referenced Standards:
   1. American Concrete Institute (ACI):
      a. SP 66, ACI Detailing Manual.
      b. 117, Specification for Tolerances for Concrete Construction and Materials.
      d. 318, Building Code Requirements for Structural Concrete.
   2. ASTM International (ASTM):
      c. A615, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
      d. A706, Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
      e. A970, Standard Specification for Headed Steel Bars for Concrete Reinforcement.
   3. Concrete Reinforcing Steel Institute (CRSI):

**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.
      c. Mill certificates for all reinforcing.
      d. Manufacturer and type of proprietary reinforcing mechanical splices.
   2. Qualifications of welding operators, welding processes and procedures.
   3. Reinforcing number, sizes, spacing, dimensions, configurations, locations, mark numbers, lap splice lengths and locations, concrete cover and reinforcing supports.
   4. Sufficient reinforcing details to permit installation of reinforcing.
   5. Reinforcing details in accordance with ACI SP 66 and ACI 315.
   6. Locations where proprietary reinforcing mechanical splices are required or proposed for use.
   7. Shop Drawings shall be in sufficient detail to permit installation of reinforcing without reference to Contract Drawings.
      a. Shop Drawings shall not be prepared by reproducing the plans and details indicated on the Contract Drawings but shall consist of completely redrawn plans and details as necessary to indicate complete fabrication and installation of all reinforcing steel.
b. Where multiple types of supports for reinforcing steel (such as chairs, runners, bolsters, and other types of supports) will be used in the Work, clearly indicate on the Shop Drawings the support types and materials of supports.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Support and store all reinforcing above ground.

B. Ship to jobsite with attached plastic or metal tags with permanent mark numbers which match the Shop Drawing mark numbers.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURES

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Reinforcing adhesive anchors:
   a. See Specification Section 03 15 19.

2. Reinforcing mechanical splices:
   a. Lenton Rebar Splicing by Erico, Inc.
   b. Richmond dowel bar splicer system by Richmond Screw and Anchor Co., Inc.
   c. Bar-Grip Systems by Barsplice Products, Inc.

2.2 MATERIALS

A. Reinforcing Bars: ASTM A615, grade 60, deformed.

B. Reinforcing Bars to be Welded: ASTM A706, Grade 60, deformed.


D. Smooth Dowel Bars:
   1. Water containing structures: ASTM A276, Type 316.
   2. All other locations: ASTM A36, with metal end cap to allow longitudinal movement equal to joint width plus 1 IN.

E. Proprietary Reinforcing Mechanical Splices: To develop in tension and compression a minimum of 125% of the yield strength of the reinforcing bars being spliced.

F. Headed Deformed Bars: ASTM A970, Class A.


2.3 ACCESSORIES

A. Chairs, Runners, Bolsters, Spacers, Hangers, and Other Reinforcing Supports:
   1. Metal fabrications with plastic-coated tips in contact with forms.
   2. All plastic construction meeting the requirements of CRSI Manual of Standard Practice.
      a. 100% non-metallic, non-corrosive.
      b. Required for all walls and elevated construction exposed to liquid containing structures.

B. Protective plastic caps at mechanical splices.

2.4 FABRICATION

A. Tolerances:
   1. Conforms to ACI 117, expect as modified herein.
   2. Sheared lengths: +1 IN.
   3. Overall dimensions of stirrups, ties and spirals: +1/2 IN.
   4. All other bends: +0 IN, -1/2 IN.
B. Minimum diameter of bends measured on the inside of the reinforcing bar to be as indicated in ACI 318 Paragraph 7.2.

C. Ship reinforcing to jobsite with attached plastic or metal tags.
   1. Place on each tag the mark number of the reinforcing corresponding to the mark number indicated on the Shop Drawing.
   2. Mark numbers on tags to be so placed that the numbers cannot be removed.

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

A. Tolerances:
   1. Conform to ACI 117, except as modified herein.
   2. Reinforcing placement:
      a. Clear distance to formed surfaces: +1/4 IN.
      b. Minimum spacing between bars: -1/4 IN.
      c. Top bars in slabs and beams:
         1) Members 8 IN deep or less: +1/4 IN.
         2) Members between 8 IN and 2 FT deep: -1/4 IN, +1/2 IN.
         3) Members more than 2 FT deep: -1/4 IN, +1 IN.
      d. Crosswise of members: Spaced evenly within +1 IN.
      e. Lengthwise of members: +2 IN.
   3. Minimum clear distances between reinforcing bars:
      a. Beams, walls and slabs: Distance equal to bar diameter or 1 IN, whichever is greater.
      b. Columns: Distance equal to 1-1/2 times the bar diameter or 1-1/2 IN, whichever is greater.
      c. Beam and slab reinforcing shall be threaded through the column vertical rebars without displacing the column vertical bars and still maintaining the clear distances required for the beam and slab reinforcing bars.

B. Minimum concrete protective covering for reinforcement: As shown on Drawings.

C. Unless indicated otherwise on Drawings, provide splice lengths for reinforcing as follows:
   1. For reinforcing: Class B splice meeting the requirements of ACI 350.
   2. For welded wire reinforcement:
      a. Splice lap length measured between outermost cross wires of each fabric sheet shall not be less than one spacing of cross wires plus 2 IN, nor less than 1.5 x development length nor less than 6 IN.
      b. Development length shall be as required for the yield strength of the welded wire reinforcement in accordance with ACI 350.
   3. Provide splices of reinforcing not specifically indicated or specified subject to approval of Engineer.
      a. Mechanical proprietary splice connectors may only be used when approved or indicated on the Contract Drawings.

D. Welding: Welding reinforcing is not permitted.

E. Placing Reinforcing:
   1. Assure that reinforcement at time concrete is placed is free of mud, oil or other materials that may affect or reduce bond.
   2. Reinforcement with rust, mill scale or a combination of both will be accepted as being satisfactory without cleaning or brushing provided dimensions and weights including heights of deformations on a cleaned sample is not less than required by applicable ASTM specification that governs for the reinforcing supplied.
   3. Reinforcing support:
      a. Uncoated reinforcing:
1) Support reinforcing and fasten together to prevent displacement by construction operations.
   a) Locate and support reinforcement with bar supports to maintain minimum concrete cover.
   b) Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
   c) Reinforcement shown on the Contract Documents may not be repositioned for use as support for reinforcement. Additional drop bars may be provided for support of reinforcing.

2) Reinforcing supported on ground:
   a) Slab on grade and other members with only one mat of reinforcing:
      (1) Provide metal bar supports with bottom plate.
      (2) Do not use concrete blocks to support slab-on-grade reinforcing.
   b) All other members: Provide supporting concrete blocks or metal bar supports with bottom plate.

3) Reinforcing supported on formwork:
   a) Concrete surfaces in contact with or over process liquid: All-Plastic chairs, runners and bar supports.
   b) All other formed surfaces:
      (1) Provide plastic-coated metal chairs, runners, bolster, spacers, hangers and other reinforcing support.
      (2) Only tips in contact with the forms need to be plastic coated.

4. Support reinforcing over cardboard void forms by means of concrete supports which will not puncture or damage the void forms during construction nor impair the strength of the concrete members in any way.

5. Where parallel horizontal reinforcement in beams is indicated to be placed in two or more layers, bars in the upper layers shall be placed directly above bars in the bottom layer with clear distance between layers to be 1 IN.
   a. Place spacer bars at 3 FT maximum centers to maintain the required 1 IN clear distance between layers.

6. Extend reinforcement to within 2 IN of concrete perimeter edges.
   a. If perimeter edge is formed by earth, extend reinforcement to within 3 IN of the edge.

7. To assure proper placement, furnish templates for all column vertical bars and dowels.

8. Do not bend reinforcement after embedding in hardened concrete unless approved by Engineer.
   a. Do not bend reinforcing by means of heat.

9. Do not tack weld reinforcing.

10. Embed reinforcing into hardened concrete utilizing adhesive anchor system specifically manufactured for such installation:
    a. See Specification Section 03 15 19.

3.2 FIELD QUALITY CONTROL

A. Reinforcement Congestion and Interferences:
   1. Notify Engineer whenever the specified clearances between bars cannot be met.
   2. Do not place any concrete until the Engineer submits a solution to reinforcing congestion problem.
   3. Reinforcing may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items.
   4. If bars are moved more than one bar diameter, obtain Engineer's approval of resulting arrangement of reinforcing.
   5. No cutting of reinforcing shall be done without written approval of Engineer.

B. Special Inspection:
   1. See Section 01 45 33.
   2. See Section 03 05 05.
END OF SECTION
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SECTION 03 31 30
CONCRETE, MATERIALS AND PROPORTIONING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Concrete materials, strengths and proportioning for concrete work.
   2. Grouting:
      a. Base plates for columns and equipment.
      b. As specified and indicated in the Contract Document.

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 05 05 - Concrete Testing and Inspection.
   5. Section 03 15 19 - Anchorage to Concrete.
   6. Section 03 31 31 - Concrete Mixing, Placing, Jointing, and Curing.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Concrete Institute (ACI):
      a. CT-13, Concrete Terminology.
      b. 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
      c. 212.3R, Chemical Admixtures for Concrete.
      d. 232.2R, Use of Fly Ash in Concrete.
   2. ASTM International (ASTM):
      f. C192, Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.
      j. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
      n. C1293, Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction.
q. C1609, Standard Test Method for Flexural Performance of Fiber-Reinforced Concrete (Using Beam with Third-Point Loading).

3. Steel Deck Institute (SDI):
   a. 31, Design Manual for Composite Decks, Form Decks and Roof Decks.

1.3 DEFINITIONS
A. Words and terms used in these Specifications are defined in ACI CT-13.
B. Water-Bearing Concrete: Any concrete surface to be in contract with process fluids during normal operation of the facility, including, but not limited to, tank, channels, wet wells and distribution chambers.
C. Supplementary Cementitious Materials (SCM): Fly ash, silica fume and ground granulated blast furnace slag.

1.4 SUBMITTALS
A. Shop Drawings:
   1. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Manufacturer's instructions.
      c. Concrete mix designs as required by Specification Section 03 05 05.
      d. Manufacturer and type of proposed admixtures.
      e. Manufacturer and type of proposed non-shrink grout and grout cure/seal compound.
   2. Certifications:
      a. Certification of standard deviation value in psi for ready mix plant supplying the concrete.
      b. Certification that the SCM meet the quality requirements stated in this Specification Section, and SCM supplier's certified test reports for each shipment of SCM delivered to concrete supplier.
      c. Certification that the class of coarse aggregate meets the requirements of ASTM C33 for type and location of concrete construction.
      d. Certification of aggregate gradation.
      e. Certification of coarse aggregate impurities as relates to alkali-silica reactivity per ASTM C33, Appendix X.
      f. Certification of shrinkage test results.
   3. Test reports:
      a. Cement and SCM mill reports for all cement to be supplied.
      b. Provide test results for alkali-silica reactive impurities on coarse aggregates per referenced ASTM standards.

1.5 DELIVERY, STORAGE AND HANDLING
A. Storage of Materials:
   1. Store cement and SCM in weathertight buildings, bins, or silos which will exclude moisture and contaminants.
   2. Arrange aggregate stockpiles and use in a manner to avoid excessive segregation and to prevent contamination with other materials or with other sizes of like aggregates.
   3. Allow natural sand to drain until it has reached a relatively uniform moisture content before use.
   4. Do not use frozen or partially frozen aggregates.
   5. Do not use bottom 6 IN layer of stockpiled material in contact with ground.
   6. Store admixtures in such a manner as to avoid contamination, evaporation, or damage:
      a. For those used in form of suspensions or non-stable solutions, provide agitating equipment to assure thorough distribution of ingredients.
b. Protect liquid admixtures from freezing and temperature changes which would adversely affect their characteristics and performance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the manufacturers are acceptable:
   1. Non-shrink grout:
      a. Master Builders Solutions.
      b. Euclid Chemical Company.
      c. Five Star Products, Inc.
   2. Epoxy grout:
      a. Master Builders Solutions.
      b. Five Star Products, Inc.
      c. Euclid Chemical Company.
      d. Sika Corporation.

2.2 MATERIALS

A. Cement:
   1. ASTM C150, Type II.
   2. Cement type used shall correspond to that upon which selection of concrete proportions was based in the mix design.

B. SCM:
   1. Fly Ash:
      a. ASTM C618, Class F.
      b. Non-staining.
      c. Suited to provide hardened concrete of uniform light gray color.
      d. Compatible with other concrete ingredients and having no deleterious effects on the hardened concrete.
      e. Produced by source approved by the State Highway Department in the state where the Project is located for use in concrete for bridges.
      f. Evaluate and use in accordance with ACI 232.2R.
   2. Cement and SCM type used shall correspond to that upon which selection of concrete proportions was based in the mix design.

C. Admixtures:
   2. Water reducing, retarding, and accelerating: Conform to ASTM C494, Types A through E, and provisions of ACI 212.3R.
   3. High range water reducers (superplasticizers): Conform to ASTM C494, Types F or G.
   4. All concrete mixes require the use of water reducers to maintain the specified water-to-cement ratios without additional cement.
   5. SCM: Per above.
   6. Admixtures to be chloride free.
      a. Do not use calcium chloride.
   7. Provide admixtures of same type, manufacturer and quantity as used in establishing required concrete proportions in the mix design.
   8. Provide admixtures certified by manufacturer to be compatible with other admixtures.
   9. Shrinkage reducing admixtures:
      a. Admixture used to reduce the shrinkage of Portland Cement concrete.
      b. Utilize at dosage necessary to help achieve required shrinkage value stated herein.
      c. Similar to:
         1) Eclipse 4500 by GCP Applied Technologies, Inc.
         2) Conex by Euclid Chemical Co.
         3) MasterLife SRA 20 or MasterLife CRA 007 by Master Builders Solutions.
D. Crystalline Cementitious Waterproofing:
   1. Xypex Chemical Corporation – Xypex Admixture.
      a. No substitutions.
   2. Factory blended dry powder compound consisting of Portland cement, treated aggregate, and active chemicals.
      a. NSF 61 listed as approved for use in contact with potable water.
   3. Formulated for use as a concrete admixture:
   4. Dosage per manufacturer's recommendations.
   5. See Drawings for concrete requiring crystalline cementitious waterproofing.

E. Water:
   1. Potable.
   2. Clean and free from deleterious substances.

F. Aggregates for Normal Weight Concrete:
   1. ASTM C33.
   2. Fine and coarse aggregates to be regarded as separate ingredients.
   3. Provide aggregates approved for bridge construction by the Department of Transportation of the State the project is located.
   4. Coarse aggregate:
      a. Use only washed aggregates.
      b. Coarse aggregate sieve analysis:
         1) Per Table 1 IN the PART 2 MIXES Article.
   5. Fine aggregates to be natural, not manufactured.
   6. Do not use aggregates that may be deleteriously reactive when combined with alkalis in cement.
      a. Evaluate proposed aggregates for potential deleterious expansion due to alkali silica reactivity per ASTM C33 (Appendix X), ASTM C227, ASTM C1260, ASTM 1293, or ASTM C1567.

