CONTRACT DOCUMENTS

FOR

CONSTRUCTION OF

WATER QUALITY SYSTEMS BUILDING

FOR

SOUTH FORK WATER BOARD

AUGUST 2026

Consor North America, Inc.
One SW Columbia Avenue, Suite 1700
Portland, OR 97204
503-225-9010

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SECTION 00 01 07 - SEALS PAGE
FOR
WATER QUALITY SYSTEMS BUILDING
FOR
SOUTH FORK WATER BOARD

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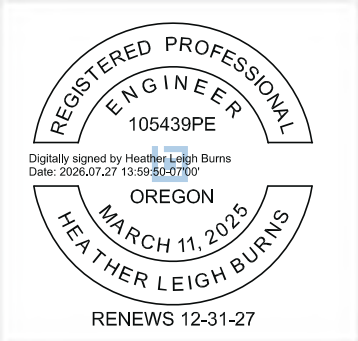

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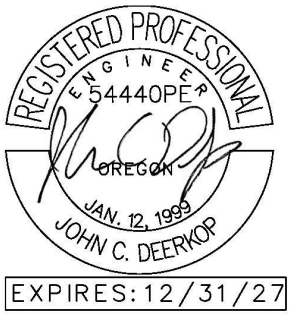
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SECTION 00 01 10 – TABLE OF CONTENTS
FOR
WATER QUALITY SYSTEMS BUILDING (WQSB)
FOR
SOUTH FORK WATER BOARD (SFWB)

Section	Person Responsible	Title	Page
TECHNICAL SPECIFICATIONS			
VOLUME 1			
Division 00 – Front End Specs			
00 01 01	JDF	Flysheet	1-2
00 01 07	JDF	Seals Page Signed	1-7
00 01 10	JDF	Table of Contents	1-6
00 11 13	JDF	Advertisement for Bid	1-2
00 21 13	JDF	Instructions for Bidders	1-10
00 41 13	JDF	Bid Form	1-10
00 45 13.01	JDF	Responsibility Determination Form	1-6
00 45 17	JDF	First-Tier Subcontractor Disclosure Form	1-2
00 45 19	JDF	Non-Collusion Affidavit	1-2
00 51 00	JDF	Notice of Award	1-2
00 52 43	JDF	Public Improvement Contract	1-80
00 61 13.13	JDF	Performance Bond	1-4
00 61 13.16	JDF	Payment Bond	1-4
00 62 76	JDF	Application for Payment	1-6
00 65 16	JDF	Certificate of Substantial Completion	1-2
00 65 20	JDF	Notice of Acceptability of Work	1-2
00 73 43	JDF	Oregon Prevailing Wage Rate Flysheet	1-2
00 73 44	JDF	Davis-Bacon Wage Rate Flysheet	1-2
00 73 45	JDF	WIFIA Requirements	1-20
Division 01 - General Requirements			
01 11 00	JDF	Summary of Work	1-10
01 20 00	ANB	Measurement and Payment	1-4
01 26 00	JDF	Contract Modification Procedures	1-6
01 26 13	JDF	Request for Information	1-2
01 26 39	JDF	Field Orders	1-2
01 26 49	JDF	Work Change Directives	1-2
01 26 53	JDF	Proposal Request	1-2
01 26 57	JDF	Change Order Request	1-2
01 26 70	JDF	Time and Materials Work Logs	1-2
01 31 19	JDF	Project Meetings	1-8
01 32 21	JDF	Schedules and Reports	1-12
01 33 00	JDF	Submittal Procedures	1-8
01 33 17	MP	Structural Design, Support and Anchorage	1-6
01 43 33	JDF	Manufacturer Field Services	1-6
01 45 00	JDF	Quality Control	1-6

01 56 39	RWP	Temporary Tree and Plant Protection	1-6
01 60 00	JDF	Product Requirements	1-2
01 75 00	JDF	Testing, Training, and Commissioning	1-4
01 78 23	JDF	Operation and Maintenance Data	1-16
Division 02 - Existing Conditions			
02 30 00	ANB	Subsurface Investigation	1-2
02 41 00	ANB	Demolition	1-4
Division 03 - Concrete			
03 01 30	MP	Concrete Repair and Rehabilitation	1-18
03 11 00	MP	Concrete Forming	1-6
03 21 00	MP	Reinforcing Steel	1-10
03 31 00	MP	Cast-In-Place Concrete	1-38
03 32 00	MP	Joints In Concrete	1-14
03 60 00	MP	Grouting	1-10
Division 04 - Masonry			
04 04 19.29	MP	Post-Installed Anchors In Masonry	1-6
04 21 15	PEW	Masonry Veneer	1-20
04 22 00	MP	Reinforced Concrete Block Masonry	1-8
Division 05 - Metals			
05 05 19	MP	Post-Installed Anchors in Concrete	1-8
05 12 00	MP	Structural Steel Framing	1-6
05 21 19	MP	Open Web Steel Joists	1-4
05 30 00	MP	Metal Decking	1-4
05 40 00	MP	Cold Formed Metal Framing	1-6
05 50 00	MP	Miscellaneous Metalwork	1-12
Division 06 – Wood, Plastics, Composites			
06 20 00	PEW	Finish Carpentry	1-8
06 80 00	MP	Fiber Glass Reinforce Plastic Fabrications	1-8
Division 07 - Thermal and Moisture Protections			
07 10 00	PEW	Dampproofing	1-6
07 14 00	PEW	Fluid Applied Waterproofing	1-6
07 19 00	PEW	Surface Applied Water Repellents	1-6
07 21 00	PEW	Thermal Insulation	1-4
07 21 13	PEW	Foundation Insulation	1-4
07 22 16	PEW	Roof Insulation	1-6
07 42 16	PEW	Metal Roof and Soffit Panels	1-16
07 92 13	PEW	Sealants and Caulking	1-8
Division 08 - Doors and Windows			
08 11 13	PEW	Steel Doors and Frames	1-10
08 33 00	PEW	Overhead Coiling Doors	1-10
08 51 13	PEW	Aluminum Windows	1-12
08 71 00	PEW	Door Hardware	1-16
08 81 00	PEW	Glazing	1-10

08 91 00	PEW	Louvers	1-12

Division 09 - Finishes

09 29 00	PEW	Gypsum Board	1-12
09 30 13	PEW	Ceramic Tile	1-12
09 51 13	PEW	Suspended Acoustical Tile	1-12
09 65 00	PEW	Resilient Flooring	1-10
09 68 00	PEW	Carpeting	1-12
09 90 00	HLB	Painting and Coating	1-10

Division 10 - Specialties

10 14 00	PEW	Building Signage	1-8
10 28 13	PEW	Toilet and Shower Accessories	1-6
10 44 00	PEW	Fire Extinguishers	1-4
10 56 13	HLB	Storage Shelving	1-2

Division 11 - 21
NOT USED

VOLUME 2
Division 22 - Plumbing

22 10 00	SS	Plumbing Piping	1-16
22 30 00	SS	Plumbing Equipment	1-8
22 40 00	SS	Plumbing Fixtures	1-8

Division 23 – Heating, Ventilation, and Air Conditioning (HVAC)