G. Maximum total chloride ion content for concrete mix including all ingredients measured as a weight percent of cement in accordance with ASTM C1218:
   1. All other concrete: 0.10.

H. Non-Shrink Grout:
   1. Non-shrink, nonmetallic, noncorrosive, and non-staining.
      a. Conform to ASTM C1107.
   2. Premixed with only water to be added in accordance with manufacturer's instructions at jobsite.
   3. Grout to produce a positive but controlled expansion.
      a. Mass expansion shall not be created by gas liberation or by other means.
   4. Minimum 28 day compressive strength: 7,000 PSI.
   5. Acceptable manufacturers:
      a. Master Builders Solutions "Masterflow, 713".
      b. Euclid Chemical "NS Grout".
      c. Sika Corporation "Sika Grout 212".
      d. Sauereisen, Inc. "F-100 Level Fill Grout".

I. See Specification Section 03 31 31 for Grout Schedule of use.

2.3 MIXES

A. General:
   1. Provide concrete capable of being placed without aggregate segregation and, when cured, of developing all properties specified.
   2. Ready-mixed concrete shall conform to ASTM C94/C94M.
   3. All concrete to be normal weight concrete, weighing approximately 145 to 150 LBS/CF at 28 days after placement.
B. Concrete Mixes: Refer to Table 1 below.

C. Air Entrainment:
   1. Provide air entrainment in concrete resulting in a total air content percent by volume per Table 1 below.
      a. Adjust dosage rate as necessary to compensate for shrinkage reducing admixtures.

D. Slump:
   1. Measure slump at point of discharge into concrete members.
   2. Walls and columns:
      a. 8 IN maximum, 4 IN minimum measured at the point of discharge into the concrete member.
      b. Slump shall be obtained by use of mid-range or high-range water reducer conforming to ASTM C494.
   3. All other members:
      a. Concrete using a water reducer per ASTM C494: 8 IN maximum, 4 IN minimum measured at the point of discharge into the concrete member.
      b. Concrete without a water reducer per ASTM C494: 5 IN maximum, 1 IN minimum measured at point of discharge into the concrete member.
   4. Concrete of lower than minimum slump may be used provided it can be properly placed and consolidated.
   5. Provide additional water or water reducing admixture at ready mix plant for concrete that is to be pumped to allow for slump loss due to pumping.
      a. 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 ration is not exceeded.
   6. Slump may be adjusted in the field through the use of water reducers.
      a. Coordinate dosage and mixing requirements with concrete supplier.
   7. Slump tolerances shall comply with the requirements of ACI 117.

E. Proportioning:
   1. General:
      a. Proportion ingredients to produce a mixture which will work readily into corners and angles of forms and around reinforcement by methods of placement and consolidation employed without permitting materials to segregate or excessive free water to collect on surface.
      b. Proportion ingredients to produce proper placability, durability, strength and other required properties.
   2. Normal weight concrete target cementitious materials contents and maximum water cementitious ratios per Table 1 below.
      a. Target cementitious materials contents are intended to provide a crack free, durable finished product, not one with excessive strength.
   3. SCM:
      a. Fly ash:
         1) 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 a rate of 1 LB fly ash for 1 LB cement.
         2) If fly ash is used, the water to fly ash plus cement ratio not to exceed the maximum water cement ratio specified in this Specification Section.
   4. Water reducing, retarding, and accelerating admixtures:
      a. Use in accordance with manufacturer's instructions.
      b. Add to mix at batching plant.
      c. Use water-reducing or high-range water reducing admixture in concrete, as required, for placement and workability.
         1) Water reducers are required to maintain specified maximum water to cement ratios.
5. High range water reducers (superplasticizers):
   a. Use required for:
      1) All concrete to be pumped except slabs on grade.
      2) All concrete for water containing structures.
      3) Other concrete members at Contractor’s option.
   b. Maximum concrete slump before addition of admixture to be 3 IN maximum slump after addition to be 8 IN.
   c. Reference Specification Section 03 31 31 for additional requirements.
6. Concrete mix proportioning methods for normal weight concrete:
   a. Method 1:
      1) Used when combination of materials proposed is to be evaluated and proportions selected to be on a basis of trial mixes.
      2) Produce mixes having suitable proportions and consistencies based on ACI 211.1, using at least three different water cement ratios or cement contents which will produce a range of compressive strengths encompassing the required average strength.
      3) Design trial mixes to produce a slump within 0.75 IN of maximum specified, and for air entrained concrete, air content within 0.5% specified.
      4) For each water cement ratio or cement content, make at least three trial strength tests for specified test age, and cure in accordance with ASTM C192.
         b) Test for strength at 28 days in accordance with ASTM C39.
            (1) Quantity of cylinders per trial strength test:
               (a) 6 IN DIA cylinders: Two.
               (b) 4 IN DIA cylinders: Three.
      5) From results of these tests, plot a curve showing relationship between water cement ratio or cement content and compressive strength.
      6) From this curve select water cement ratio or cement content to be used to produce required average strength.
      7) Use cement content and mixture proportions such that maximum water cement ratio is not exceeded when slump is maximum specified.
      8) Base field control on maintenance of proper cement content, slump, air content and water cement ratio.
      9) See paragraph hereafter for definition of required average strength.
   b. Method 2:
      1) In lieu of trial mixes, field test records for concrete made with similar ingredients may be used.
      2) Use of proposed concrete mix proportions based on field test records subject to approval by Engineer based on information contained in field test records and demonstrated ability to provide the required average strength.
      3) Field test records to represent materials, proportions and conditions similar to those specified.
         a) Changes in the materials, proportions and conditions within the test records shall have not been more restricted than those for the proposed concrete mix.
         b) Field test records shall meet the requirements of ACI 350.
      4) Required concrete proportions may be established by interpolation between the strengths and proportions of two or more test records each of which meets the requirements of this Specification Section.
7. Required average strength to exceed the specified 28 day compressive strength by the amount determined or calculated in accordance with ACI 350, Chapter 5 using the standard deviation of the proposed concrete production facility as described in ACI 350, Chapter 5.

F. Allowable Shrinkage:
1. Per Table 1 when tested in accordance with ASTM C157 at 28 Days.
2. Continue testing to 64 weeks for informational purposes.

<table>
<thead>
<tr>
<th>TABLE 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE OF CONCRETE</td>
</tr>
<tr>
<td>Normal weight concrete w/ power trowel finish</td>
</tr>
<tr>
<td>Normal weight water-bearing concrete</td>
</tr>
</tbody>
</table>

Table 1 Notes:
1. If fly ash is proposed for use, the weight of fly ash plus weight of Portland cement shall be used to meet total target cement requirement.

2.4 SOURCE QUALITY CONTROL

A. To assure stockpiles are not contaminated or materials are segregated, perform any test for determining conformance to requirements for cleanness and grading on samples secured from aggregates at point of batching.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Special Inspection:
1. See Specification Section 01 45 33.
2. See Specification Section 03 05 05.

B. Perform concrete tests per Specification Section 03 05 05.
1. Perform a strength test on all concrete to which water or superplasticizer, above the amount stated in the approved concrete mix design, has been added.
   a. Perform sampling after water or superplasticizer has been added and additional mixing has been performed.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Mixing, placing, jointing, and curing of concrete construction.

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 45 33 – Special Inspections and Testing Program.
   5. Section 03 05 05 - Concrete Testing and Inspection.
   6. Section 03 11 13 - Formwork.
   7. Section 03 21 00 - Reinforcement.
   8. Section 03 31 30 - Concrete, Materials and Proportioning.
   9. Section 03 35 00 - Concrete Finishing and Repair of Surface Defects.
   10. 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.
      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):
      d. D994, Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
   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.
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.
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 per foot) 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) Waterstops.
   2. Certifications:
B. Samples:
1. Of each prefabricated waterstop joint type to be used in project.
2. Waterstops:
   a. Extruded or molded section: Each size and shape.
   b. Fabricated crosses: Each size and shape.
   c. Must be representative in all respects:
      1) Materials.
      2) Manufacture of sections.
      3) Fabrication.

C. Informational Submittals:
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.

D. Fiber Expansion Joint Fillers:

E. Waterstops, PVC Type:
1. Acceptable manufacturers:
   a. Sika Greenstreak Plastic Products.
   b. W.R Meadows.
   c. Vinylex Corporation.
   d. Bometals, Inc.
2. Materials:
   a. Virgin polyvinyl chloride compound not containing any scrap or reclaimed materials or pigment.
3. Approved profiles as listed.
   a. Construction joints:
      1) Ribbed: 6 IN wide by 3/8 IN.
      2) Sika Greenstreak Plastic Products Style #679, or equal.
   b. Control joints:
      1) 6 IN wide by 3/8 IN thick with ribs and center bulb.
      2) Sika Greenstreak Plastic Products Style #705, or equal.
   c. Expansion joint:
      1) 9 IN wide by 3/8 IN thick center bulb 2 inch OD.
      2) Sika Greenstreak Plastic Products Style #739, or equal.
4. Provide factory-made waterstop fabrications at all changes in direction, intersections and transitions, leaving only straight butt splices for the field. Butt welds to be a minimum 6 IN clear of the intersection.
5. Factory prepunched (less than 1/8 IN centers, each edge, staggered) for wire supports.
   a. Provide hog rings or grommets at all punched holes along the length of the waterstop.
6. See Drawings for application and other requirements.

F. Waterstops, Preformed Strip Type:
1. Acceptable manufacturers:
   a. Sika Greenstreak Plastics, Inc. (Hydrotite).
   b. Adeka Ultra Seal USA (MC-2010MN).
   c. DeNeef (Swellsesal 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.

G. Water Swelling Sealant:
1. Required adhesive for use with strip-type waterstop.
2. Compatible with strip-type waterstop.
5. Minimum 70% volumetric expansion swelling capability.

H. Curing Products to conform to one or more of the following:
1. Absorbent Covers.
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.
      4) Euclid Chemical Company; Super Diamond Clear VOX.
      5) L&M Construction Chemicals, Inc.; Lumiseal WB Plus.

I. Bonding Agent:
1. Acceptable manufacturers:
   a. L&M Construction Chemicals, Inc.
   b. Sika.
   c. Euclid Chemical Co.
2. Materials:
   a. Epoxy: ASTM C881, Type V.

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.
   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 21 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. Coat all construction joints for proper bond per the Construction Joints - Bonding Paragraph in PART 3 of this Specification Section.
9. Coat all construction joints with an approved bonding material, before new concrete is placed.
   a. Apply proprietary bonding adhesive in accordance with manufacturer’s instructions.
10. Remove hardened concrete and foreign materials from inner surfaces of conveying equipment and formwork.
11. 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. 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 31 30 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:
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. 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. Make joints perpendicular to main reinforcement with all reinforcement continuous across joints.
7. Provide the following joints unless noted otherwise on Drawings:
8. 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.
9. 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.
10. Minimum time before placement of adjoining concrete construction:
a. All other concrete: 60 HRS, unless otherwise noted.

B. Construction Joints - Spacing Unless Otherwise Specified:
1. Water retaining structures:
a. Elevated slab construction joints:
   1) Placements to be approximately square and not to exceed 4000 SQFT.
   2) Maximum side dimension of a slab pour to be less than:
      a) Twice the length of the short side.
      b) 70 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.
4. Keyed construction joints:
   a. Thoroughly clean construction joints and remove all laitance.
b. Dampen the hardened concrete immediately prior to placing of fresh concrete.
c. Epoxy adhesive:
   1) Use:
      a) Walls and slabs of tanks and structures designed to contain liquids.
      b) Joints in beams, girders, wall, and slabs.
   2) Joints receiving an adhesive shall be prepared, and the adhesive applied in accordance with the manufacturer's recommendations.
   3) Epoxy adhesive shall have adequate pot life to allow new concrete to be placed while the adhesive has not set.

D. 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.

E. 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.

4. PVC waterstops:
   a. Pre-position waterstop accurately in joints, with adequate clearance from all reinforcing. Do not push waterstop into wet concrete.
   b. Secure waterstops in correct position using hog rings or grommets spaced no more than 18 IN maximum staggered along each edge full length and passed through the edge of the waterstop.
      1) Tie wire to adjacent reinforcing.
   c. Hold horizontal waterstops in place with continuous supports.
   d. Install according to manufacturer's instructions.
      1) Do not displace reinforcement from required location.
   e. Splice ends and intersections with perpendicular butt splice using electrical splicing iron in accordance with manufacturer's instructions.
      1) Use factory fabricated "T" and corner intersection fittings.
      2) Field splice straight runs of material.
   f. Unless otherwise noted, use for all construction joints in new construction for all structures indicated on Drawings.

F. 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.

G. 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. Non-shrinking non-metallic grout:
      a. Filling form tie holes.
      b. Under column and beam base plates.
      c. Other uses indicated on the Drawings.
   2. Epoxy grout:
      a. Patching cavities in concrete.
b. As noted on the Drawings.

B. Grout Installation:
   1. 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.
   2. Epoxy grout:
      a. Mix and place in accordance with manufacturer's instructions.
      b. Apply only to clean, dry, sound surface.
      c. 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. 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.
      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 11 13.
   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. 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.
D. 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.
   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.
E. 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.

F. 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.

G. 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:
1. See Section 01 45 33 and Section 03 05 05.

END OF SECTION
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. Chemical Sealers.
   3. Polymer Modified Cementitious Coating.

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 11 13 - Formwork.
   5. Section 03 31 30 - Concrete, Materials and Proportioning.
   6. Section 03 31 31 - Concrete Mixing, Placing, Jointing and Curing.

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):
         (Using 2-in. or 50-mm Cube Specimens).
         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.
      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. 310.2R, Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings,
         and Polymer Overlays.
      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.
B. Qualifications:
   1. Chemical Sealer CS-2:
      a. Applicator shall be factory trained and approved, in writing, by the manufacturer to
         apply the product.
      b. Applicator shall have a minimum of five years of experience successfully applying
         materials specified.
   2. Hydromolition:
      a. Installer/applicator of the hydromolition shall have minimum of five (5) years’
         experience installing similar applications.
   3. Precast Concrete Patching Material:
      a. Manufacturer of the patching material shall have minimum of five (5) years’
         experience in manufacturing of same with documented performance history for similar
         installations.
      b. Installer/applicator of the patching material shall have minimum of three (3) years’
         experience installing similar coatings and shall be licensed or approved in writing by
         manufacturer to install/apply this product.

C. Mock-Ups.
   1. General:
      a. Construct additional mock-ups as required until accepted.
      b. Mock-ups constitute minimum standard of quality for actual construction.
      c. Maintain mock-up during construction.
      d. Remove when directed by Engineer.
   2. Construct mock-up for each type of wall finish specified for review and acceptance by
      Engineer.
      a. Minimum 4 x 4 FT area for each different wall finish specified.
      b. Mock-ups shall include:
         1) Sample of patched tie hole.
         2) Sample of all jointery being used in the walls.
      c. Include mock-up of wall having polymer modified cementitious coating.
         1) Mock-up shall be stepped to show surface preparation, repairs and coating in all
            stages of application.
   3. Construct mock-up floor slab for review and acceptance by Engineer.
      a. Minimum 10 x 10 FT.
   4. Construct mockup of precast wall panel repairs at location in agreement with the Owner. It
      is acceptable to use one existing connection as mockup.
      a. Demonstrate construction repair process.
      b. Correct deficiencies identified by Engineer and repair until acceptable to Engineer.
      c. Mock-up constitutes minimum standard of quality for actual construction.
      d. Maintain mock-up during construction.
      e. Mock-up of colored concrete wall including area using Architectural Cementitious
         Patching Mortar patch for Engineer's review and acceptance.
      f. Contractor to make color recommendations based on existing conditions.