23 05 00	SS	Common Work Results for HVAC	1-18
23 05 29	SS	Hangers and Supports for HVAC	1-14
23 05 48	SS	Vibration and Seismic Controls for HVAC	1-12
23 05 53	SS	Identification for HVAC Piping and Equipment	1-6
23 05 93	SS	Testing, Adjusting, and Balancing for HVAC	1-10
23 07 00	SS	HVAC Insulation	1-10
23 08 00	SS	Commissioning for HVAC	1-12
23 09 01	SS	Instrumentation and Control Devices for HVAC	1-26
23 23 00	SS	Refrigerant Piping	1-20
23 31 13	SS	Metal Ducts	1-14
23 34 00	SS	HVAC Fans	1-4
23 70 00	SS	Central HVAC Equipment	1-6
23 81 29	SS	Variable Refrigerant Flow HVAC Systems	1-24
23 82 10	SS	Electric Heating Equipment	1-6

Division 25 – Integrated Automation
NOT USED

Division 26 - Electrical

26 00 00	JCD	Electrical Work, General	1-14
26 01 26	JCD	Electrical Tests	1-28
26 05 15	JCD	Industrial Control Panels	1-4
26 05 19	JCD	Wire and Cabling	1-6
26 05 26	JCD	Grounding	1-6

26 05 33	JCD	Electrical Raceway Systems	1-10
26 05 36	JCD	Wiring Devices	1-4
26 05 43	JCD	Underground Raceway Systems	1-4
26 05 73	JCD	Protective Device Studies	1-6
26 12 16	JCD	Panelboards and Dry Type Transformers	1-4
26 50 00	JCD	Lighting	1-6

Division 27 - Communications

27 15 26	JCD	Fiber Optic Cabling	1-14

Division 28 – Electronic Safety and Security
NOT USED

Division 31 - Earthwork

31 05 13	ANB	Soils for Earthwork	1-4
31 05 16	ANB	Aggregates for Earthwork	1-6
31 10 00	ANB	Site Clearing	1-6
31 22 13	ANB	Rough Grading	1-4
31 23 16	ANB	Excavation	1-8
31 23 16.26	ANB	Rock Removal	1-4
31 23 19	ANB	Dewatering	1-4
31 23 23	ANB	Fill	1-8
31 23 23.33	ANB	Flowable Fill	1-6
31 23 33	ANB	Trenching and Backfilling	1-20
31 25 00	ANB	Erosion and Sediment Controls	1-6
31 37 00	ANB	Riprap	1-4

Division 32 - Exterior Improvements

32 11 23	ANB	Aggregate Base Courses	1-6
32 12 16	ANB	Asphalt Paving	1-4
32 31 13	ANB	Chain Link Fencing and Gates	1-6
32 31 14	ANB	Electric Gate Operators	1-4
32 90 00	RWP	Planting	1-8
32 91 21	RWP	Finish Grading and Seeding	1-10

Division 33 - Utilities

33 05 13	ANB	Manholes	1-12
33 05 50	ANB	Removal and Abandonment of Existing Pipe and Structures	1-4
33 05 64	ANB	Precast Concrete Valve Vaults and Meter Boxes	1-8
33 11 10	ANB	Water Utility Distribution and Transmission Piping	1-22
33 12 16	ANB	Water Utility Distribution and Transmission Valves	1-8
33 12 19	ANB	Fire Hydrants	1-6
33 13 00	ANB	Testing and Disinfection of Water Utility Piping	1-8
33 30 10.13	ANB	Sewer and Manhole Testing	1-8
33 31 10	ANB	Gravity Sanitary Utility Sewerage Piping	1-10
33 41 10	ANB	Storm Utility Drainage Piping	1-12
33 42 13	ANB	Pipe Culverts	1-4

Division 34 - Transportation
NOT USED

Division 40 - Process Integration

40 05 13	HLB	Common Work Results for Process Piping	1-16
40 05 51	HLB	Common Requirements Results for Process Valves	1-12
40 05 51.15	ANB	Gate Valves	1-4

Division 41 – Material Processing and Handling Equipment
NOT USED

Division 43 – Process Gas & Liquid Handling

43 05 10	HLB	Common Work Results for Gas Handling Equipment	1-8
43 23 13.27	HLB	Centrifugal Pumps	1-4
43 40 02	HLB	Fiberglass Reinforced Plastic Tanks	1-12
43 41 17	HLB	Hydropneumatic Tank Systems	1-4
43 41 43	HLB	Polyethylene Tanks	1-8

Division 44 – Pollution and Waste Control Equipment
NOT USED

Division 46 – Water and Wastewater Equipment

46 20 00	HLB	Miscellaneous Chemical Feed Equipment	1-8
46 30 00	HLB	Chemical Feed Pumps	1-6
46 33 13	HLB	On-Site Hypochlorite Generation System	1-14
46 36 33	HLB	Soda Ash Bulk Bag Unloader System	1-12

VOLUME 3
DRAWINGS
See Sheet G-1 for Drawing Index

SUPPLEMENTARY INFORMATION
A. Geotechnical Engineering Report, Shannon & Wilson, September 2021
B. Arborist Report, Integrated Arboricultural Solutions, March 2021
C. Record Drawings
    a. Existing Water Treatment Building Design Drawings, Stevens & Thompson Consulting Engineers, 1957
    b. Existing Water Treatment Building Modifications Drawings, Stevens, Thompson & Runyan, Inc., 1976
    c. System Capacity Improvements Drawings, MWH, 2024

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SECTION 00 11 13 ADVERTISEMENT FOR BIDS
SOUTH FORK WATER BOARD
OREGON CITY, OREGON
WATER QUALITY SYSTEMS BUILDING

General Notice

South Fork Water Board ("Owner" and "Board") is requesting Bids for the construction of the following Project:

WATER QUALITY SYSTEMS BUILDING
W253326OR.00

Sealed Bids for the construction of the Project will be received electronically via a link at *sfwbor.gov/bids-and-rfps*, until Friday, August 28, 2026 at 2:00 PM local time. At that time the Bids received will be opened publicly and read aloud. **No bids will be accepted after this time. The bid opening will be in person at the following address unless circumstances prevent that from happening. In that case, the Owner will arrange for a virtual bid opening.**

Bids will be received by Sebastian Dirringer, Capital Projects Manager, 15962 Hunter Ave, Oregon City, Oregon. Sebastian may be contacted at sebastiand@sfwbor.gov or 201-220-4616.

The Bidder is required to submit a First Tier Subcontractor Disclosure Form, as described by ORS 279C.370, within two (2) hours of bid closing time on the bid date. The Owner must reject a bid if the bidder fails to submit the disclosure form by the deadline.

A contract will be awarded within sixty (60) days after the selection of the lowest responsible responsive bidder. No bidder may withdraw or modify the bidder's bid after the hour set for the closing thereof, until after the lapse of this time period.

The Project includes the following Work as described in the Contract Documents:

Construction of a 6,826 SF building that will house meeting space, restrooms, a staff kitchen, and chemical storage and distribution equipment providing water treatment chemicals for the existing treatment plant; on-site sodium hypochlorite generators, relocation of an existing 24" water distribution pipe; associated electrical improvement; site/civil improvements; public street frontage improvements; and storm water facilities. The work generally consists of, but is not limited to, furnishing required labor, equipment, and materials for construction of the Water Quality Systems Building facility as described in the Contract Documents.

This Project is anticipated to be partially funded by the United States Environmental Protection Agency (EPA)'s Water Infrastructure Finance and Innovation Act (WIFIA). As such, all work on this Project is subject to the Federal American Iron and Steel (AIS) requirements, as well as all other WIFIA requirements. Materials specified to be incorporated into this Project shall meet the AIS requirement of P.L. 113-76, Consolidated Appropriations Act, 2014. The Contractor awarded the Project shall adhere to all requirements stated within the Specifications and other WIFIA requirements. Each bid form shall include specific acknowledgment, in the space provided, of bidder's understanding of the WIFIA funding requirements. Failure to acknowledge may result in the bid being rejected as not responsive.