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. Product technical data including:
   a. Acknowledgement that products submitted meet requirements of standards referenced.
   b. Manufacturer's installation instructions.
2. Certifications:
   a. Certification of aggregate gradation.
   b. Certification of manufacturer experience qualifications and performance history.
   c. Certification of applicator's qualifications.
      1) Refer to Qualifications paragraph.
      2) Provide manufacturer's written approval of applicators.
      3) Provide references substantiating specialty experience.

B. Informational Submittals:

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. Master Builders Solutions.
   b. Euclid Chemical Co.
   c. Laticrete - L&M Construction Chemicals.
2. Chemical Sealers:
   a. Master Builders Solutions.
   b. Euclid Chemical Co.
   c. Laticrete - L&M Construction Chemicals.
   d. Tnemec Chemprobe.
3. Polymer Modified Cementitious Coating:
   a. Aquafin International.
   b. Master Builders Solutions.
   c. Euclid Chemical Co.
4. Patching Mortar:
   a. Master Builders Solutions.
   b. Euclid Chemical Co.
   c. Laticrete - L&M Construction Chemicals.
5. Architectural Cementitious Patching Mortar (Pre-mixed):
   a. Euclid Chemical Co.
   b. BASF Admixtures, Inc.
   c. L&M Construction Chemicals, Inc.

2.2 MATERIALS

A. Chemical Sealer CS-1:
   1. High solids, water-based solution containing acrylic copolymers.
      a. ASTM C1315, Type I, Class A.
b. Non-yellowing UV resistant.
c. VOC Content: <200 G/L.

2. USDA approved as a concrete floor sealer.
3. Euclid Chemical Super Diamond Clear VOX.

B. Architectural Cementitious Patching Mortar (Pre-Mixed):
1. Trowelable cementitious repair mortar for vertical, overhead, and horizontal repairs.
2. For use on exterior precast concrete wall panels at precast connection repair spots.
3. Match existing precast color and texture.
4. Mockup required.

C. Chemical Sealer CS-3:
2. VOC content: ≤50 G/L.
3. Odorless.
4. Flash point: >200 DEGF.
5. Water absorption: 85% reduction per NCHRP 244.
6. Chloride penetration: 82% reduction per NCHRP 244.
7. Euclid Chemical Baracade WB 244.

D. 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.

E. 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) 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.

F. Cement:
1. ASTM C150, Type II Portland for areas exposed to sewage.

G. Aggregate:
1. Sand: Maximum size #30 mesh sieve.
2. For exposed aggregate finish surfaces: Same as surrounding wall.

H. Water: Potable.

I. Polymer modified cementitious 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. Master Builders Solutions MasterSeal 581 or Euclid Chemical Tamoseal.
   a. Color:
      1) Interior surfaces: Custom color to match precast concrete wall panels.
      2) Exterior surfaces: Custom color to match precast concrete wall panels.
b. Texture: Fine.


2.3 MIXES

A. Bonding Grout: One part cement to one part aggregate.

B. Patching Mortar:
   1. One part cement to 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.

C. Architectural Cementitious Patching Mortar (Pre-Mixed):
   1. Cement-based, one component repair mortar.
   2. Compressive Strength minimum per ASTM C109.
      a. 3 days: 2800 PSI.
      b. 7 days: 4000 PSI.
      c. 28 days: 5700 PSI.
   3. Bond Strength minimum per ASTM C882, 1600 PSI.
   4. Flexural Strength minimum per ASTM C348, 1700 PSI.
   5. Color: To match existing wall colors.
   6. Product: US Heritage Group, Historic Masonry Repair Mortar CCS60 Concrete and Cast
      Stone.

PART 3 - EXECUTION

3.1 PREPARATION

A. For methods of curing, see Specification Section 03 31 31.

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 featheredges 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.
E. Polymer Modified Cementitious Coating:
   1. Mix in accordance with manufacturer's recommendations using bonding agent acceptable to coating manufacturer.

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. Chemical Sealer Application:
   1. General:
      a. Immediately prior to Substantial Completion, thoroughly clean floor in accordance with ASTM D4258 and prepare to receive chemical sealer.
         1) Remove previously applied membrane curing compounds.
         2) Remove soil, oils, stains, discoloration, or any other imperfection having a negative impact on the appearance of the finished floor.
      b. Apply product to floor areas indicated on the Drawings.
      c. Apply in accordance with manufacturer's published installation instructions.
   2. Chemical Sealer (CS-1):
      a. Apply two uniform coats at rate recommended by manufacturer.
         1) Apply using manufacturer's recommended equipment with a fan-tip nozzle.
         2) Do not allow material to puddle.
      b. Allow first coat to completely dry before applying second coat.
      c. Spotted or mottled appearances will not be accepted.
   3. Chemical Sealer (CS-2):
      a. Apply two uniform coats at rate recommended by manufacturer.
         1) Scrub the material into the floor using a mechanical scrubber.
            a) Keep the surface wet for not less than 30 minutes.
            b) Continue scrubbing in accordance with manufacturer’s application instructions.
            c) After material has thickened, but not more than 60 minutes after application, remove all excess liquid.
         2) Thoroughly rinse with clean water to remove all residue.
            a) Damp mop with clean water to remove any streaks.
            b) Do not allow residue to dry on floor surface.
         3) Do not track material onto untreated surfaces.
      b. After rinsing, allow floor to dry completely and apply second coat following the same procedures.
      c. Final floor finish shall have uniform sheen without streaking, stains or white residue.
   4. Chemical Sealer (CS-3):
      a. Apply uniform coats at rate recommended by manufacturer.
         1) Apply with fine, uniform spray or microfiber pad.
      b. Allow floor to dry completely and remove any dried residue using hot water and mild citric acid.
      c. Final floor finish shall be uniform, free of residue, and shall repel water.
      d. Apply additional coat(s) as necessary to achieve water repellent finish.

C. 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:
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.

D. 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 #2 - As cast form finish:
   a. Form facing material shall produce a smooth, hard, uniform texture.
      1) Use forms specified for surfaces exposed to view in accordance with Specification Section 03 11 13.
   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.
3. Finish #3 - Grout rubbed finish:
a. Provide this finish for: Exterior edge of tank lid.

E. 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 finish occurs immediately adjacent to unformed surface, provide surface with most stringent formed surface requirement.
3. Continue treatment uniformly across unformed surfaces.

F. 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) Surfaces intended to receive bonded applied cementitious applications: Scratched finish.
      2) Surfaces intended to receive roofing or waterproofing membranes: Floated finish.
      3) Floors and roof surfaces which are future floors intended as walking surfaces or for reception of floor coverings: Troweled finish.
      4) Exterior slabs, sidewalks, platforms, steps and landings, and ramps, not covered by other finish materials: Broom or belt finish.
      5) 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 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 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. Finished floor slabs:
      a. Slabs indicated to be sloped or curved:
         1) Measure in accordance with ASTM E1486.
         2) Provide slopes or curves as indicated on the Drawings or to match existing.
      2. Horizontal surfaces other than finished floor slabs, 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 B tolerance: 3/8 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 in existing concrete.
   2. Repair of cracks in concrete Work provided by Contractor, where approved or directed by Engineer, to remedy defective concrete Work.
   5. Equipment used in performing crack repairs.

B. Scope:
   1. Contractor shall provide all labor, materials, equipment, tools, services, and incidentals to furnish and install epoxy grout injected into cracks in concrete, in accordance with the Contract Documents.

C. Related Requirements: 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 05 05 - Concrete Testing and Inspection.

1.2 PRICE AND PAYMENT PROCEDURES

A. Unit Prices:
   1. Bid/pay items of Unit Price Work addressed in this Section are indicated in the Bid Form, the Agreement, and in Section 01 04 00.
   2. Description of each type of crack repair Unit Price Work is indicated in Article 3.1 of this Section.
   3. Criteria for measurement for payment of such Unit Price Work are addressed in the General Conditions (as may be modified by the Supplementary Conditions) and Section 01 04 00, as augmented by this Section.

B. Measurement:
   1. Quantity of each item of Unit Price Work covered by this Section shall be measured for payment prior to commencement of the associated Work in each work area. Limits of cracks in concrete existing prior to the Contract that are to be repaired by Contractor will be marked at the Site by Engineer or Owner. Cracks, beyond the marked limits indicated at the Site, in concrete existing prior to the Contract, will not be eligible for payment unless approved in writing by Engineer prior to injection.
   2. Work not marked and measured in advance for payment will not be eligible for payment.
   3. Engineer will observe the associated Work performed. Crack repair Work shall be in accordance with the Contract Documents for such Work to be eligible for payment, even when such Work was marked and measured in advance for payment.
   4. Repair of cracks in new concrete Work provided by Contractor is not eligible for payment under the Unit Price Work item(s) addressed by this Section. Such crack repairs are included in the Work of the associated bid/pay item under which the subject new concrete Work was provided.
1.3 REFERENCES

A. Terminology:
1. This provision indicates terminology used in this Section and in other Contract Documents that coordinate with this Section. Such terminology may or may not be indicated using initial capital letters and, when used in relation to the Work of this Section, have the meanings indicated below.
2. “Active crack” means crack in concrete with plane surfaces in a state of movement relative to each other; dynamic condition.
3. “Crack depth” means distance the crack extends from injection surface into the concrete to location where the subject crack is less than 0.002 IN wide.
4. “Effective pressure” means fluid grout pressure at point of grout entry at the injection port/nozzle. Effective pressure is gauge pressure minus hydraulic head losses in the injection system.
5. “Flushing” means removing debris and foreign matter from concrete crack to be repaired by introducing pressurized air or pressurized liquid.
6. “Gauge pressure” means reading of pressure of fluid grout, as indicated on an appropriate gauge for the service, with current, valid calibration, on discharge of the grout pump during injection of epoxy grout.
7. “Gravity feed” means filling and sealing of horizontally positioned cracks in concrete, using low-viscosity resins, by pouring and spreading onto surface or placing into purposely-formed reservoirs.
8. “MPII” means manufacturer’s printed installation instructions.
9. “Passive crack” means crack in concrete with plane surfaces not moving relative to each other.
10. “Pot life” means time during which polyurethane or epoxy resin is capable of being pumped.
11. “Refusal criteria” means zero flow of grout at proposed effective pressure for duration of five minutes.
12. “Resin” or “resin adhesive” means crack-filling material injected or introduced into crack in concrete for re-bonding the crack’s separated edges for transfer of stress across the crack and to prevent subsequent flow of water or other liquids through the crack.
13. “Sealant” means crack-filling material, with adhesive and cohesive properties, that forms seal preventing ingress and egress of liquids and gases into and from concrete.
15. The meaning of selected, other words and terminology used in this Section are indicated in ACI CT and ACI 503.7.

B. Reference 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, Concrete Terminology.
2. ASTM International (ASTM):
   b. C882, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
1.4 QUALITY ASSURANCE

A. Qualifications (General):
   1. Entity Performing Crack Repairs:
      a. Entity performing repair of cracks in concrete, whether Contractor or Subcontractor, and including installers and applicators, shall possess not less than five years current experience repairing cracks in concrete in facilities of similar environmental exposures installing or applying materials similar to those required in this Section.
      b. Entity performing crack repairs 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 crack repair Work of this Project within the past five years.
      c. Certification by Materials Manufacturers:
         1) Installer or applicator of crack repair materials shall be certified or approved, in writing, by crack repair materials manufacturers used in the Work, for installing the crack repair materials required.
   2. Manufacturer’s Representative:
      a. Trained at materials manufacturers’ production facilities.
      b. Experienced with and capable of properly and clearly instructing entity performing crack repairs.
      c. Knowledgeable of and experienced with current theories on the nature and causes of cracking in concrete.
      d. Methods for repairing damaged concrete.
      e. Technical aspects of correct materials selection and use.
      f. Operation, maintenance, and troubleshooting of application equipment.

B. Pre-Installation Conference for Crack Repair Work:
   1. Schedule, convene, and actively participate in pre-installation conference at the Site not less than seven days prior to commencing crack repair Work at the Site.
   2. Conference participants shall be knowledgeable on the types and general extent of the crack repair Work and requirements of the Contract Documents relative to crack repair Work, and times for crack repair Work as allocated in the Progress Schedule accepted by Engineer. Conference participants shall include individuals empowered to speak for and bind their respective organization regarding crack repair Work.
   3. Required Participants:
      a. Contractor’s project manager and Site superintendent.
      b. Project manager and foreman for each entity performing crack repair Work, including installers and applicators of crack repair materials.
      c. Manufacturer’s representative of each Supplier of crack repair materials to be used in the Work.
      d. Engineer and Resident Project Representative.
      e. Owner’s project manager (when available) and other personnel invited by Owner (when available).
   4. Conference will be chaired by Engineer or Resident Project Representative, who will also advise required participants of conference date, time, and location, and prepare and distribute to participants (and others as appropriate) a record of topics discussed, and decisions made during the conference.
   5. Topics to be discussed include:
      b. Required environmental conditions and forecasted weather conditions at scheduled times of crack repair Work.
      c. Storage of crack repair materials.
      d. Material manufacturers’ representatives’ required services.
      e. Submittals required prior to commencing the crack repair Work.
f. Surface preparation under this Section and other Specifications sections, and substrate condition and pretreatment.
g. Installation and application of repair materials.
h. Required curing period.
i. Special details.
j. Field quality control requirements.
k. Protection of adjacent surfaces and installed Work, and clean.

1.5 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Prepare crack repair work plan and submit to Engineer not less than 21 days prior to commencing Work under this Section.
   b. Crack repair work plan shall indicate the following:
      1) Basis of material selection.
      2) Specific materials proposed for use at each type of crack and work area.
      3) Proposed effective pressure for injection of repair material(s) into cracks.
      4) Surface finishing.
      5) Location and size of injection ports.
      6) Surface preparation of concrete prior to surface sealing.
      7) Method of storing and handling resins, cleaning solvents, and waste materials.
   c. Engineer’s approval of crack repair work plan and any proposed crack repair methods, and Engineer’s acceptance of any required certifications, does not mitigate or relieve Contractor of Contractor’s responsibility to provide crack repair Work in accordance with the Contract Documents and, in no way, imparts on Engineer responsibility of any sort for construction means, methods, techniques, procedures, or sequences, or safety and protection measures incident thereto.

2. Product Data:
   a. Material manufacturers’ published technical data including:
      1) Published product data, indicating properties, appropriate uses and applications, and limitations; and manufacturer’s specifications.
      2) Manufacturer’s written acknowledgement that materials proposed comply with requirements of standards referenced in the Contract Documents.
   b. When crack repair Work includes concrete in contact with potable water or water that will be treated to become potable, submit documentation of compliance with NSF/ANSI 61.
   c. Material manufacturers and types:
      1) Polyurethane sealant.
      2) Surface seal.
      3) Epoxy penetrating sealant.

B. Informational Submittals: Submit the following:

1. Certifications:
   a. Certification of Materials for Intended Service:
      1) Certification of material manufacturer, signed by person factory-trained by material manufacturer in the application of the materials proposed for use, indicating that materials and crack repair work plan have been reviewed and are suitable for the intended use on this Project.
      2) Do not begin injection of cracks in concrete until crack repair methods proposed for the Work are certified by material manufacturer's technical representative and accepted by Engineer.
   b. Manufacturer’s Certification of Installer or Applicator:
      1) Written certification or approval of material manufacturer of each proposed installer or applicator of crack repair materials, acknowledging that installer or applicator is knowledgeable regarding installing and applying each product proposed for use.
2) In lieu of written certification or approval required by the paragraph immediately above, submit certification that manufacturer’s technical representative performed training for the installers or applicators at the Site in accordance with this Section.

c. Certification of calibration, and calibration records for the past year, for each pressure gauge to be used in the crack repair Work.

2. Technical data for metering, mixing, and injection equipment.

3. Manufacturer’s Instructions:
   a. Repair materials manufacturers’ published installation instructions.
   b. Installation instructions for repairing core holes taken at epoxy resin injection locations.

4. Qualifications Statements:
   a. Entity performing concrete crack repairs, including installers and applicators.
   b. Manufacturers’ representatives performing services at the Site, when such qualifications are requested by Engineer.

C. Closeout Submittals: Submit the following:
   1. Record documents that accurately depict actual locations of repaired cracks and type of crack injection materials used at each location. This may be shown and indicated on record drawings required in Section 01 78 39 - Project Record Documents.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with material manufacturer’s written instructions and recommendations regarding handling, delivery, and storage.

B. Storage:
   1. Store materials in tightly-sealed, original containers, off the ground and in dry location with humidity controls.
   2. Do not store in direct sunlight.
   3. Protect materials from temperature extremes and avoid freezing temperatures.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, manufacturers indicated below are acceptable for use in the Work of this Section.

1. Surface Seal:
   a. Master Builders Solutions.
   b. Sika Corporation.
   c. Euclid Chemical Company.
   d. Or equal.

2. Polyurethane Sealant:
   a. Master Builders Solutions.
   b. Sika Corporation.
   c. Euclid Chemical Company.
   d. Green Mountain International.
   e. Or equal.

3. Epoxy Penetrating Sealant:
   a. Master Builders Solutions.
   b. Sika Corporation.
   c. Euclid Chemical Company.
   d. Or equal.

B. All materials of each type used for crack injection shall be furnished by a single manufacturer, to ensure compatibility of materials.
2.2 MATERIALS

A. All crack repair materials that will be in contact with potable water or water that will be treated to become potable shall be:
   1. Non-toxic and free of taste and odor; and
   2. Certified in accordance with NSF/ANSI 61.

B. Surface Seal:
   1. Material shall seal crack faces and have sufficient strength and adhesion to contain the injection adhesive during injection and while injection adhesive cures.
   2. Capable of being removed after injection, when not leave residue or damage concrete surface concrete.
   3. Acceptable Products:
      a. MasterEmaco ADH 1420, by Master Builders Solutions.
      b. Sikadur 31, Hi-Mod Gel, by Sika Corporation.
      c. Dural Fast Set Gel, by Euclid Chemical Company.
      d. Or equal.

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 seal non-structural cracks in concrete.
   2. Polyurethane sealant and accelerator, if used, shall be provided by a single manufacturer to ensure compatibility of materials.
   3. Acceptable Products:
      a. MasterInject 1230 IUG, by Master Builders Solutions.
      b. Sikadur HH LV, by Sika Corporation.
      c. Dural Aqua-Dam LV, by Euclid Chemical Company.
      e. Or equal.

D. Epoxy Penetrating Sealant:
   1. Super-low-viscosity, two-component epoxy penetrating sealer containing 100% solids.
   2. Capable of being used alone to seal passive horizontal cracks less than 0.030 IN wide.
   3. Acceptable Products:
      a. MasterInject 1000, by Master Builders Solutions.
      b. Sikadur 55 SLV, by Sika Corporation.
      c. Dural 335, by Euclid Chemical Company.
      d. Or equal.

PART 3 - EXECUTION

3.1 CRACK REPAIR – GENERAL

A. Cracks wider than 0.004 IN in existing concrete, as shown or indicated or as directed by Engineer and designated as active crack or passive crack, and as either structural crack or non-structural crack, shall be numbered, and physically marked and measured in accordance with Article 1.2 of this Section.

B. Cracks in new concrete Work as directed by Engineer shall be repaired in accordance with this Section.

C. Crack Monitoring:
   1. Engineer may require monitoring of cracks to be repaired, using crack width monitor (provided by Contractor) for period (not less than 96 HRS) established by Engineer, to verify whether crack is active or passive.
   2. When directed by Engineer, continue monitoring crack width for time required by Engineer to determine whether crack is at its widest, as measured at concrete surface.
D. Crack repair procedures for cracks shall be verified by material manufacturer’s technical representative and shall be in conformance with the following:
   1. Method 3: Repair of active, non-structural cracks, cracks that exhibit leakage, or as directed by Engineer shall be as follows:
      a. Crack widths less than 1/8 IN shall be pressure injected with polyurethane sealant.
   2. Method 5: Very narrow crack (less than 0.010 IN wide) may be treated with silane sealer when directed by Engineer and approved by material manufacturer for the intended application.
   3. Crack widths greater than 1/8 IN will be further investigated by Engineer and direction furnished to Contractor on repair method(s) required.

3.2 PREPARATION
   A. Remove loose matter, dirt, dust, laitance, oil, grease, salt, and other contaminants from surfaces of cracks.
   B. Clean cracks in accordance with the crack repair product MPII.
   C. Clean surfaces adjacent to cracks, for not less than 1 IN on each side of each crack, to remove loose matter, dirt, dust, laitance, oil, grease, salt, and other contaminants that may be detrimental to bond of surface seal.
   D. Do not use cleaners that will or have potential to adversely affect the repair.

3.3 EQUIPMENT USED FOR CRACK REPAIRS
   A. Gauges:
      1. Use properly-calibrated gauges, with current calibration, with pump and injection hose used for introducing material into cracks. Provide additional gauges at the Site to replace gauges that malfunction.
   B. Pump:
      1. Pump equipment used for pressure injection of material into cracks shall be suitable for the intended use and compatible with injection resin used.
      2. Portable, positive displacement-type pump with interlock providing inline mixing and metering for two-component injection resins.
      3. Where volume of crack repair is less than one quart for 1000 SQFT of gross repair area, or where excessive grout pressure developed by pump might further damage structure, pre-mixed material and hand cartridge pumps may be used if acceptable to Engineer.
      4. Pump may be electric-powered or air-powered with interlocks providing, at the nozzle, positive ratio control of proportions for the two components.
      5. Use a primary injection pump for each material of different mix ratio. Also have available at the Site standby backup pump of similar ratio.
      6. Capable of immediately compensating for changes in resins.
      7. Do not use batch mix pumps.
      8. Provide pressure hoses and injection nozzle for proper mixing of two adhesive components of epoxy resin adhesive.
   C. Discharge Pressure Control:
      1. Use automatic pressure controls capable of discharging mixed resin adhesive at pressures up to 190 to 210 PSI, that maintain required pressure within range indicated in this paragraph.
   D. Automatic Shutoff Control:
      1. Provide and use sensors on both components for epoxy resin adhesive reservoirs for stopping pump 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. Use two independent, valved nozzles capable of controlling flow rate and pressure by opening or closing valve as necessary to restrict material flow.
2. Pressure gauge capable of sensing pressure behind each valve.

3.4 APPLICATION

A. Environmental Conditions:
1. Comply with material manufacturers’ written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting performance of concrete crack repair products.
2. Substrate surface and ambient air temperature shall be between 40 and 90 DEGF for not less than 24 HRS after application.
3. Pre-condition components to temperature of 70 DEGF for 24 HRS immediately prior to installation, unless otherwise required in MPII.
4. Allow surfaces to attain temperature and conditions required before application.

B. Pressure Injection:
1. Use repair methods and equipment in accordance with Articles 3.1 and 3.3 of this Section. Use of caulk guns to fill cracks is unacceptable.
2. Drilling and Installing Injection Ports:
   a. Drill injection holes on each side of crack at a 45 DEG angle to concrete surface.
   b. Provide holes at locations so that holes intersect crack at the approximate midpoint of crack depth. Holes shall extend through the crack section.
   c. Size of holes shall accommodate injection ports.
   d. Spacing of Injection Ports:
      1) Spacing between injection port holes shall not exceed the lesser of: depth of crack, 8 IN, or thickness of concrete member. Injection port holes shall be alternated from one side of crack to the other side of the crack.
      2) Space injection ports closer together to allow adjustment of injection pressure for 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 installing injection ports, clean each hole each hole of deleterious material by air-water blast to completely remove drill cuttings from hole.
   f. Install and seal around each injection port with surface seal material in accordance with material MPII.
      1) Inserted end of injection port shall not extend beyond point at which drilled hole intersects the crack.
3. Cleaning and Flushing:
   a. After injection ports are inserted and sealed, flush crack with air-water mixture, or alternating water and air flush, to remove deleterious materials prior to injection of resin.
   b. Inject flushing media (air and water) through injection ports. Continue flushing until flushing media discharges from adjacent injection port and the crack is thoroughly cleaned.
   c. Perform final flush with air only to remove remaining water.
4. Surface Sealing:
   a. Provide surface seal in accordance with MPII to faces of all accessible cracks prior to pressure injecting.
   b. Seal surfaces of crack to prevent escape of injection resin.
5. Injection:
   a. Comply with material MPII and manufacturer’s technical representative for mixing and injecting procedures.
   b. Commence injecting resin starting with injection port at crack’s lowest elevation.
c. Proceed upward along the crack, injecting resin through each successive injection port, without interruption, to the crack’s highest elevation.
d. Do not relocate injection nozzle to adjacent injection port until resin appears at the next-higher adjacent injection port or refusal criteria is developed.
e. Seal each injection port immediately after completing the injection at that injection port.

C. Gravity Feed: Provide epoxy penetrating sealant in accordance with material MPII.

3.5 CLEANING

A. Removal of Crack Seals at Pressure-Injected Cracks:
   1. After completion of pressure injecting cracks in a given work area, remove surface seal material and re-finish concrete in area of pressure injection to match finish of existing, adjacent concrete.
   2. Comply with Section 03 35 00 - Concrete Finishing and Repair of Surface Defects regarding finishing requirements.
   3. Do not perform surface finishing until curing period, as specified by material MPII, is complete.

B. Cleaning:
   1. Clean and properly dispose of excess materials.
   2. Avoid creation of nuisances.
   3. Comply with Section 01 74 00 - Cleaning.

3.6 FIELD QUALITY CONTROL

A. Field Tests:
   1. Monitor each pressure injection location. Observe and record the following:
      a. Volume of resin used within each 10 FT of crack length.
      b. Pump gauge pressure at intervals of nor more than 10 minutes while material is being pumped.
      c. Indication of crack location and number, injection port spacing, and confirmation of resin appearing or refusal at each injection port.
   2. Injection Pressure Test:
      a. Perform injection pressure test for each injection equipment unit:
         1) At start and end of each injection workday.
      b. When injection work is stopped for more than 45 minutes Disconnect mixing head of injection equipment and connect two adhesive component delivery lines to pressure check device.
      c. Pressure Check Device:
         1) Two independent, valved nozzles capable of controlling flow rate and pressure.
         2) Pressure gauge capable of sensing and displaying pressure behind each valve.
      d. Close valves on pressure check device and operate equipment until gauge pressure on each line reads 160 PSI.
      e. Check tolerance to verify equipment capable of meeting specified ratio tolerance.

B. Suppliers’ Services:
   1. Manufacturers of crack repair materials shall:
      a. Furnish required materials and services of manufacturer’s representative at the Site.
      b. Review preparation and installation by Contractor and entity performing crack repair Work.
      c. Certify the installation methods to be used for each repair material used in the crack repair Work of this Section.
      d. Certify the installers and applicators of crack repair materials, if documentation of such prior certification was not previously furnished as a Submittal prior to starting the Work.
2. Manufacturers’ representatives of crack repair materials shall be at the Site prior to and during first installation of the materials furnished under this Section to review preparation, field quality control, and proposed installation methods.

C. Item – Concrete Crack Repair and Injection:
   1. Measurement will be the length, in feet, of existing, concrete crack repaired, measured at the concrete surface.
   2. Sub-Items: This Work of this item is divided into the following, separate sub-items, with separate quantity for each sub-item as indicated in the Bid Form and Agreement:
      a. Method 3: Repair of active, non-structural cracks, cracks that exhibit leakage, or as directed by Engineer.
      b. Method 5: Very narrow cracks (0.010 IN wide and less).
      c. Crack widths greater than 1/8 IN.
   3. Item Includes (all in accordance with the Contract Documents):
      a. As indicated in Section 03 64 23 - Crack Repair and Injection Concrete.
   4. Not included in this bid/pay item:
      a. As indicated in Section 03 64 23 - Crack Repair and Injection.
      b. Repair of cracks in new concrete Work provided by Contractor is not eligible for payment under the Unit Price Work of this item. Such repairs shall be performed without additional cost to Owner.
   5. Payment: Unit price per foot for the crack repair Work of the type indicated, under this item will be full compensation for Work for the associated type of crack repair Work, performed under the associated sub-item, complete in accordance with the Contract Documents, and not specifically included under other bid/pay items or contracts.

END OF SECTION
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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. Modular framing system.

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 15 19 - Anchorage to Concrete.
   5. Section 03 31 30 - Concrete, Materials and Proportioning.

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):
   5. American Society of Civil Engineers (ASCE):
   6. ASTM International (ASTM):
      l. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.


o. A500, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.


s. A572, Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.


u. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.


z. A1064, Standard Specification for Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.


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.


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):


b. D1.1, Structural Welding Code - Steel.


d. D1.6/D1.6M, Structural Welding Code - Stainless Steel.

8. National Association of Architectural Metal Manufacturers (NAAMM):

a. AMP 510, Metal Stairs Manual.
c. MBG 531, Metal Bar Grating Manual.


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.

B. Qualifications:
   1. Qualify welding procedures and welding operators in accordance with AWS.
   2. Fabricator shall have minimum of 10 years of 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 years of 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. 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.
   2. 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) Modular framing systems.

B. Informational Submittals:
   1. Certification of welders and welding processes.
      a. Indicate compliance with AWS.