The Contract is for a Public Work subject to ORS 279C.800 to 279C.870 and the Davis-Bacon Act (40 U.S.C. 3141 to 3148)

Obtaining the Bidding Documents

Plans may be viewed, ordered, or electronically downloaded from the South Fork Water Board at sfwbor.gov/bids-and-rfps.

Copies of contract terms, conditions, specifications, and solicitation documents may be reviewed at:

South Fork Water Board, 15962 S. Hunter Ave., Oregon City, OR 97045

Prospective Bidders are urged to register with the designated website as a plan holder, even if Bidding Documents are obtained from a plan room or source other than the designated website. The designated website will be updated periodically with addenda, lists of registered plan holders, reports, and other information relevant to submitting a Bid for the Project. All official notifications, addenda, and other Bidding Documents will be offered only through the designated website. Neither Owner nor Engineer will be responsible for Bidding Documents, including addenda, if any, obtained from sources other than the designated website.

Pre-bid Conference

A voluntary pre-bid conference for the Project will be held on August 14, 2026 at 9:00 AM at South Fork Water Board, 15962 Hunter Ave, Oregon City, OR 97045. Statements made by the Owner's representatives at the conference will not be binding on the Board unless confirmed by written addendum.

Instructions to Bidders.

For all further requirements regarding bid submittal, qualifications, procedures, and contract award, refer to Section 00 21 13, Instructions to Bidders that are included in the Bidding Documents.

This Advertisement is issued by:

Owner: South Fork Water Board
By: Sebastian Dirringer
Title: Capital Projects Manager
Date: July 31, 2026

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SECTION 00 21 13 - INSTRUCTIONS TO BIDDERS

ARTICLE 1 DEFINED TERMS

1.1 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:

A. First-Tier Subcontractor - an individual, firm or corporation having a direct contract with the Contractor for furnishing labor or furnishing labor and materials in connection with the performance of a part of the work.

B. Issuing Office—The office and/or website from which the Bidding Documents are to be issued, and which registers plan holders.

ARTICLE 2 BIDDING DOCUMENTS

2.1 GENERAL: Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents). See Section 00 52 43, Agreement for a list of the Contract Documents. It is Bidder's responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misinterpretations resulting from the use of incomplete documents, by Bidder itself or by its prospective Subcontractors and Suppliers.

AIS REQUIREMENTS: This Project is anticipated to be partially funded by the United States Environmental Protection Agency's (EPA) Water Infrastructure Finance and Innovation Act (WIFIA). As such, all work on this Project is subject to the Federal American Iron and Steel (AIS) requirements. Materials specified to be incorporated into this Project shall meet the AIS requirement of P.L. 113-76, Consolidated Appropriations Act, 2014. The Contractor shall adhere to all requirements stated within the Specifications and to all other WIFIA requirements.

2.2 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use. Authorization to download documents, or other distribution, includes the right for plan holders to print documents solely for their use, and the use of their prospective Subcontractors and Suppliers, provided the plan holder pays all costs associated with printing or reproduction. Printed documents may not be re-sold under any circumstances.

2.3 Owner has established a Bidding Documents Website as indicated in the Advertisement to Bid. Owner recommends that Bidder register as a plan holder with the Issuing Office at such website and obtain a complete set of the Bidding Documents from such website. Bidders may assume that sets of Bidding Documents obtained from the Bidding Documents Website are complete unless an omission is blatant. Registered plan holders will receive Addenda issued by Owner.

2.4 Bidder may register as a plan holder and obtain complete sets of Bidding Documents, in the number and format stated in Section 00 11 13, Advertisement to Bid, from sfwbor.gov/bids-and-rfps. Registered plan holders will receive Addenda issued by Owner.

2.5 Electronic Documents

A. When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to the Bidders as Electronic Documents in the manner specified in Section 00 11 13.

B. Bidding Documents will be provided in Adobe PDF (Portable Document Format, .pdf). It is the intent of the Engineer and Owner that such Electronic Documents are to be exactly representative of the paper copies of the documents. However, because the Owner and Engineer cannot totally control the transmission and receipt of Electronic Documents nor the Contractor's means of reproduction of such documents, the Owner and Engineer cannot and do not guarantee that Electronic Documents and reproductions prepared from those versions are identical in every manner to the paper copies.

C. Unless otherwise stated in the Bidding Documents, the Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents. However, Bidder assumes all risks associated with differences arising from transmission/receipt of Electronic Documents versions of Bidding Documents and reproductions prepared from those versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to derive information that is not explicitly contained in printed paper versions of the documents, and for Bidder's reliance upon such derived information.

ARTICLE 3 BIDDER RESPONSIBILITY CRITERIA

3.1 Bidder shall submit the following information with its Bid to demonstrate Bidder's qualifications to perform the Work and refer to Section 00 45 13, Bidder's Qualifications and Section 00 45 13.01, Subcontractor Statement of Qualifications for requirements.

A. Completed responsibility determination form.

B. A written statement that Bidder is authorized to do business in the state where the Project is located, or a written certification that Bidder will obtain such authority prior to the Effective Date of the Contract.

C. Bidder's state or other contractor license number, if applicable.

3.2 A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.

3.3 No requirement in this Article 3 to submit information will prejudice the right of Owner to seek additional pertinent information regarding Bidder's qualifications.

ARTICLE 4 PRE-BID CONFERENCE

4.1 A voluntary pre-bid conference will be held at the time and location indicated in the Advertisement to Bid. Representatives of Owner and Engineer will be present to discuss the Project.

4.2 Information presented at the pre-Bid conference does not alter the Contract Documents. Owner will issue Addenda to make any changes to the Contract Documents that result from discussions at the

pre-Bid conference. Information presented, and statements made at the pre-bid conference will not be binding or legally effective unless incorporated in an Addendum.

ARTICLE 5 EXISTING SITE CONDITIONS AND EXAMINATION

5.1 Site and Other Areas

A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.

5.2 Existing Site Conditions

A. Subsurface and Physical Conditions; Hazardous Environmental Conditions

1. Section 00 73 00, Supplementary Conditions identifies the following regarding existing conditions at or adjacent to the Site:

a. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data.

b. Those as-built drawings known to Owner of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site.

2. The above referenced documents are included in the Appendices to the Contract Documents. While These reports and drawings are not part of the Contract Documents, the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions, has been identified and established in Section 00 73 00, Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

3. If the Supplementary Conditions do not identify Technical Data, the default definition of Technical Data set forth in Article 1 of the Section 00 72 00, General Conditions and Section 00 73 00, Supplementary Conditions will apply.

5.3 Other Work at the Site

A. Reference is made to Article 8 in Section 00 73 00, Supplementary Conditions for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 6 BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.1 Express Representations and Certifications in Bid Form, Agreement

A. The Bid Form that each Bidder will submit contains express representations regarding the Bidder's examination of Project documentation, Site visit, and preparation of the Bid, and certifications regarding lack of collusion or fraud in connection with the Bid. Bidder should review these representations and certifications and assure that Bidder can make the representations and certifications in good faith, before executing and submitting its Bid.

B. If Bidder is awarded the Contract, Bidder (as Contractor) will make similar express representations and certifications when it executes the Agreement.

ARTICLE 7 INTERPRETATIONS AND ADDENDA

7.1 Owner on its own initiative may issue Addenda to clarify, correct, supplement, or change the Bidding Documents.

7.2 All Addenda will be posted at sfwbor.gov.bids-and-rfps and registered plan holders will be notified by email.

7.3 Bidder shall submit all questions about the meaning or intent of the Bidding Documents to Owner and Engineer in writing and address the request to Sebastian Dirringer, sebastiand@sfwbor.gov and Jeff Fuchs, jeff.fuchs@consoreng.com.