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. Mechanical anchor bolts: See Section 03 15 19.
   2. Epoxy adhesive anchor bolts: See Section 03 15 19.
   3. Concrete screw anchors: See Section 03 15 19.
   4. Galvanizing repair paint:
      a. Clearco Products Co., Inc.
      b. ZRC Products.
   5. Modular framing system:
      c. Kindorf.
      d. Superstrut.

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: ASTM F3125, Grade A325.
   6. Washers (hardened):
      a. ASTM F436.
      b. Provide two (2) washers with all bolts.
   7. Bolts and nuts (unfinished): ASTM A307, Grade A.
   8. Welding electrodes: AWS D1.1, E70 Series.

B. 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 316.
      b. Tubing and pipe: ASTM A269, ASTM A312 or ASTM A554, Type 316.
      c. Strip, plate and flat bars: ASTM A666, Type 316.
      d. Bolts and nuts: ASTM F593, Type 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.

C. 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.
      b. Weir plates, baffles and deflector plates, ASTM B209.
   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.

D. Washers: Same material and alloy as found in accompanying bolts and nuts.
E. Embedded Anchor Bolts: See Specification Section 03 15 19.

F. Mechanical Anchor Bolts and Adhesive Anchor Bolts: See Specification Section 03 15 19.

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:
   1. Multi-Purpose Epoxy, Series N69 Hi-Build Epoxoline II by Tnemec or similar.
   2. 4.5 to 5.5 MIL prime coat minimum.

2.3 MANUFACTURED UNITS

A. Modular Framing System:
   1. Materials:
      a. Steel: ASTM A1011, carbon steel, Grade 33.
         1) Hot-dipped galvanized, ASTM A123 or ASTM A153.
      b. Aluminum: ASTM B221 or ASTM B209.
   2. Channels and inserts:
      a. Steel or stainless steel: Minimum 12 GA.
      b. Aluminum: Minimum 0.080 IN.
      c. Channels to have one 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.
         a) Plastic for all exposed ends 7 FT or more above floor or platform.
         b) Plastic or metallic for all other exposed ends.
   6. Schedule:
      a. Interior wet areas: Stainless steel.
         1) Including the following rooms or areas:
      b. Interior corrosive areas: Stainless steel.
         1) Including the following rooms or area:
      c. Exterior areas: Stainless steel.
      d. All other areas not listed above: Stainless steel.
   7. Provide dissimilar materials protection in accordance with this Section.

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. 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. 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.

2.5 SOURCE QUALITY CONTROL
A. Surface Preparation: Prepare surfaces for coatings as required by coating manufacturer.
B. 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 years performing similar work and shall be subject to Owner's approval.
C. 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. 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.

D. 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.

E. 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.

F. Erect plumb and level; introduce temporary bracing required to support erection loads.

G. Welding:
   1. Comply with AWS D1.1, AWS D1.2, and AWS D1.6 (as applicable for the material welded) and requirements of this Section’s “Fabrications” Article in “Part 2 - Products”.
   2. When joining two sections of steel of different ASTM designations, welding techniques shall be in accordance with a qualified AWS D1.1 procedure.

H. Clean stored material of all foreign matter accumulated prior to the completion of erection.


J. Field Welding:
   1. Follow AWS procedures.
   2. Grind welds smooth where field welding is required.

K. Remove all burrs and radius all sharp edges and corners of miscellaneous plates, angles, framing system elements, etc.

L. 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.
   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.

M. 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.

N. 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.

O. Install bollards as detailed on Drawings.
   1. Fill pipe with concrete and round off at top.

P. Coat aluminum surfaces in contact with dissimilar materials in accordance with this Specification Section.

Q. 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.

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.

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 this Specification
   Section.

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DIVISION 07

THERMAL AND MOISTURE PROTECTION
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PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Sealing all joints which will permit penetration of dust, air or moisture.

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 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Concrete Institute (ACI):
      a. 302.1R, Guide for Concrete Floor and Slab Construction.
   2. ASTM International (ASTM):

B. Qualifications: Sealant applicator shall have minimum five years 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: Entire Work Area.

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. 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.

2. Certification from sealant manufacturer stating product being used is recommended for and is best suited for joint in which it is being applied.
3. 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:

1.5 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.

1.6 PROJECT CONDITIONS
A. Schedule installation of sealant work after completion of penetrating item installation but prior to covering or concealing of openings.

B. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

C. During installation provide masking and drop cloths to prevent sealant materials from contaminating any adjacent surfaces.

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.

3. Polyether sealants:
   a. Master Builders Solutions.
   b. Chem Link.
   c. Tremco Commercial Sealants & Waterproofing.

4. Polysulfide rubber sealant:
   a. Pecora Corporation.
   b. Master Builders Solutions.
   c. PolySpec by ITW Polymers Sealants.

5. Polyurethane sealants:
   a. Pecora Corporation.
b. Sika.

c. Master Builders Solutions.

d. Tremco Commercial Sealants & Waterproofing.

6. Backer rod, compressible filler, primer, joint cleaners, bond breaker:
   a. As recommended by sealant manufacturer.

2.2 MATERIALS

A. Sealants - General:
   1. Provide colors matching materials being sealed as selected by the Engineer.
   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. Compressible Sealant:
   1. For joints exposed to wastewater fumes or vapor:
      a. Closed cell ethylene vinyl acetate (EVA) foam with epoxy adhesive.
      b. Schul "HydroStop".
   2. Adhesive: As recommended by sealant manufacturer.

C. Expanding Foam Sealant:
   1. One or two component 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.
   7. Smoke developed: Less than 25.

D. Polyether Sealant:
   1. Silyl-terminated polyether polymer.
   2. ASTM C920, Type S, Grade NS, Class 50, Use NT, M, A, and O.
      a. Master Builders Solutions MasterSeal 150.
      b. Chem Link DuraLink.
      c. Tremco Dymonic FC.

E. Polysulfide Rubber Sealant:
   1. One or two components.
      a. Pecora Synthacalk GC2+.
      b. PolySpec THIOKOL 2235.

F. 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.
      b. Sika Chemical Corporation Sikaflex-1a, Sikaflex-2C NS/SL.
      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.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

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 penetrates the 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. 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.
   2. 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. Construction, control and expansion joints.
2. Joints between precast wall panels.
C. 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:
      b. 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. Interior areas:
      a. Corrosive areas:
         1) Wet exposure: Polysulfide.
   3. Immersion:
      a. Prolonged contact with or immersion in:
         1) Non-potable water, wastewater or sewage: Polysulfide.
   4. Exterior wall penetrations: Expanding urethane foam, with finish sealant.
      a. Finish sealant:
         1) Exterior side:
            a) Above grade: Polyether.
            b) Below grade: Polyurethane.

END OF SECTION
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PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Basic requirements for electrical systems.

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. Division 03 - Concrete.
   5. Section 03 15 19 - Anchorage to Concrete.
   6. Section 26 05 19 - Wire and Cable - 600 Volt and Below.
   7. 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 Institute of Steel Construction (AISC):
   4. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
   5. National Fire Protection Association (NFPA):
      a. 70, National Electrical Code (NEC).
   6. Underwriters Laboratories, Inc. (UL).

B. Products to be listed by a Nationally Recognized Testing Laboratory (NRTL) in accordance with applicable product standards.
   1. Applicable product standards including, but not limited to, ANSI, FM, IEEE, NEMA and UL.
   2. NRTL includes, but is not limited to, CSA Group Testing and Certification (CS), FM Approvals LLC (FM), Intertek Testing Services NA, Inc. (ETL), and Underwriters Laboratories, Inc. (UL).

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. Non-architecturally finished interior area: Pump, chemical, mechanical, electrical rooms and other similar process type rooms.
   3. Highly corrosive and corrosive area: 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.
   4. Hazardous areas: Class I, II or III areas as defined in NFPA 70.
   5. Shop fabricated: Manufactured or assembled equipment for which a UL test procedure has not been established.
1.4 SUBMITTALS

A. Shop Drawings:
   1. See individual specification sections for submittal requirements for products defined as equipment.
   2. 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 NRTL listed or are constructed utilizing NRTL recognized components.
      d. Manufacturer's delivery, storage, handling and installation instructions.
      e. Product installation details.
      f. Equipment area classification rating.
      g. Short Circuit Current Rating (SCCR) nameplate marking per NFPA 70, include any required calculations.
      h. See individual specification sections for any additional requirements.
   3. Fabrication and/or Layout Drawings:
      a. Concrete and reinforcing steel, per Division 03 requirements.

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 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. 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. Provide all components of a similar type by one (1) manufacturer.

2.2 MATERIALS

A. Electrical Equipment Support Pedestals and/or Racks:
   1. Manufacturers:
      a. Modular strut:
1) Unistrut Building Systems.
2) B-Line by Eaton.
3) Globe Strut.
4) Superstrut by Thomas & Betts.

2. Material requirements:
   a. Modular strut:
      1) Aluminum: AA Type 6063-T6.
   b. Mounting hardware:
      1) Stainless steel.
   c. 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. Conduit routings and stub-up locations that are shown are approximate; exact routing to be as required for equipment furnished and field conditions.
   1. All conduit routing shall be reviewed by Engineer and Owner before installation.

D. Do not use equipment that exceed dimensions or reduce clearances indicated on the Drawings or as required by the NFPA 70.

E. Install equipment plumb, square and true with construction features and securely fastened.

F. Install electrical equipment, including pull and junction boxes, minimum of 6 IN from process, gas, air and water piping and equipment.

G. 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.

H. 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 of up to 6 IN in equipment location with the Engineer's approval.

I. 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.

J. 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.

K. Provide non-metallic 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.

L. Do not place equipment fabricated from aluminum in direct contact with earth or concrete.

M. Screen or seal all openings into equipment mounted outdoors to prevent the entrance of rodents and insects.

N. Do not use materials that may cause the walls or roof of a building to discolor or rust.

3.2 FIELD QUALITY CONTROL

A. Replace equipment and systems found inoperable or defective and re-test.

B. Cleaning:
   1. See Specification Section 01 74 00.

C. 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 PVC coated components utilizing a patching compound, of the same material as the coating, provided by the manufacturer of the component.
   4. Repair surfaces which will be inaccessible after installation prior to installation.
   5. See Specification Section 26 05 33 for requirements for conduits and associated accessories.

D. Replace nameplates damaged during installation.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Material and installation requirements for:
      a. Instrumentation cable.
      b. Wire connectors.
      c. Insulating tape.
      d. Pulling lubricant.

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 26 05 00 - Electrical - Basic Requirements.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. Aluminum Association (AA).
   2. Insulated Cable Engineers Association (ICEA):
   3. National Electrical Manufacturers Association (NEMA):
      a. ICS 4, Industrial Control and Systems: Terminal Blocks.
   4. 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.
   5. 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.
   6. Telecommunications Industry Association/Electronic Industries Alliance/American National
      Standards Institute (TIA/EIA/ANSI):
      a. 568, Commercial Building Telecommunications Cabling Standard.
   7. Underwriters Laboratories, Inc. (UL):
      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.

1.4 SUBMITTALS

A. Shop Drawings:
1. 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. Instrumentation cable:
   a. Analog cable:
      1) Alphawire.
      2) Belden Inc.
      3) General Cable.
2. 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.
3. Insulating and color coding tape:
   a. 3M Co.
   b. Plymouth Bishop Tapes.
   c. Red Seal Electric Co.

2.2 MANUFACTURED UNITS

A. Instrumentation Cable:
1. Surface mark with manufacturer’s name or trademark, conductor size, insulation type and UL label. Two (2) twists per foot minimum.
b. Conform to NFPA 262, UL 2250, UL 1581 and NFPA 70 Type ITC.

B. Pulling Lubricant: Cable manufacturer's standard containing no petroleum or other products which will deteriorate insulation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Conductor Size Limitations:
   1. Instrumentation conductors shall not be smaller than No. 18 AWG unless otherwise indicated on the Drawings.

B. Install all wiring in raceway unless otherwise indicated on the Drawings.

C. 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.

D. Ground the drain wire of shielded instrumentation cables at one end only.
   1. The preferred grounding location is at the load (e.g., control panel), not at the source (e.g., field mounted instrument).

E. Splices and terminations for the following circuit types shall be made in the indicated enclosure type using the indicated method.
   1. 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.
   2. 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.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Material and installation requirements for grounding and bonding system(s).

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 26 05 00 - Electrical - Basic Requirements.
   5. Section 26 05 19 - Wire and Cable - 600 Volt and Below.
   6. Section 26 05 33 - Raceways and Boxes.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. ASTM International (ASTM):
   2. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
      a. 837, Standard for Qualifying Permanent Connections Used in Substation Grounding.
      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. 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 by Pentair.
      b. Harger Lightning & Grounding.
      d. Burndy by Hubbell.
      e. Robbins Lightning, Inc.
      f. Blackburn by Thomas & Betts.
      g. Thompson Lightning Protection, Inc.
   2. Exothermic weld connections:
a. ERICO by Pentair - Cadweld.
b. Harger Lightning & Grounding - Ultraweld.
c. Burndy by Hubbell - Thermoweld.
d. FurseWELD by Thomas & Betts.

2.2 COMPONENTS

A. Conduit: As specified in Specification Section 26 05 33.

B. Grounding Clamps, Connectors and Terminals:
   1. Mechanical type:
      b. High copper alloy content.
   2. Compression type for interior locations:
      b. High copper alloy content.
      c. Non-reversible.
   3. Terminals for connection to bus bars shall have two bolt holes.

C. 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. Do not use exothermic welding if it will damage the structure the grounding conductor is being welded to.

B. Supplemental Grounding Electrode:
   1. Equipment support rack and pedestals mounted outdoors:
      a. Connect metallic structure to a ground rod.
      b. Grounding conductor: #6 AWG minimum.

C. 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.

D. Equipment Grounding:
1. Ground all utilization equipment with an equipment grounding conductor.

END OF SECTION
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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. Pull and junction boxes.

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 26 05 00 - Electrical - Basic Requirements.
   5. Section 26 05 19 - Wire and Cable - 600 Volt and Below.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. Aluminum Association (AA).
   2. National Electrical Manufacturers Association (NEMA):
      a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
      a. C80.5, Electrical Aluminum Rigid Conduit (ERAC).
      a. 70, National Electrical Code (NEC).
   5. Underwriters Laboratories, Inc. (UL):
      a. 360, Standard for Liquid-Tight Flexible Metal Conduit.
      b. 467, Grounding and Bonding Equipment.
      c. 514B, Conduit, Tubing, and Cable Fittings.
      d. 1203, Standard for Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations.
      e. 2515, Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.

1.3 SUBMITTALS

A. Shop Drawings:
   1. 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.
   2. Fabrication and/or Layout Drawings:
      a. Identify dimensional size of pull and junction boxes to be used.