7.4 Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all registered plan holders. Questions received less than seven (7) days prior to the date for opening of Bids may not be answered.

7.5 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract Documents unless set forth in an Addendum that expressly modifies or supplements the Contract Documents.

7.6 All Addenda issued prior to the time for receiving Bids shall be incorporated in and become a part of the BIDDING DOCUMENTS as if they were originally included therein. Bidders shall acknowledge receipt of Addenda by completing the lines provided on the Bid form for such acknowledgment.

ARTICLE 8 BID SECURITY

8.1 A Bid must be accompanied by Bid Security made payable to Owner in an amount of 10 percent of the Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a Bid Bond issued by a surety meeting the requirements of Paragraph 6.01 of Section 00 72 00, General Conditions and Section 00 73 00, Supplementary Conditions. Such Bid Bond will be issued in the form included in the Bidding Documents.

8.2 The Bid Security of the Apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract and furnish the required Contract

security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid Security of that Bidder will be forfeited, in whole in the case of a penal sum bid bond. Such forfeiture will be Owner's exclusive remedy if Bidder defaults.

8.3 The Bid Security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of 10 days after the Effective Date of the Contract or 60 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.

8.4 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within 7 days after the Bid opening.

ARTICLE 9 CONTRACT TIMES

9.1 The number of days within which, or the dates by which, the Work is to be (a) substantially completed and (b) ready for final payment, and (c) Milestones (if any) are to be achieved, are set forth in Section 00 52 43, Agreement.

9.2 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in Section 00 52 43, Agreement.

ARTICLE 10 SUBSTITUTE AND "OR EQUAL" ITEMS

10.1 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration during the bidding and Contract award process of possible substitute or "or-equal" items. In cases in which the Contract allows the Contractor to request that Engineer authorize the use of a substitute or "or-equal" item of material or equipment, application for such acceptance may not be made to and will not be considered by Engineer until after the Effective Date of the Contract.

10.2 All prices that Bidder sets forth in its Bid will be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of "or-equal" or substitution requests are made at Bidder's sole risk.

ARTICLE 11 SUBCONTRACTORS, SUPPLIERS, AND OTHERS

11.1 All Bidder must be prepared to retain specific Subcontractors and Suppliers for the performance of the Work if required to do so by the Bidding Documents or in the Specifications. If a prospective Bidder objects to retaining any such Subcontractor or Supplier and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.

11.2 Bidder must submit a list of the proposed Subcontractors and Suppliers with their bid for the following portions of the Work.

A. On Site Sodium Hypochlorite Generator equipment
B. FRP Tanks
C. Chemical Feed Pumps
D. Process Mechanical Piping Installation

11.3 If Owner or Engineer, after due investigation, has reasonable objection to any proposed Subcontractor or Supplier, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder will submit a substitute, Bidder's Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.

11.4 If apparent Successful Bidder declines to make any such substitution, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors and Suppliers. Declining to make requested substitutions will constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor or Supplier, so listed and against which Owner or Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to subsequent revocation of such acceptance as provided in Paragraph 7.07 Section 00 72 00, General Conditions.

ARTICLE 12 PREPARATION OF BID

12.1 The Bid Form is included with the Bidding Documents. All blanks on the Bid Form must be completed. A Bid price must be indicated for each section, Bid item, alternate, adjustment unit price item, and price item listed therein.

12.2 If Bidder has obtained the Bidding Documents as Electronic Documents, then Bidder shall prepare its Bid on a copy of the Bid Form from the Electronic Documents version of the Bidding Documents. The Bid Form must be clearly legible and as closely identical in appearance to the Electronic Document version of the Bid Form as may be practical. The Owner reserves the right to accept Bid Forms which nominally vary in appearance from the original version of the Bid Form, providing that all required information and submittals are included with the Bid.

12.3 A Bid by a corporation must be executed in the corporate name by a corporate officer (whose title must appear under the signature). The corporate address and state of incorporation must also be shown.

12.4 A Bid by a partnership must be executed in the partnership name and signed by a partner (whose title must appear under the signature). The official address of the partnership must be also shown.

12.5 A Bid by a limited liability corporation (LLC) must be executed in the name of the firm by a member or other authorized person. The state of formation of the firm and the official address of the firm must also be shown.

12.6 A Bid by an individual must show the Bidder's name and official address.

12.7 A Bid by a joint venture must be executed by an authorized representative in the manner indicated on the Bid Form. The joint venture must have been formally established prior to submittal of a Bid, and the official address of the joint venture must also be shown.

12.8 All names must be printed below the signatures.

12.9 The Bid must contain evidence of Bidder's authority to do business in the state where the Project is located, or Bidder must certify in writing that it will obtain such authority within the time for acceptance of Bids and attach such certification to the Bid.

12.10 The Bid must contain an acknowledgment of receipt of all Addenda, the numbers of which must be filled in on the Bid Form.

12.11 Postal and email addresses and telephone number for communications regarding the Bid must be shown.

12.12 If Bidder is required to be licensed to submit a Bid or perform the Work in the state where the Project is located, the Bid must contain evidence of Bidder's licensure, or Bidder must certify in writing that it will obtain such licensure within the time. Bidder's state Contractor license number, if any, must also be shown on the Bid Form.

ARTICLE 13 BASIS OF BID

13.1 Unit Price Basis

A. Bidders must submit a Bid on a unit price basis for each item of Work listed in the unit price section of the Bid Form.

B. The "Bid Price" (sometimes referred to as the extended price) for each unit price Bid item will be the product of the "Estimated Quantity", which Owner or its representative has set forth in the Bid Form, for the item and the corresponding "Bid Unit Price" offered by the Bidder. The total of all unit price Bid items will be the sum of these "Bid Prices"; such total will be used by Owner for Bid comparison purposes. The final quantities and Contract Price will be determined in accordance with Paragraph 13.03 of Section 00 72 00, General Conditions.

C. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.]

ARTICLE 14 SUBMITTAL OF BID

14.1 Bids must be submitted to Sebastian Dirringer, Capital Projects Manager, via the link at sfwbor.gov/bids-and-rfps.

14.2 The Bidding Documents include one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form is to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of Article 2 of the Bid Form.

14.3 All Bids must be received no later than the date and time prescribed and at the place indicated in the Advertisement to Bid, and must be accompanied by the Bid security and other required documents.

14.4 Bids received after the date and time prescribed for the opening of bids or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

ARTICLE 15 MODIFICATION AND WITHDRAWAL OF BID

15.1 An unopened Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.

15.2 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 15.1 and submit a new Bid prior to the date and time for the opening of Bids.

15.3 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, the Bidder may request to withdraw its Bid, and if accepted, Bid security will be returned. Thereafter, if the Work is rebid, the Bidder will be disqualified from further bidding on the Work.

ARTICLE 16 OPENING OF BIDS

16.1 Bids will be opened at the date, time and place indicated in the Advertisement to Bid and, unless obviously non-responsive, read aloud. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 17 BIDS TO REMAIN SUBJECT TO ACCEPTANCE

17.1 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid Security prior to the end of this period.

ARTICLE 18 EVALUATION OF BIDS AND AWARD OF CONTRACT

18.1 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner also reserves the right to waive immaterial irregularities as an informality.

18.2 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible.

18.3 If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, whether in the Bid itself or in a separate communication to Owner or Engineer, then Owner will reject the Bid as nonresponsive.