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.
      b. Western Tube and Conduit Corporation.
      c. Wheatland Tube.
      d. Patriot Aluminum Products, LLC.
   2. Conduit fittings and accessories:
      a. Appleton by Emerson Electric Co.
      b. Carlon by Thomas & Betts.
      c. Cantex, Inc.
      d. Crouse-Hinds by Eaton.
      e. Killark by Hubbell.
      g. O-Z/Gedney by Emerson Electric Co.
      h. Raco by Hubbell.
      i. Steel City by Thomas & Betts.
      j. Thomas & Betts.
   3. Support systems:
      b. B-Line by Eaton.
      c. Kindorf by Thomas & Betts.
      d. Minerallac Company.
      e. CADDY by Pentair.
      f. Superstrut by Thomas & Betts.
   4. Outlet, pull and junction boxes:
      a. Appleton by Emerson Electric Co.
      b. Crouse-Hinds by Eaton
      c. Killark by Hubbell.
      d. O-Z/Gedney by Emerson Electric Co.
      e. Steel City by Thomas & Betts.
      f. Raco by Hubbell
      g. Bell by Hubbell.
      h. Hoffman Engineering.
      i. Wiegmann by Hubbell.
      j. B-Line by Eaton.
      k. Adalet.
      l. RITTAL North America LLC.
      m. Stahlin by Robroy Enclosures.

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.

2.3 CONDUIT FITTINGS AND ACCESSORIES

A. Fittings for Use with RAC:
   1. General:
      a. Finish: Electrostatically applied epoxy powder coat.
      b. In hazardous locations listed for use in Class I, Groups C and D locations.
2. Locknuts:
   a. Threaded stainless steel.
   b. Gasketed or non-gasketed.
   c. Grounding or non-grounding type.
3. Bushings:
   a. Threaded, insulated metallic.
   b. Grounding or non-grounding type.
4. Hubs: Threaded, insulated and gasketed metallic for raintight connection.
5. 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.
6. Unions: Threaded stainless steel or aluminum.
7. Conduit bodies (ells and tees):
   b. Standard and mogul size.
   c. Cover:
      1) Clip-on type with stainless steel screws.
      2) Gasketed or non-gasketed stainless steel or cast copper free aluminum.
8. Conduit bodies (round):
   b. Cover: Threaded screw on type, gasketed, stainless steel or cast copper free aluminum.
9. Sealing fittings:
   b. Standard and mogul size.
   c. With or without drain and breather.
   d. Fiber and sealing compound: UL listed for use with the sealing fitting.
10. Hazardous location flexible coupling (HAZ-FLEX):
    a. Liquid tight and arc resistant.
    b. Electrically conductive so no bonding jumper is required.
    c. Dry and wet areas:
       1) Stainless steel braided covering over flexible stainless steel core.
       2) Stainless steel end fittings.
       3) Aluminum unions and nipples.
11. Expansion/deflection couplings:
    a. 3/4 IN nominal straight-line conduit movement in either direction.
    b. 30 DEG 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.

2.4 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.

2.5 PULL AND JUNCTION BOXES

A. NEMA 1 Rated:
   1. Body and cover: 14 GA minimum, stainless steel or 14 GA minimum, steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
   2. With or without concentric knockouts on four sides.
   3. Flat cover fastened with screws.

B. NEMA 7 and NEMA 9 Rated:
   1. Copper-free aluminum with manufacturer's standard finish.
2. Drilled and tapped openings or tapered threaded hub.
3. Cover bolted-down with stainless steel bolts or threaded cover with neoprene gasket.
4. External mounting flanges.
5. Grounding lug.

C. Standards: NEMA 250, UL 50.

2.6 SUPPORT SYSTEMS

A. Multi-conduit Surface or Trapeze Type Support and Pull or Junction Box Supports:
   1. Material requirements.
      a. Stainless steel: AISI Type 316.
      b. Aluminum: AA Type 6063-T6.

B. Single Conduit and Outlet Box Support Fasteners:
   1. Material requirements: Stainless steel.

2.7 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.

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. Deburr 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.
   2. Use the following to seal fire-rated walls:
      a. For single conduit penetrations:
         1) Flanged and segmented to install around in-place conduits.
      b. For blockouts:
         1) Mounting frame and elastomeric sealing material to be set in place prior to installation of conduits.

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 and on a structure shall be installed exposed except as follows:
   1. Concealed above gypsum wall board or acoustical tile suspended ceilings.

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 600 V and less AC power or control: 6 IN.
   2. 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. 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. Instrumentation cables: Metallic raceway except nonmetallic may be used underground.

B. Permitted Raceway Types Per Area Designations:
   1. Dry areas:
      a. RAC.
   2. Wet areas:
      a. RAC.
   3. NFPA 70 hazardous areas:
      a. RAC when required by other area designations.
C. HAZ-FLEX coupling shall be installed as the final conduit to motors, electrically operated valves, instrumentation primary elements and electrical equipment that is liable to vibrate.
   1. The maximum length shall not exceed:
      a. 3 FT to motors.
      b. 2 FT to all other equipment.

3.4 CONDUIT FITTINGS AND ACCESSORIES

A. Conduit Seals:
   1. Installed in conduit systems located in hazardous areas as required by the NFPA 70.
   2. Fill plug and drain shall be accessible.
   3. Pour the conduit seals in a two-step process.
      a. Pour the seal and leave cover off.
      b. After seal is dry, inspect for proper sealing, install cover and mark (for example, paint or permanent marker) as complete.

B. 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.

C. Threaded connections shall be made wrench-tight.

D. Conduit joints shall be watertight:
   1. Where subjected to possible submersion.
   2. In areas classified as wet.

E. Terminate Conduits:
   1. In NEMA 7 and NEMA 9 rated enclosures:
      a. Into an integral threaded hub.

3.5 CONDUIT SUPPORT

A. Permitted multi-conduit surface or trapeze type support system per area designations and conduit types:
   1. Dry or wet and/or hazardous 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. Stainless steel system may be used with RAC.
      b. Aluminum system may be used with RAC.

B. Permitted single conduit support fasteners per area designations and conduit types:
   1. Dry or wet and/or hazardous areas:
      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.

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.

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 03 15 19 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. 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.
      b. Pull or junction box surface mounted above 10 FT in areas designated as dry in architecturally and non-architecturally finished areas.
      c. Pull or junction box surface mounted in areas designated as dry in architecturally and non-architecturally finished areas.
   3. Permitted uses of NEMA 7 enclosure:
      a. Pull or junction box surface mounted in areas designated as Class I hazardous.
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SECTION 40 05 23
PIPE - STAINLESS STEEL

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes: Stainless steel tubing, piping, fittings, and appurtenances.
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 QUALITY ASSURANCE
A. Referenced Standards:
   1. American Society of Mechanical Engineers (ASME):
   2. ASTM International (ASTM):

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. Acknowledgement that products submitted meet requirements of standards referenced.
   3. Fabrication details and welding procedure specifications for all work to be done under this Specification Section.

PART 2 - PRODUCTS

2.1 MATERIALS
A. Tubing:
   1. ASTM A269.
   2. Filler material: Extra low carbon (ELC) with 0.03% maximum carbon.
B. Pipe:
   1. ASTM A778.
   2. ASTM A312.
C. Pipe Fittings: ASTM A774.
D. Flanges:
   1. Flat faced.
   2. Welding neck or slip on type.
3. ASTM A182, Type 316L.

E. Nuts, Bolts and Washers:
   1. ASTM A320, Type 316.
   2. Two nuts provided for 1 IN DIA bolt applications and larger.

F. Gasket Material:
   1. Rubber or neoprene.
   2. Temperature rating of 250 DEGF.

2.2 FABRICATION

A. All tube, piping, fitting product to be immersion pickled subsequent to manufacturing and fabrication operations and prior to shipping.
   1. Pickling solution of 6-10% nitric acid and 3-4% hydrofluoric acid.
   2. Temperature and exact concentrations to be such only a modest etch is produced but all oxidation and ferrous contamination is removed from metal surface.
   3. All pickling solution residues are to be neutralized after pickling.

B. Diameter tolerance and wall thickness tolerance are to conform to ASTM A530.

C. Joints:
   1. Shop welded circumferential butt weld joints.
   2. ASME B16.1, Class 150.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to installation, inspect and verify condition of piping and appurtenances.
   1. Installation constitutes installer's acceptance of condition for satisfactory installation.

3.2 PREPARATION

A. Correct defects or conditions which may interfere with or prevent a satisfactory installation.

B. Ensure ends of pipe to be fitted with flanges have all protrusions ground flush.

3.3 INSTALLATION

A. Ensure all pipe cutting, threading, and jointing conforms to requirements of ASME B31.1.
   1. Lubricate all pipe threads with Teflon tape.

B. Welding:
   1. Only factory welds are allowed. No field welding allowed.
   2. Provide welds sound and free from embedded scale or slag, and tensile strength at weld not less than pipe.
   3. Perform butt welds only with an inert gas shielded process.
   4. Adequate inert gas protection is to be provided to the top and under or backside of the weld to protect from atmospheric contamination.
   5. Filler metal is to be applied to all manually-performed welds appropriate for the base material being welded.
   6. Only inert gas shielded welding processes are to be used for spool fabrication.
   7. Provide butt welds with 100% penetration to the interior or back side of the weld joint.
   8. Weld reinforcement on both sides of the weld are to be smooth, uniform and no more than 1/16 IN in height.

C. Joining Method - Flanges:
   1. Leave 1/8 IN to 3/8 IN flange bolts projecting beyond face of nut after tightening.
      a. Coordinate dimensions and drillings of flanges with flanges for valves, equipment, and other systems.
b. Tighten bolts evenly around pipe until following range of torques is achieved:

<table>
<thead>
<tr>
<th>BOLT SIZE, IN</th>
<th>RANGES OF TORQUE, FT/LBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/8</td>
<td>40 - 60</td>
</tr>
<tr>
<td>3/4</td>
<td>60 - 90</td>
</tr>
<tr>
<td>1</td>
<td>70 - 100</td>
</tr>
<tr>
<td>1-1/4</td>
<td>90 - 120</td>
</tr>
</tbody>
</table>

3.4 FIELD QUALITY CONTROL

A. Pipe Testing - General:
   1. Test exposed piping upon completion of system.
   2. Isolate equipment which may be damaged by the specified pressure test conditions.
   3. Perform pressure test using calibrated pressure gages and calibrated volumetric measuring equipment to determine leakage rates.
      a. Select each gage so that the specified test pressure falls within the upper half of the gage's range.
      b. Notify the Engineer 24 HRS prior to each test.
   4. Completely assemble and test new piping systems prior to connection to existing pipe systems.
   5. Acknowledge satisfactory performance of tests and inspections in writing to Engineer prior to final acceptance.
   6. Bear the cost of all testing and inspecting, locating and remedying of leaks and any necessary retesting and re-examination.

B. Test requirements:
   1. Test medium: Water.
   2. Pressure: 125 PSIG.
   3. Duration: 6 HRS.

3.5 CLEANING

A. Clean interior of piping systems thoroughly before installing.

B. Maintain pipe in clean condition during installation.

C. Before jointing piping, thoroughly clean and wipe joint contact surfaces and then properly dress and make joint.

D. At completion of work and prior to Final Acceptance, thoroughly clean work installed under these Specifications.
   1. Clean equipment, fixtures, pipe, valves, and fittings of grease, metal cuttings, and sludge which may have accumulated by operation of system, from testing, or from other causes.
   2. Repair any stoppage or discoloration or other damage to parts of building, its finish, or furnishings, due to failure to properly clean piping system, without cost to Owner.

END OF SECTION
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SECTION 40 05 63
BALL VALVES

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes: Ball valves.
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 QUALITY ASSURANCE
A. Referenced Standards:
   1. ASTM International (ASTM):
      b. A351, Standard Specification for Castings, Austenitic, for Pressure-Containing Parts.
   2. Manufacturers Standardization Society of the Valve and Fittings Industry Inc. (MSS):
      a. SP-110, Ball Valves; Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

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.
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.

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 BALL VALVES 3 IN DIA
A. Comply with MSS SP-110.
B. Manufacturers:
   1. Apollo.
   2. Jamesbury.
   3. Watts.
   4. Stockham.
   5. Nibco.
   6. Or approved equal.
C. Materials (All Stainless Steel):
   1. Body: Three-part stainless steel, ASTM A351 CF8M.
3. Seats, stuffing box ring, and thrust washer: RPTFE.

D. Design Requirements:
1. Rated for a minimum of:
   a. 500 PSI CWP.
   b. 150 PSI of saturated steam.
   c. 29 IN vacuum.
2. Two-position lockable handle that show direction of opening.
3. Stuffing boxes capable of being repacked under pressure and adjustable for wear.
4. Stem with RPTFE stuffing box ring and blowout-proof design.
5. RPTFE seats.
6. Ball design which does not allow media contact with stem.
7. Balancing stop for all applications.
8. Bodies with mounting pad for applications requiring actuators.
9. Port area: 100% of full pipe area.

2.3 ACCESSORIES
A. Furnish actuator integral with valve.

2.4 FABRICATION
A. End Connections:
   1. Comply with the following standards:
      b. Flanged: ASME B16.1, Class 125 unless otherwise noted or AWWA C207.
   B. Nuts, Bolts, and Washers:
      1. Type 316 or 304 stainless steel: ASTM A193 and ASTM A194.

2.5 SOURCE QUALITY CONTROL

PART 3 - EXECUTION

3.1 INSTALLATION
A. Install in accordance with manufacturer’s instructions.
B. Install valves accessible for operation, inspection, and maintenance.
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Basic requirements for complete instrumentation system for process control.
   2. Requirement for Contractor to subcontract the Process Control System portion of the Work to a “Systems Integrator.”

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 QUALITY ASSURANCE

A. Referenced Standards:
   1. The International Society of Automation (ISA):
      a. 7.0.01, Quality Standard for Instrument Air.
      b. S5.1, Instrumentation Symbols and Identification.
      c. S5.3, Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic and Computer Systems.
   2. National Electrical Manufacturers Association (NEMA):
      a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
      a. 70, National Electrical Code (NEC).
   4. Underwriters Laboratories, Inc. (UL):
   5. National Institute of Standards and Technology (NIST):

B. Qualifications:
   1. System Integrator:
      a. Jetco Inc., Altoona, IA; no substitutes.
      b. Experience:
         1) Have satisfactorily provided control system integration for a minimum of five projects of similar magnitude and function.
      c. Qualification:
         1) Regularly engaged in the design and the installation of process control and instrumentation systems and their associated subsystems as they are applied to the municipal water and wastewater industry.
         2) Maintains a permanent, fully staffed and equipped service facility within 200 miles of the project site with full time employees capable of designing, documenting, fabricating, installing, calibrating, programming, configuring, providing training services, and testing the systems specified herein.
         3) Capable of responding to on-site problems within 12 HRS of notice. Provide an on-site response within 4 HRS of notification starting two months after startup completion.
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. Radar Level Transmitters are being added to the top of 5 digesters. The system integrator will provide PLC & HMI programming for each of the level transmitters meeting the minimum requirements:
      a. Add PLC and HMI programming for each level transmitter. Match programming for existing similar instrumentation.
      b. Add PLC and HMI programming for level transmitter process value mismatch warnings and alarms (comparing the new values to values from the existing hydrostatic level transmitters).
      c. Add the level transmitter process values and alarms to existing system interlocks for digester pumps and valves. These will largely match the system response to the existing hydrostatic level transmitters.
      d. Add the level indication and alarms to the HMI screens and historian.
   2. The owner will provide new I/O cards where 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. Retain a System Integrator subcontractor 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) Computer and network equipment configuration.
         7) Preparation of Drawings and Operation and Maintenance Manuals.
8) System start-up.
9) Training.
10) 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. Submittals shall be original printed material or clear unblemished photocopies of original printed material.
      a. Facsimile information is not acceptable.
   2. 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.
   3. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Equipment catalog cut sheets.
      c. Instrument data sheets:
         1) ISA S20 or approved equal.
         2) Separate data sheet for each instrument type.
      d. Materials of construction.
      e. Minimum and maximum flow ranges.
      f. Pressure loss curves.
      g. Physical limits of components including temperature and pressure limits.
      h. Size and weight.
      i. Electrical power requirements and wiring diagrams.
      j. NEMA rating of housings.
      k. Submittals shall be marked with arrows to show exact features to be provided.
   4. RTU Equipment Drawings.
   5. HMI graphics.
   6. 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.
   7. Provide a parameter setting summary sheet for each field configurable device.
   8. 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.
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. All Shop Drawings shall be modified with as-built information/corrections.
3. 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 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.
4. Warranties: Provide copies of warranties and list of factory authorized service agents.