18.4 If Owner awards the contract for the Work, such award will be to the responsible Bidder submitting the lowest responsive Bid.

18.5 Evaluation of Bids

A. In evaluating Bids, Owner will consider whether the Bids comply with the prescribed requirements, and such other data as may be requested in the Bid Form or prior to the Notice of Award.

B. In the comparison of Bids, alternates will be applied in the same order of priority as listed in the Bid Form. To determine the Bid prices for purposes of comparison, Owner will announce to all bidders a "Base Bid plus alternates" budget after receiving all Bids, but prior to opening them. For comparison purposes alternates will be accepted, following the order of priority established in the Bid Form, until doing so would cause the budget to be exceeded. After determination of the Successful Bidder based on this comparative process and on the responsiveness, responsibility, and other factors set forth in these Instructions, the award may be made to said Successful Bidder on its base Bid and any combination of its additive alternate Bids for which Owner determines funds will be available at the time of award.

C. For determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the estimated quantity of each item and unit price Bid for that item, together with any lump sum items.

18.6 In evaluating whether a Bidder is responsible, Owner will consider the responsibility criteria identified in the attached responsibility determination form.

18.7 Owner may conduct such investigations as Owner deems necessary to establish the responsibility of Bidders and any proposed Subcontractors or Suppliers.

ARTICLE 19 BONDS AND INSURANCE

19.1 Article 6 of Section 00 72 00, General Conditions, as may be modified by Section 00 73 00, Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds, other required bonds (if any), and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by required bonds and insurance documentation.

19.2 Article 8, Bid Security, of these Instructions, addresses the requirements for providing bid bonds as part of the bidding process.

ARTICLE 20 SIGNING OF AGREEMENT

20.1 When Owner issues a Notice of Award to the Successful Bidder, it will be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in Agreement. Within 15 days thereafter, Successful Bidder must execute and deliver the required number of counterparts of the Agreement and any bonds and insurance documentation required to be delivered by the Contract Documents to Owner. Within 10 days thereafter, Owner will deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of Section 00 72 00, General Conditions and Section 00 73 00, Supplementary Conditions.

ARTICLE 21 OREGON REQUIRED TERMS

21.1 Each bidder must identify whether the Bidder is a "resident Bidder," as defined in ORS 279A.120.

21.2 No offer will be received or considered by the Board unless the offer contains a statement by the Bidder as a part of its offer that "Contractor agrees to be bound by and will comply with the provisions of 279C.838, 279C.840 or 40 U.S.C. 3141 to 3148."

21.3 The Board will not receive or consider an offer unless the Bidder is registered with the Construction Contractors Board, or is licensed by the State Landscape Contractors Board, as specified in OAR 137-049-0230.

21.4 Bidders and their subcontractors need not be licensed under ORS 468A.720 regarding asbestos abatement projects.

21.5 Bidders shall certify in their bid that it has not discriminated and will not discriminate, in violation of ORS 279A.110(1), against a disadvantaged business enterprise, a minority-owned business, a woman-owned business, a veteran-owned business or an emerging small business in awarding a subcontract.

ARTICLE 22 CONFIDENTIALITY STATEMENT

22.1 The South Fork Water Board abides by the public records laws of the State of Oregon. As such, bid documents are generally considered to be a matter of public record after the contract for work has been awarded. Information in a bid may or may not be considered to be exempt from public disclosure based on the following:

- Trade secrets as identified in ORS 192.345(2);
- Information submitted in confidence as identified in ORS 192.355(2).

If bidder believes any portion of its bid contains information considered a trade secret under ORS 192.345(2), or otherwise is exempt from disclosure under the Oregon Public Records Law, ORS 192.311 through 192.478, each page containing such information must include the following:

“This data is exempt from disclosure under the Oregon Public Records Law pursuant to ORS192 and is not to be disclosed except in accordance with the Oregon Public Records Law, ORS 192.311 through 192.478.”

Identifying the bid in whole as exempt from disclosure is not acceptable. Cost information submitted in response to an ITB is generally not considered a trade secret under Oregon Public Records Law. If bidder fails to identify the portions of the Bid which Bidder claims are exempt from disclosure, bidder is deemed to have waived any future claim of non-disclosure of that information.

END OF SECTION

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SECTION 00 41 13 - BID FORM

ARTICLE 1 - OWNER AND BIDDER

1.1 This Bid is submitted to: South Fork Water Board, 15962 Hunter Ave., Oregon City, Oregon 97045.

1.2 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 - ATTACHMENTS TO THIS BID

2.1 The following documents are submitted with and made a condition of this Bid:

A. Section 00 43 13, Bid Bond;

B. Section 00 45 17, First-Tier Subcontractors Disclosure Form;

C. Section 00 45 13, Bidder Qualifications

D. Section 00 45 13.01, Subcontractor Statement of Qualifications

E. Section 00 45 19, Non-Collusion Affidavit

ARTICLE 3 - BASIS OF BID UNIT PRICES

3.1 Unit Price Bids

A. Bidder will perform the following Work at the indicated unit prices:

B. Note: This project is subject to AIS requirements and Davis-Bacon Wage Rates.

Item	Description	Unit	Quantity	Unit Price	Bid Amount
1	Mobilization, bonds, insurance, and demobilization	LS	1		$
2	Traffic control	LS	1		$
3	Erosion control	LS	1		$
4	Construction survey and staking	LS	1		$
5	Extra work as authorized	LS	1		$
6	Demolition of Existing Facilities	LS	1		$
7	Shop drawings and approvals	LS	1		$
8	Tree protection and removal, clearing, and grubbing	LS	1		$
9	Dewatering	LS	1		$
10	Clearing and Grubbing	LS	1		$

Item	Description	Unit	Quantity	Unit Price	Bid Amount
11	Backfill with imported material	CY	2300		$
12	Excavation	LS	1		$
13	Sawcutting	LF	630		$
14	Subgrade Stabilization	SY	120		$
15	Cold Plane Pavement Removal, 2 inches	SY	400		$
16	Asphalt Concrete Paving (ACP) - Swan Avenue				$
	a. Level 2, 1/2-Inch ACP, 4-inch depth	TON	100		
	b. Grind and Inlay, 2-Inch ACP	SY	400		
	c. Crushed Aggregate 3/4-Inch (leveling course) - Swan Avenue Roadway	CY	25		
	d. Crushed Aggregate 1/2-Inch (base) - Swan Avenue Roadway	CY	125		
	e. Geotextile Fabric, Woven	SY	450		
17	Concrete Curb and Gutter - Swan Avenue				$
	a. Concrete Curb and Gutter - Swan Avenue	LF	380		
	b. Crushed Aggregate 3/4-Inch - Swan Avenue Curb and Gutter	CY	30		
18	Concrete Sidewalk - Swan Avenue				$
	a. Concrete Sidewalk - Swan Avenue	SF	2320		
	b. Crushed Aggregate 3/4-Inch - Concrete Sidewalk - Swan Avenue	CY	20		
	c. Extra for Curb Ramps	EA	6		
19	Concrete Driveway - Swan Avenue				$
	a. Concrete Driveway - Swan Avenue	SF	600		
	b. Crushed Aggregate 3/4-Inch - Concrete Driveway - Swan Avenue	CY	10		
20	Asphalt Concrete Paving (ACP) - On Site				$
	a. Level 2, 1/2-Inch ACP, 4-inch depth	TON	400		
	b. Crushed Aggregate 3/4-Inch - Access Road and Parking	CY	590		
	c. Geotextile Fabric, Woven	SY	1770		
21	Concrete Curb - On Site				$
	a. Concrete Curb - On Site	LF	750		
	b. Crushed Aggregate 3/4-Inch - On Site	CY	50		
22	Concrete Sidewalk - On Site				$
	a. Concrete Sidewalk - On Site	SF	2090		
	b. Crushed Aggregate 3/4-Inch - Concrete Sidewalk - On Site	CY	20		
23	Chemical Containment Pad - On Site				$
	a. Concrete Driveway - On Site	SF	300		
	b. Crushed Aggregate 3/4-Inch - Concrete Driveway - On Site	CY	10		

Item	Description	Unit	Quantity	Unit Price	Bid Amount
24	Furnish and Install 7-foot chain link gate and fence, complete				$
	a. 7-foot Chain Link Fencing with Barbed Wire	LF	360		
	c. Motorized Chainlink Access Gate, 20'-wide, Swing	LS	1		
25	Furnish and install DI pipe with Class B (imported granular material) Trench Backfill				$
	a. 10" DI Stormwater Pipe, non-restrained	LF	260		
	b. 12" DI Stormwater Pipe, non-restrained	LF	70		
26	Furnish and install 4" PVC Stormwater Pipe	LF	250		$
27	Furnish and install 8" PVC Stormwater Pipe	LF	70		$
28	Furnish and install 10" PVC Stormwater Pipe	LF	20		$
29	Furnish and install 18" Concrete Storm Culvert, Class V, complete	LS	1		$
30	Site Stormwater system testing and start-up	LS	1		$
31	Furnish and install NW Rain Garden, Complete	LS	1		$
32	Furnish and install NE Rain Garden, Complete	LS	1		$
33	Furnish and install Swan Avenue Stormwater Planter, Complete	LS	1		$
34	Furnish and install 2' Wide Roadway Drainage Ditch, Complete	LS	1		$
35	Furnish and install manholes				$
	a. 48" Stormwater Manhole	EA	8		
	b. 60" Stormwater Manhole	EA	1		
	c. 72" Stormwater Manhole	EA	1		
36	Furnish and install stormwater inlets				$
	a. Ditch Inlet	EA	1		
	b. Curb Inlet	EA	1		
	c. Catch Basin, Type 3	EA	2		
37	Furnish and install Polydrain PDX H-20, Complete	LF	20		$
38	Existing Ditch Connection	LS	1		$
39	Furnish and Install 24-inch Class 52 Ductile Iron Pipe with Class B Trench Backfill	LF	108		$
40	Common Utility Trench, complete	LS	1		$
41	Hydrostatic testing, flushing, and disinfection of water mains	LS	1		$

Item	Description	Unit	Quantity	Unit Price	Bid Amount
42	Furnish and Install Fire Hydrant Assembly	EA	1		$
43	All work required to constructing landscape items, complete, including all incidental work as specified and necessary	LS	1		$
44	Alum Bulk Tank, HDPE, (6,000 gal)	EA	2		$
45	Coagulant Polymer Aid Bulk Tank, HDPE (6,000 gal)	EA	1		$
46	Brine Tank, FRP (7,100 gal)	EA	1		$
47	Sodium Hypochlorite Tank, FRP (10,000 gal)	EA	2		$
48	Sodium hypochlorite Generator, (2) 900 PPD units & Accessories	LS	1		$
49	Soda Ash Batching System	EA	1		$
50	Metering Pump Assemblies	EA	1		$
51	Air Compressor	EA	1		$
52	Chemical Feed Piping				$
	a. 1/2-Inch, PVC	LF	20		
	b. 1-Inch, PVC	LF	220		
	c. 2-Inch, PVC	LF	190		
	e. 3-Inch, PVC	LF	300		
	f. 4-Inch, PVC	LF	90		
	g. 8-Inch, PVC	LF	30		
	h. 3/8-Inch, Poly-Braided Tubing	LF	160		
	i. 1/4-Inch, Poly-Braided Tubing	LF	150		
	j. 1-Inch, Poly-Braided Tubing	LF	250		
	k. 1-1/2-Inch, Poly-Braided Tubing	LF	250		
53	Ball Valves				$
	a. Valves 1/2-inch	EA	9		
	b. Valves, 3/4 inch	EA	4		
	c. Valves 1-1/2-inch	EA	3		
	d. Valves, 2-inch	EA	18		
	e. Valves 3-inch	EA	8		
54	Utility Water Twin Booster Pumps & Accessories	LS	1		$
55	Hydropneumatic Tanks	EA	2		$
56	All work and materials required to construct the architectural facilities for water quality systems building, complete, including all incidental work as specified and necessary:				$
	a. CMU Wall Systems, Complete	LS	1		
	b. Doors and Fenestration, Complete	LS	1		
	c. Architectural Roof System, Complete	LS	1		

Item	Description	Unit	Quantity	Unit Price	Bid Amount
	d. Finishings, Coatings, and Paint, Complete	LS	1		
	e. Furniture and Devices, Complete	LS	1		
57	All work and materials required to construct the structural facilities for water quality systems building, complete, including all incidental work as specified and necessary:				$
	a. Concrete Foundations and Slab-On-Grade, Complete	LS	1		
	b. Structural Roof Support and steel, Complete	LS	1		
58	All work and materials required to construct the HVAC facilities for water quality systems building, complete, including all incidental work as specified and necessary:				$
	a. VRF Packaged Heat Pump System, Complete	LS	1		
	b. Makeup Air Handling Unit, Complete	LS	1		
	c. Ducting and Conveyance Systems, Complete	LS	1		
59	All work and materials required to construct the plumbing facilities for water quality systems building, complete, including all incidental work as specified and necessary:				$
	a.Water Service Piping and Fixtures, Complete	LS	1		
	b. Sewer Collection System, Complete	LS	1		
	c. Emergency Shower and Eyewash Systems, Complete	LS	1		
60	All work required to construct the electrical facilities for the water quality systems building, complete, including all incidental work as specified and necessary				$
	a. Service & Distribution	LS	1		
	b. Controls / PLC / SCADA / Comms	LS	1		
	c. Lighting & Devices	LS	1		
	d. Equipment Connections	LS	1		
	e. Raceway / Wire / Installation	LS	1		
Total of All Unit Price Bid Items					$

C. Bidder acknowledges that:

1. Each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item, and

2. Estimated quantities are not guaranteed and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Work will be based on actual quantities, determined as provided in the Contract Documents.

ARTICLE 4 - TIME OF COMPLETION

4.1 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Section 00 72 00, General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

4.2 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 5 - BIDDER'S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

5.1 Bid Acceptance Period

A. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

5.2 Instructions to Bidders

A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

5.3 Receipt of Addenda

A. Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

ARTICLE 6 - BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.1 Bidder's Representations

A. In submitting this Bid, Bidder represents the following:

1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.

2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.

4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.

5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.

6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder's (Contractor's) safety precautions and programs.

7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.

8. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.

9. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

6.2 Bidder's Certifications

A. The Bidder certifies the following:

1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.

2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.

3. Bidder has not solicited or induced any individual or entity to refrain from bidding.

4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this contract:

    a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.

    b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.

    c. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.

    d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

B. Bidder acknowledges of all funding agency requirements for the Contract. The Owner will be utilizing WIFIA funds for this project, which have requirements pertaining to the use of American Iron and Steel (AIS) products, federal Davis-Bacon wage requirements, the requirement that the Bidder and all subcontractors are not subject to debarment and suspension with SAM, certification that any property acquisition complies with the URA 'Uniform Relocation Assistance' requirements, prohibition on certain telecommunication and video surveillance services or equipment, Disadvantaged Business Enterprises (DBE) good faith efforts and reporting, among other requirements. Bidder acknowledges that they have familiarized themselves with all WIFIA funding requirements (described in Section 00 73 45), and have accounted for all required compliance while placing their bid.