1.6 DELIVERY, STORAGE, AND HANDLING
A. 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.
   4. Either architecturally or non-architecturally finished areas designated as dry, noncorrosive, and nonhazardous: NEMA Type 12.
   5. 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 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.

3.2 FIELD QUALITY CONTROL
   A. See Section 01 75 00.
   B. Maintain accurate daily log of all startup activities, calibration functions, and final setpoint adjustments.
   C. 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. 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. Level transducers/transmitters shall be checked at two points in addition to zero.
         c. Replace any instrument which cannot be properly adjusted.
      3. 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.
      4. Calibration equipment shall be at least three times more accurate as the device being calibrated.
   D. 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. Utilize the Loop Check-Out Sheet located at the end of this Specification Section (or Engineer approved equivalent) to document on-site calibration checks.
      3. 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
Loop Check-out Sheet

**LEAK AND TERMINATION/CONTINUITY CHECKS**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>LEAK CHECK (1)</th>
<th>TERM/CONT CHECK (2)</th>
<th>TERM/CONT CHECK (2)</th>
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</thead>
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</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>PARAMETER TYPE</th>
<th>TAG NO.</th>
<th>TAG NO.</th>
<th>TAG NO.</th>
<th>TAG NO.</th>
<th>TAG NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROCESS VAR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EQUIP STATUS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALARM POINT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**OPERATOR CONTROL FUNCTIONS CHECKED**

<table>
<thead>
<tr>
<th>FUNCTION TYPE</th>
<th>TAG NO.</th>
<th>LOCATION</th>
<th>TAG NO.</th>
<th>LOCATION</th>
<th>TAG NO.</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**FINAL CONFIGURED SETTINGS**

<table>
<thead>
<tr>
<th>TAG NO.</th>
<th>SWITCH &amp; ALARM SP</th>
<th>CONTROLLERS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Gain</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reset, rpm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deriv. (rate), min</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PV Set Point</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Project Name:</th>
<th>Owner’s Project No. (if applicable):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Owner:</td>
<td>Regulatory Agency Project No. (if applicable):</td>
</tr>
<tr>
<td>HDR Project No.:</td>
<td>Date:</td>
</tr>
<tr>
<td>Control Loop No.:</td>
<td></td>
</tr>
<tr>
<td>Instrument Tag No.:</td>
<td>Transmitter/gauge span:</td>
</tr>
<tr>
<td>Manufacturer:</td>
<td>Switch set-point:</td>
</tr>
<tr>
<td>Model No.:</td>
<td>Switch dead band:</td>
</tr>
<tr>
<td>Serial No.:</td>
<td>Switch range:</td>
</tr>
</tbody>
</table>

### TRANSMITTERS AND INDICATORS

<table>
<thead>
<tr>
<th>% OF SPAN</th>
<th>INCREASING INPUT</th>
<th>DECREASING INPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INPUT</td>
<td>OUTPUT</td>
</tr>
<tr>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (if applicable)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (if applicable)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SWITCHES

<table>
<thead>
<tr>
<th>ACTUATION POINT</th>
<th>INCREASING INPUT</th>
<th>DECREASING INPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INPUT</td>
<td>OUTPUT</td>
</tr>
<tr>
<td>High (Increasing input)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (Decreasing input)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Maximum allowable error (per Contract Documents): 
Remarks:

### CALIBRATION EQUIPMENT UTILIZED

<table>
<thead>
<tr>
<th>DEVICE TYPE</th>
<th>MFR/MODEL NO.</th>
<th>ACCURACY</th>
<th>NIST TRACEABILITY?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Certified by: ___________________________ Date Certified: ________

HDR Project No. 10229519 Des Moines-IA Metro WRA 05/27/2022
WRF Digester Repairs and Improvements Issued for Bid
PROCESS CONTROL SYSTEM GENERAL REQUIREMENTS
40 61 13 - 8
# SECTION 40 61 93
## PROCESS CONTROL SYSTEM INPUT-OUTPUT LIST

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes: Edit listing and add any additional elements as needed for the Project application. Utilize Appendix 40 61 93A for the actual I/O list.

1. Process Control System (PCS) PLC Input/Output (I/O) List description.

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 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.

### PART 2 - PRODUCTS

#### 2.1 I/O LIST

A. The I/O List herein 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 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. **I/O TAG** describes the point name that will be used throughout the control system to identify the point.
2. **PANEL** indicates the control panel in which the I/O module is located.
3. **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.
4. **TYPE** denotes the signal type such as analog input or output, discrete input or output, pulse, etc.
5. **POWER SOURCE** describes the power source of signal (or instrument).
6. **INTERFACE** denoted the method of communication (hardwired, via data-link, etc.).
7. **LRV / URV** are the lower and upper range values in engineering units of an analog input or output signal.
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. The I/O List shall include for each I/O point, at minimum, all information as listed in Section 2.1.C.

D. 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.

E. 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 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
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Configuration requirements for Human Machine Interface (HMI) and reports, which includes but is not necessarily limited to:
      a. Specific software functional descriptions.
      b. Graphics requirements.
      c. HMI functionality requirements.
      d. Process overview screens.
      e. Detail displays.
      f. Trend displays.
      g. Alarm monitoring.
      h. Report generation.
      i. Configuration standards and conventions.
      j. Screen configuration review meetings.
      k. Report configuration review meetings.
      l. Coordination.

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 QUALITY ASSURANCE

A. Referenced Standards:

B. Qualifications:
   1. Programmer(s) shall have had experience in HMI software configuration and installation for at least two projects of similar size and complexity in the past five years.
      a. At least one of the two projects must have used the HMI software being utilized for this project.

1.3 DEFINITIONS

A. HMI: Human Machine Interface.

B. I/O: Input/Output.

C. OLE: Object Linking and Embedding, a document standard developed by Microsoft that enables the creation of an object with one application and the linking or embedding of the object in a second application.

D. OPC: "OLE for Process Control"; a software standard utilizing a client/server model that makes interoperability possible between automation/control applications and field systems/devices.

E. PC: Personal Computer.

F. PLC: Programmable Logic Controller.
1.4 SUBMITTALS
A. Certifications: Qualifications of programmer(s).
B. Software Configuration Standards and Conventions document.
C. Shop Drawings:
   1. Graphic screen displays; provide in actual colors utilized.
   2. Native file format of the HMI Configuration including tag database and graphic screens.
   3. Sample reports.
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.
   2. Software Configuration Standards and Conventions - final version.
E. Informational Submittals:
   1. Results of factory testing procedures.
   2. Proposed training agendas and schedule.

1.5 GENERAL FUNCTIONAL REQUIREMENTS
A. Software Functional Requirements:
   1. General functional requirements for system configuration are indicated on the Drawings and described in the Specifications.
   2. The information presented herein and indicated on the Drawings illustrates the general functional intent of the system and may not be sufficient to fully configure the system.
   3. The Contractor is responsible for determining what additional information may be required to complete the configuration tasks, and for obtaining this information from the Owner.
B. Available Process Values:
   1. All process alarm, equipment status, and process variable values shall be available at any HMI.
   2. If communications to a particular I/O point have failed for any reason, then wherever that data is displayed, the software shall post a visual indication that the point is not valid.
C. Text Presentation:
   1. In general, use mixed or title case lettering rather than uppercase.
      a. If a paragraph is required, do not capitalize each word. Single words or short phrases may be capitalized.
   2. Avoid abbreviations and acronyms unless part of normal operator language.
   3. Do not underline for emphasis; reserve underlined text for hyperlinks.
   4. Display text in horizontal orientation unless unavoidable or for clarity.
D. Command Entry:
   1. Utilize multiple input actions for commands that result in direct action to the process; do not allow a single inadvertent input action to result in a direct action to the process.
   2. Where a command entry requires multiple selections by the operator, selections shall be followed by confirmation of the entire list of actions before the command is executed (e.g., selecting new recipe and confirming additive sources and product destinations).
   3. If the selection lists of options are long; construct groupings to allow for easier navigation, scanning and identification of desired selection.
   4. Either provide a method for canceling a command change during the change process or have means for recovering quickly to the prior configuration, or both.
   5. Provide feedback for all entries that are outside of an expected range. If an input is critical, acceptable limits on entry shall be enforced.
E. Buttons:
   1. Buttons that interact directly with the process shall be visually distinct from buttons that provide navigation linkages or launch applications.
2. Any buttons that are currently unavailable shall remain visible. A text color and button background change shall indicate their temporary unavailability.
3. Provide feedback confirmation for button execution.

F. Data Entry and Presentation:
1. Provide the capability for manual entry of surrogate data and other variables, which must then be available for display and use in reports.
   a. Operator-entered commands from any of the operator workstations must be logged to the specific user account by the computer servers.
   b. In cases where error avoidance techniques are employed to enforce limits on data entry, utilize methods to clarify reason for rejection.
2. Suppress leading zeroes on whole numbers but use leading zeroes for numbers between -1 and 1.
4. Utilize no more or fewer display digits than is commensurate with the accuracy of the displayed value.

G. Provide comprehensive on-line help for all development functions.

H. System Failure:
1. Failure of any PLC, remote I/O hardware, or network communication link must be individually alarmed at HMIs.
2. Unless otherwise specified, each alarm must be specific to a single point of failure.

I. All process related functions, calculations, timers, and numeric manipulations, shall be accomplished in the PLC hardware and not in the HMI.
1. The HMI shall function as a monitoring system, not as a process controller.
2. The HMI shall transfer data to the PLC system and the PLC system shall perform all control algorithms.

1.6 SECURITY

A. Fully integrate security into the SCADA system to allow only users with appropriate security levels access to individual parts of the system.

B. Include a minimum of four user categories that will determine appropriate access levels:
   1. Guest
   2. Operator.
   3. Supervisor.

C. Remove all default user names and passwords. Any required configuration or service accounts shall be coordinated with owner. Service accounts and configurations accounts to be submitted to owner during close-out as required by 40 61 13.

PART 2 - PRODUCTS

2.1 SPECIFIC SOFTWARE FUNCTIONAL DESCRIPTIONS

A. Specific functional requirements for various software control blocks within the computer system are as specified in this subsection.

B. Descriptions are general and are not intended to fully indicate the complete functionality of the system.
1. Monitoring of process values:
   a. Process values derived from analog process variable signals must be historically archived.
      1) Present analog values within context i.e., provide indication of where each displayed value fits within normal operating range, and how it compares to process and alarm set points.
a) Consider the use of sparklines for critical analog values to provide more context and situational awareness.
   (1) Final determination of where sparklines are to be used, and how each analog value is to be displayed shall be made at the HMI Screen Configuration Review Meeting(s) with the Owner.

2) Store all historical data with time and date of occurrence.
3) Make values available for use in reports.
4) Assign high and low alarms to process values as defined below and otherwise deemed appropriate.

b. Provide capability for computer server(s) to retrieve real-time values from the PLC system at adjustable time periods.
c. Alarm limits:
   1) Set per direction from the Owner.
   2) An operator having proper security authorization must be able to enable, disable, and adjust the set point of any individual alarm.

C. Provide the four levels of graphic screen displays per ANSI/ISA-101.01 and as described below:

1. Level 1 – Overview Display:
   a. One display to provide continuous overview or summary of key parameters, alarms, calculated process conditions and operator’s entire span of control.
   b. Separate overview display for all operating modes, for example start-up and shutdown.
   c. Display all top priority alarms including the indication of acknowledgement status.
     1) Locate to convey functional relationship (i.e., locate adjacent to associated equipment or device).
   d. Display actual values, abnormal status and severity of deviation for key process parameters that depict health of high-level process areas.
   e. Display embedded trends on important parameters.
   f. Orient the operator to the existence, severity, location and direction of change of abnormal process conditions.
   g. In general, do not use for performing control functions (e.g., controller set point changes).

2. Level 2 – High Level Displays (system and subsystem overviews):
   a. Serves as the operator’s primary operating display during normal operations for routine changes and monitoring.
   b. Include process unit overviews or primary displays for every major system.
   c. Provide easy navigation to the more detailed level 3 and 4 displays.
   d. Enable operator to perform tasks using a limited number of displays and minimal navigation.
   e. Display all top and middle priority alarms for the specific system or subsystem.
     1) Provide notification of the existence of low priority alarms within the relevant process so that the Operator knows to navigate to a Level 3 screen, if so desired, for more information.
   f. Provide enough information and controllers within the main control interface to control the system under most conditions.
   g. Contain the primary controllers for the specific process area.
   h. Display task-specific information for start-up and/or shutdown.

3. Level 3 – System/Subsystem Detail Displays:
   a. Typically contain more detail than associated level 2 displays.
   b. Used by the operator to perform non-routine operations such as lineup changes, equipment switching, or complex routing tasks.
   c. Provide sufficient information to facilitate process diagnostics.
   d. Task based: enable the operator to perform tasks using a limited number of displays and minimal navigation.
   e. Contain control loops and indicators for process equipment.
   f. Display alarms of all priorities.
   g. Display status of various interlocks for depicted equipment.
h. Utilize pop-up control screens.

4. Level 4 – Diagnostic Displays:
   a. Make available all system information.
   b. Not intended for process or system control, although functionality to perform control may exist in these displays (such as point details).
   c. May utilize faceplates or popups to display system information.
      1) Provide timeout period after which popup closes without any user interaction.
         a) Provide the operator with capability to override any configured timeout period.
      2) Design popups so as not to cover or obscure important parts of HMI display.
   d. Provide operating procedures for individual pieces of equipment.
   e. Provide help information for equipment control and diagnostics.
   f. Contain detailed safety shutdowns.
   g. Contain interlock and permissive information.

D. HMI operator interface functionality shall include:
   1. Indication of process variables.
   2. Configuration of control loop parameters (e.g., set points, gains, etc.).
   3. Adjustment of controller output.
   4. Display of real time and historical process trends.
   5. Selector switch and pushbutton station controls.
   7. Graphic representation of plant operations with interactive status and measurement symbols.
   8. Annunciation.