BIDDER hereby submits this Bid as set forth above:

Bidder:

_____

(typed or printed name of organization)

By: _____

(individual's signature)

Name: _____

(typed or printed)

Title: _____

(typed or printed)

Date: _____

(typed or printed)

If Bidder is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.

Attest: _____

(individual's signature)

Name: _____

(typed or printed)

Title: _____

(typed or printed)

Date: _____

(typed or printed)

Address for giving notices:

_____

_____

Bidder's Contact:

Name: _____

(typed or printed)

Title: _____

(typed or printed)

Phone: _____

Email: _____

Address:

_____

_____

_____

Bidder's Contractor License No.: (if applicable) _____

END OF SECTION

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SECTION 00 45 13.01 - RESPONSIBILITY DETERMINATION FORM

Bidder's Legal Name: _____ **CCB #:** _____

EXPERIENCE: List the number of years Bidder has been operating under its current license. If Bidder's business has been in continuous existence under a current active license and a previous license number, identify the previous license number.

INSURANCE: Does the Bidder have insurance and worker's compensation coverage as specified in the sample contract attached to this solicitation? **YES** ☐ **NO** ☐

LAWSUITS/JUDGMENTS: Within the past 3 years, has Bidder had any lawsuits filed against it involving contract or payment disputes? Include requests for arbitration. **YES** ☐ **NO** ☐

If "YES" indicate dates and ultimate resolution:

BANKRUPTCY: Within the past 3 years, has Bidder filed a bankruptcy action, filed for reorganization, made a general assignment of assets for the benefit of creditors, or had an action for insolvency instituted against it? **YES** ☐ **NO** ☐

If "YES", provide details:

DEFECTIVE WORK. In the past 5 years has your company been ordered to fix defective work on a project?
YES ☐ **NO** ☐

If "YES," identify the owner, the project and the resolution of the problem.

DEBARMENT: Has Bidder been debarred or disqualified by any public agency within the past 3 years?

YES ☐ NO ☐

If "YES" identify the public agencies:

NON-COMPLETION: Has Bidder failed to complete a contract in the last 5 years? YES ☐ NO ☐

If "YES" identify the project(s) and provide details:

REVOKED LICENSE: Has Bidder's company or any key person in the company, had a license revoked by the Oregon Construction Contractors Board? YES ☐ NO ☐

If "YES" explain the reason for the revocation:

CRIMINAL OFFENSE: Has Bidder's company or any owner of or management employee in the company been convicted of a crime involving fraud, material misrepresentation or any crime involving the awarding of a contract for a government construction project or the bidding or performance of a government contract? YES ☐ NO ☐

TERMINATION OF BONDING/INSURANCE COVERAGE: In the last five years, has a surety or insurance company terminated existing bonding and/or insurance coverage due to excessive claims history and/or nonpayment of premiums? YES ☐ NO ☐

CITATIONS OR ENFORCEMENT ACTIONS. Within the last five years, has the Bidder been cited or subject to any enforcement action for violation of any applicable law or regulations related to its performance of a prior construction contract? For the purposes of this section, "applicable law or regulations" includes without limitation, any building, zoning, environmental, site development, or Oregon Public Contracting Code regulations with which a prior project was required to comply, including non-discrimination regulations and prevailing wage requirements. YES ☐ NO ☐

If “YES”, please provide details for all:

BIDDER REFERENCES FOR COMPARABLE PROJECTS IN SIZE AND SCOPE

Provide three references for projects of comparable size and scope in the past 5 years. The South Fork Water Board reserves the right to contact other persons, agencies or owners not listed below as part of determining whether Bidder is responsible. References may not include current Board staff.

Project Reference #1	
Dates	
Location	
Customer (Agency, Firm, or Person)	
Description	
Contact (Name, Phone, & Email)	
Project Reference #2	
Dates	
Location	
Customer (Agency, Firm, or Person)	
Description	
Contact (Name, Phone, & Email)	
Project Reference #3	
Dates	
Location	
Customer (Agency, Firm, or Person)	

Description	
Contact (Name, Phone, & Email)	

END OF SECTION

ATTACHMENT A - PROJECT EXPERIENCE

PROJECT EXPERIENCE

PROJECT NAME:	DATE COMPLETED:
	PROJECT DURATION:
OWNER NAME:	OWNER ADDRESS:
OWNER CONTACT PERSON:	OWNER CONTACT PHONE NO. (Office and mobile number):
DESIGN FIRM NAME:	DESIGN FIRM ADDRESS:
DESIGN FIRM CONTACT PERSON:	DESIGN FIRM CONTACT PHONE NO. (Office and mobile number):
BRIEF DESCRIPTION OF THE PROJECT:	
INITIAL PROJECT COST:	
CHANGE ORDER COST:	
FINAL PROJECT COST:	
COMMENTS OR EXCEPTIONS:	

SECTION 00 45 17 –FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM
FOR
WATER QUALITY SYSTEMS BUILDING
CIP-01 FOR
SOUTH FORK WATER BOARD

List below the names of each subcontractor that will be furnishing labor or furnishing labor and materials and that is required to be disclosed, the category of work that the subcontractor will be performing and the dollar value of the subcontract. Enter 'NONE' if there are no subcontractors that need to be disclosed (ATTACH ADDITIONAL SHEETS IF NEEDED). A subcontractor is required to be disclosed if it (1) will be furnishing labor or will be furnishing labor and materials in connection with the public improvement contract; and (2) will have a contract value that is equal to or greater than five percent of the total project bid or $15,000, whichever is greater, or $350,000 regardless of the percentage of the total project bid.

Subcontractor Name*	Dollar Value	Category of Work

Form Submitted by (Bidder Name): _____

Contact Name: _____Phone No.: _____

*If no qualifying subcontractors will be used, sign the above form and submit with bid or within the Disclosure Submittal Deadline. If qualifying subcontractors are utilized, fill out the appropriate information for each qualifying subcontractor, sign the above form and submit with bid or within the Disclosure Submittal Deadline.

END OF SECTION

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SECTION 00 45 19 – NON-COLLUSION AFFIDAVIT
FOR
WATER QUALITY SYSTEMS BUILDING
FOR
SOUTH FORK WATER BOARD

BID FOR:

STATE OF _____

COUNTY OF _____

I state that I am_____(title) of_____(name of firm) and that I am authorized to make this affidavit on behalf of my firm and its owners, directors, and officers. I am the person responsible in my firm for the price(s) and the amount of this bid.

I state that:

1. The price(s) and amount of this bid have been arrived at independently and without consultation, communication, or agreement with any other contractor, bidder, or potential bidder, except as disclosed on the attached appendix.

2. Neither the price(s) nor the amount of this bid, and neither the approximate price(s) nor approximate amount of this bid, have been disclosed to any other firm or person who is a bidder or potential bidder, and they will not be disclosed before bid opening.

3. No attempt has been made or will be made to induce any firm or person to refrain from bidding on this contract, to submit a bid higher than this bid, or to submit any intentionally high or noncompetitive bid or other form of complementary bid.

4. The bid of my firm is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any firm or person to submit a complementary or other noncompetitive bid.

5. _____(name of firm), its affiliates, subsidiaries, officers, directors and employees are not currently under investigation by any governmental agency for violating any non-collusion statutes and have not in the last four years been convicted of or found liable for any act prohibited by state or federal law in any jurisdiction, involving conspiracy or collusion with respect to bidding on any public contract, except as described in the attached appendix.