E. Graphics:
   1. Color use:
      a. Do not utilize color alone as the sole discriminator of important status conditions.
      b. Do not utilize colors designated for alarms for other purposes.
      c. Utilize bright colors to draw attention to abnormal situations; do not use bright colors to designate normal conditions (e.g., equipment run status or valve position status).
      d. Unless directed otherwise, utilize gray background and muted colors to minimize screen glare and reflection.
   2. Dragging the mouse over designated process areas of screen shall allow the operator to select predetermined processes or equipment and drill down to site-specific detail screens.
      a. Provide a graphical response, such as the use borders or shading, to help the Operator easily identify clickable screen content.
   3. Critical “overview” information such as tank levels, flows and pressures shall be indicated through data fields or animation effects such as level fills or color change.
   4. All monitored and or controlled process equipment shall utilize color highlighting or shading to indicate status changes.
   5. Tank and vessel levels shall be indicated with a tabular data field, sparklines, and by graphic “fill” simulating a rising or falling level within the tank or vessel.
   6. Provide the ability to “drill down” to detail screens or graphics.
      a. Clicking on a device or process area shall generate a detail graphic or pop-up window to access specific data or control functions.
      b. All operator adjustments (e.g., set point adjustment, mode selection) shall be accomplished via a pop-up display, and shall not be allowed on the process screen.
   7. Unless otherwise directed, utilize software manufacturer’s standard symbol library.

F. Navigation:
   1. Minimize operator keystroke/equivalent actions.
      a. Single keystroke access from graphic to group display or other custom graphic displays.
   2. Utilize consistent and distinct visual display symbols for navigation targets.
3. Utilize navigation bar on every screen.
   a. Navigation bar to include navigation functions, active alarm notification, security
      functions, current date/time display, “PRINT SCREEN” pushbutton, and other
      functions as required and as agreed upon at the Screen Configuration Review Meetings.
4. Maximum access times/clicks listed below:

<table>
<thead>
<tr>
<th>METRIC</th>
<th>DISPLAY TYPE</th>
<th>MAXIMUM ACCESS TIMES/CLICKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to alarm displays</td>
<td>Alarm summary</td>
<td>1 second</td>
</tr>
<tr>
<td></td>
<td>Alarm lists (e.g., suppressed alarms)</td>
<td>5 seconds</td>
</tr>
<tr>
<td>Navigation</td>
<td>Critical displays</td>
<td>1-2 clicks</td>
</tr>
<tr>
<td></td>
<td>Non-critical displays</td>
<td>3 clicks</td>
</tr>
<tr>
<td></td>
<td>Alarm summary</td>
<td>1 click</td>
</tr>
<tr>
<td></td>
<td>System diagnostics</td>
<td>1-2 clicks</td>
</tr>
</tbody>
</table>

G. Trend Displays:
1. Provide real-time display of trend charts for selected values.
   a. Values to be selected for trend displays shall be identified during review meetings with
      the Owner.
2. Capable of displaying multiple points per display.
3. Operator shall be able to select/adjust any desired sample time interval.
4. In addition to providing configuration for trend displays of selected values, provide
   capability for easy access to real time and historical trend information for any variable TAG
   defined within the SCADA application i.e., provide ad hoc trend screen functionality.
   a. As a minimum, provide the following:
      1) Provide capability for the user to define trend scenarios.
      2) Provide a button to open a dialog window to select multiple variable TAGS and
         save them as a trend scenario for future use.
      3) Provide a pull-down menu to allow the user to open saved trend scenarios.
      4) Provide a button to allow the user to select real-time or historical trends.
      5) Provide a button to save displayed trend info to a file for export to external
         software applications (such as Microsoft Excel).
      6) Provide a Print Trend button to allow user to print current trend.
5. Utilize Historical Data Server(s) to collect and manage data.

H. Bar Charts:
1. Utilize moving pointers for bar charts where used to show relative positions and/or values.

I. Alarm Monitoring:
1. Provide standard alarm screen functionality to ensure flexibility and quick access to live
   alarms, alarm history and alarm grouping parameters.
   a. As a minimum, include the following features and functionality:
      1) An Alarm Screen header bar to head all alarm pages and reside below the
         Navigation Bar.
      2) Buttons to dynamically switch between Alarm Summary and Alarm History.
      3) A menu to allow user to select and open historical alarm archives.
         a) Utilize a time-date stamp file structure.
      4) Pull-down menu bar to select operator configured alarm groups.
      5) Capability to sort alarms by priority and to define priority for all system alarms.
      6) Capability to filter or group alarms.
2. Analog alarms:
   a. The SCADA software shall monitor analog and discrete variables and calculated conditions and determine if the variable is in an alarm condition.
   b. For each Analog Tag, an alarm for each of the following conditions shall be assignable:
      1) Low-low.
      2) Low.
      3) High.
      4) High-high.
      5) Deviation low.
      6) Deviation high.
      7) Rate of change.
   c. Provide adjustable dead bands and delay timers for all analog alarms.
3. Present alarms in order of:
   a. Priority.
   b. Time of occurrence.
   c. Non-acknowledged presented ahead of acknowledged.
4. Utilize single keystroke or pushbutton to:
   a. Acknowledge alarms.
5. Alarm list presented to operator shall include:
   a. Time of occurrence.
   b. Time of acknowledgement.
   c. Description.
   d. Acknowledgement status.
6. Alarm list printed by either of the following:
   a. On command.
   b. Periodically.
7. Audible alarming capability for user selected alarms.

PART 3 - EXECUTION

3.1 CONFIGURATION REQUIREMENTS
   A. Provide all programming and configuration required for all HMIs furnished under this Contract:

3.2 CONFIGURATION STANDARDS AND CONVENTIONS
   A. Prepare and submit a “Software Configuration Standards and Conventions” document.
      1. Submit for review and approval prior to commencing with software configuration.
      2. Prior to submitting the initial draft document, the Contractor must meet with the Owner to review the Owner’s standards and conventions.
      3. Contractor is responsible for scheduling and facilitating the standards and conventions review meeting with the Owner.
         a. Contractor is responsible for generating the meeting agenda and issuing meeting minutes.
         b. Meeting will be held at the jobsite.
      4. Follow the principles contained in ANSI/ISA-101.01 unless directed otherwise by the Owner or Owner’s Representative.
      5. Describe and define such items as:
         a. Proposed graphic display process colors/representations.
         c. Font type and size.
         d. Alarm handling conventions.
            1) Include defining alarm priorities and how they are to be represented graphically (e.g., color and symbol).
         e. Methods for navigation between displays.
         f. Address usage/naming/tagging conventions.
g. Security setup.
h. Content of Level 1, Level 2, Level 3 and Level 4 graphics.

6. Historical setup including data logging by I/O type (including alarms, events and process data), data retention, and data purge.

7. In addition to submitting the initial document for review, submit an updated version of the document as part of the Operation and Maintenance Manuals.
   a. Revise this document to include any additional standards that are established throughout the configuration process.

3.3 SCREEN CONFIGURATION REVIEW MEETINGS

A. Conduct a minimum of one configuration conferences with the Owner to review and discuss system configuration programming and related topics.
   1. The purpose of the conference will be to discuss, in detail, how each I/O point will be handled and the types, quantities, hierarchies, and functioning of display screens.
   2. Review of the Owner’s existing systems, standards, conventions, file and tag naming requirements, font type and size requirements, and reporting requirements must be part of each conference.
   3. Review the navigation bar to be utilized.
   4. Conferences will be held in at the jobsite.
   5. Each screen will be reviewed at each conference.
      a. If required, to review all screens, each conference will occur on multiple days.
   6. Submit 10 color copies of printed screens via shop drawing submittal process 10 calendar days before each conference.
   7. Bring equipment to project screens on wall or provide multiple monitors for viewing by attendees.

B. Proposed graphic screens and report formats must be reviewed with the Owner throughout the configuration process.

3.4 REPORT CONFIGURATION REVIEW MEETINGS

A. Conduct a configuration conference with the Owner to review and discuss reports and report formats, and data security. The agenda shall be, at a minimum:
   1. Review of the Owner’s existing systems, standards, conventions, and reporting requirements must be part of each conference.
   2. Review report security, storage and backup requirements.
   3. The conference(s) will be held in at a site designated by the Owner.
   4. Each report will be reviewed at each conference.
      a. If required, to review all reports, each conference will occur on multiple days.

B. Proposed report formats must be reviewed with the Owner throughout the configuration process.

3.5 COORDINATION

A. Coordinate as required with other contractors and vendors to seamlessly integrate all HMI monitoring and control functions.
   1. To the greatest extent possible, integrate graphics presentation for all systems into screens utilizing one common HMI software.

B. Examples of systems that utilize separate application software packages and thus require coordination include, but are not necessarily limited to:
   1. Generator Controls.
   2. Digital Metering Package.
   3. Distributed UPS System.
   4. Pre-purchased control systems.
   5. Vendor-furnished packaged systems.
3.6 FIELD QUALITY CONTROL
   A. Provide monitoring and control functions at the HMI(s) as specified within these Contract Documents for all vendor-furnished control systems.
      1. Provide all required coordination with the suppliers of the vendor-furnished control systems to enable seamless integration of the Plant Process Control System with the vendor-furnished controls.

3.7 DEMONSTRATION
   A. Demonstrate system in accordance with Specification Section 01 75 00.

   END OF SECTION
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PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Level Transmitters:
      a. Non-contact Radar Level Sensor and Transmitter.
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 QUALITY ASSURANCE
A. Referenced Standards:
   1. American Society of Mechanical Engineers (ASME):
   2. ASTM International (ASTM):

1.3 SUBMITTALS
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. 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.

2.2 LEVEL TRANSMITTERS
A. Non-Contact Type Radar Level Transmitter:
   1. Manufacturers:
      a. Endress + Hauser (Micropilot FMR60).
      b. Vega (VEGAPULS 6X).
2. Specifications:
   a. General:
      1) Measurement Principle: Continuous level measurement via non-contact radar
         signal measuring the “time of flight” for the signal to travel from the sensor to the
         measured surface and back again.
         a) Level Measurement.
         b) Connection on top of tank; see Drawings.
         c) Blanking Distance: Up to 12 IN.
      2) Measurement Range (see Schedule):
         a) Varies according to Antenna (High or Low) and Beam Angle (9 to 37 DEG).
         b) Maximum range: 10 to 115 FT.
      3) Accuracy:
         a) ±0.1 IN (low frequency).
         b) ±0.4 IN (high frequency).
      4) Resolution: 0.04 IN.
      5) Temperature Stability: ±0.05%.
      6) Response Time: 1 second.
   b. Process Connection:
      1) Mounted to 3 IN Full Port Isolation Ball Valve.
   c. Display and Configuration:
      1) Integral Display for live measurement and configuration.
      2) Adjustable zero and span.
      3) Output variable: Level.
      4) Output Units: Feet, inches, meters, or millimeters (mm).
   d. Electrical:
      1) Signal Power: Loop-powered, 2-wire, 24 VDC.
      2) Current Output: Analog 4-20 Ma into a 400 ohm loop.
      3) High/Low signal alarms (less than 4.0 mA and greater than 20.0 mA).
      4) Optional Communication: HART.
      5) Configuration: With remote hand-held configurator.
      6) Cable entry: 1/2 IN NPT connection.
   e. Materials of Construction:
      1) Antenna:
         a) Materials chemically inert in the mounting environment.
         b) Process Sealed Antenna.
         c) Sensor module: 316L SST.
      2) Housing: Polyurethane-covered Aluminum.
      3) O-rings: EPDM.
      4) Flanges (ASME B16.5): 316 stainless steel.
   f. Environment:
      1) Ambient Temperature: -40 to 158 DEGF (-40 to 70 DEGC).
      2) Humidity: Up to 99%.
      3) Process Temperature: -4 to 185 DEGF (-20 to 85 DEGC).
      4) Process Pressure: 0 to 150 PSIG.
      5) Protection: Refer to Area Classification Drawings.
   g. Accessories:
      1) Identification: Stainless Steel Plate Tag stamped instrument number
3. Schedule (or Instrument List):

<table>
<thead>
<tr>
<th>TAG NUMBER</th>
<th>SERVICE</th>
<th>ANTENNA TYPE and SIZE (IF HORN)</th>
<th>LRV – URV Units</th>
<th>MOUNT TYPE and SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-DIG-LIT-002</td>
<td>Digester Sludge Level</td>
<td>N/A</td>
<td>0 – 60 FT.</td>
<td>3 IN Flange, 150#</td>
</tr>
<tr>
<td>85-DIG-LIT-003</td>
<td>Digester Sludge Level</td>
<td>N/A</td>
<td>0 – 60 FT.</td>
<td>3 IN Flange, 150#</td>
</tr>
<tr>
<td>85-DIG-LIT-004</td>
<td>Digester Sludge Level</td>
<td>N/A</td>
<td>0 – 60 FT.</td>
<td>3 IN Flange, 150#</td>
</tr>
<tr>
<td>85-DIG-LIT-005</td>
<td>Digester Sludge Level</td>
<td>N/A</td>
<td>0 – 60 FT.</td>
<td>3 IN Flange, 150#</td>
</tr>
<tr>
<td>85-DIG-LIT-006</td>
<td>Digester Sludge Level</td>
<td>N/A</td>
<td>0 – 60 FT.</td>
<td>3 IN Flange, 150#</td>
</tr>
</tbody>
</table>

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:
      d. Instrument pipe stands: 316 stainless steel.

B. 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 Valves:
   1. Orient stems for proper operation.
   2. Install arrays orderly and neat in appearance with true horizontal and vertical lines.
   3. Provide a minimum of 2 IN clearance between valve handle turning radii where there are multiple valve handles appearing in a straight line.
   4. Valves shall have bonnets and any soft seals removed during welding or soldering into the line.
      a. When cool, reassemble the valves.
   5. Support each valve individually.
      a. The tubing system does not qualify as support for the valve.

D. Locate instrument piping and tubing so as to be free of vibration and interference with other piping, conduit, or equipment.

E. Keep foreign matter out of the system.

F. Remove all oil on piping and tubing with solvent before piping and tubing installation.

G. Plug all open ends and connections to keep out contaminants.

H. Threaded Connection Seals:
   1. Use Tite-Seal or acceptable alternate.
   2. Use of lead base pipe dope or Teflon tape is not acceptable.
   3. Do not apply Tite-Seal to tubing threads of compression fittings.
I. 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 on-site training in accordance with Specification Section 01 75 00.

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.
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=158092134169 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 Stated 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 day(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, F, AND G APPLICATIONS AS REFERENCED BY SUDAS FIGURE 6010.602.

RAISED LETTERS FLUSH WITH TOP SURFACE

PICKHOLES

RAISED LETTERS FLUSH WITH TOP SURFACE

LETTERED "USA" OR "MADE IN USA"

MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B
FINISH: NO PAINT

STORM SEWER LID
FOR THE CITY OF DES MOINES, IOWA

General Supplemental Specifications to the SUDAS Standard Specifications, 2022 Edition
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.


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”).

WRA General Supplemental Specifications
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:
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.