I state that_____(name of firm) understands and acknowledges that the above representations are material and important and will be relied on by the Owner in awarding the contract(s) for which this bid is submitted. I understand, and my firm understands that any misstatement in this affidavit is and shall be treated as fraudulent concealment from the Owner of the true facts relating to the submission of bids for this contract.

_____
Authorized Signature

_____
Name of Company / Position

Sworn to and subscribed before me this_____day of_____, 20____.

_____
Notary Public for the State of <_____>

My Commission Expires: _____

SECTION 00 51 00 – NOTICE OF AWARD

Date of Issuance:			
Owner:	South Fork Water Board	Owner's Project No.:	CIP-01
Engineer:	Consor, N.A.	Engineer's Project No.:	W253326OR.00
Project:	Water Quality Systems Building		
Contract Name:	Water Quality Systems Building		
Bidder:			
Bidder's Address:			

You are notified that Owner has accepted your Bid dated_____ for the above Contract, and that you are the Successful Bidder and are awarded a Contract for: South Fork Water Board - Water Quality Systems Building.

The Contract Price of the awarded Contract is $_____. Contract Price is subject to adjustment based on the provisions of the Contract, including but not limited to those governing changes, Unit Price Work, and Work performed on a cost-plus-fee basis, as applicable.

_____ unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents accompanies this Notice of Award or has been transmitted or made available to Bidder electronically.

☐ Drawings will be delivered separately from the other Contract Documents.

You must comply with the following conditions precedent within 15 days of the date of receipt of this Notice of Award:

1. Deliver to Owner _____counterparts of the Agreement, signed by Bidder (as Contractor).
2. Deliver with the signed Agreement(s) the Contract security (such as required performance and payment bonds) and insurance documentation, as specified in the Instructions to Bidders and in the General Conditions, Articles 2 and 6.
3. Other conditions precedent (if any): _____

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within 10 days after you comply with the above conditions, Owner will return to you one fully signed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

Owner: South Fork Water Board

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

Copy: Engineer

END OF SECTION

SECTION 00 52 43
PUBLIC IMPROVEMENT CONTRACT
CONTRACT NO. 2627-0XX
WATER QUALITY SYSTEMS BUILDING, CIP-01

This contract ("Contract") between the SOUTH FORK WATER BOARD, a public water utility company formed under ORS 190 and jointly operated by Oregon City and West Linn (the "Board" or "Owner") and _____, (the "Contractor").

THE PARTIES MUTUALLY AGREE AS FOLLOWS:

1. Contractor's Agreement to Provide Services. Contractor agrees to provide the construction services and materials described Exhibit A (the "Work"), in accordance with the terms and conditions of this Contract. Contractor shall provide all preparatory work and operations, including, but not limited to those necessary for the movement of personnel, equipment and supplies and any incidentals necessary to carry out the Work. Contractor shall warrant all Work against defects in materials, workmanship, and performance for a period of one year following final completion. Within the warranty period, if any defect in the Work arises, Contractor shall repair or replace the defective aspect of the Work promptly at no additional charge to the Board.

Contractor shall perform the Work using commercially reasonable efforts. Contractor shall be responsible for securing all permits, licenses, and other authorizations necessary to perform the Work. Contractor shall bear full responsibility for all Subcontractors and employees performing Work on its behalf, and for prompt payments to the same.

2. Board Responsibilities. Board will assist Contractor by placing at Contractor's disposal all reasonably available information pertinent to completing the Work, including any other relevant data and will promptly respond to questions and issues as they arise. Where possible, Board will assist Contractor in obtaining information from sources outside the Board.

3. Effective Date and Duration. This Contract is effective on _____, 20___, or on the date at which every party has signed this Contract, whichever is later. The Work under this Contract shall be substantially completed, unless otherwise terminated or extended, on or before September 30, 2028 and completed and ready for final payment on or before November 30, 2028.

4. Consideration. Board agrees to pay Contractor for accomplishing all Work required by this Contract according to the price schedule outlined in Exhibit A.

Contractor will submit an invoice on completion of the Work. Board will pay invoices within thirty (30) calendar days of the date the invoice is received and the Board approves the Work provided.

5. Standard Public Improvement Contract Terms and Conditions. This Contract is subject to Standard Contract Terms and Conditions, attached to this contract as Exhibit B.

6. **Contract Documents.** The Contract Documents are defined to include:
   A. Written amendments to this Contract
   B. This Contract
   C. Exhibit B – Standard Contract Terms and Conditions
   D. Exhibit A – Statement of Work and Payment Schedule (Contractor's Bid)
   E. Specifications
   F. Drawings
   G. Insurance and any associated bonds
   H. All other documents expressly adopted by this Contract or by the written consent of both parties

If there is a conflict between the Contract Documents, the parties shall interpret the documents in the order listed above.

7. **Addresses for Notice.** Any notice required by the terms of this Contract shall be provided to the contact information listed below and served in one of the following manners: a) in-person delivery; b) deposited in the U.S. Mail under certified or registered handling, postage prepaid; or c) via email, with read receipt function enabled. Except as provided in this Contract, it is agreed that fifteen calendar days shall constitute reasonable notice for the exercise of any right in the event that applicable law specifically requires such notice.

Board	Contractor
Sebastian Dirringer Capital Projects Manager 15962 S. Hunter Avenue, Oregon City, OR 97006 (201) 220-4616 sebastiand@sfwbor.gov	

8. **Authorized Representatives**. The Board's Authorized Representative is Sebastian Dirringer and is empowered to act for the Board in accordance with the provisions of this Contract, where such acts are not contrary to laws or ordinances. Contractor's Authorized Representative shall be

Contractor: _____
Phone: _____
Email: _____.

As the context requires, each of "Board" and "Contractor" shall refer to their respective authorized representatives.

9. Survival of Covenants. The covenants of this Contract shall survive the expiration or termination of the Contract with respect to compensation, confidentiality, non-appropriation of funds, record keeping, access to records and indemnification.

10. Authorization. The person signing this Contract on behalf of Contractor hereby covenants and warrants that he/she is authorized to do so, and that his/her signature will fully bind Contractor to the terms and conditions of this Contract. Upon Board's request, Contractor shall provide Board with evidence reasonably satisfactory to the Board's confirming the foregoing covenants and warranties.

11. Electronic Signature. This Contract may be executed in counterparts, each of which shall be deemed an original, and all of which together shall constitute one and the same instrument. An electronic signature shall be considered an original signature. Executed signature pages may be delivered using PDF or similar file type transmitted via electronic mail, cloud-based serve, e-signature technology or other similar Electronic Means.

12. Entire Contract. This Contract represents the entire understanding of the Board and Contractor as to those matters contained herein. No prior oral or written understanding shall be of any force or effect with respect to those matters covered herein. This Contract may not be modified or altered except in writing signed by both parties.

[*Remainder of this page is intentionally left blank; signatures are on the following page.*]

CONTRACTOR DATA, CERTIFICATION, AND SIGNATURE

Business Name (please print):_____
Contact Name: _____ Phone: _____
E-Mail _____Address: _____
_____
CCB Lic # _____Federal Tax ID # _____State Tax ID # _____
Business Designation (check one): ☐ Individual ☐ Partnership ☐ Corporation
☐ Government ☐ Nonprofit ☐ LLC ☐ Other _____
If not a citizen, check one: ☐ Lawful Permanent Resident ☐ Nonresident Alien

The above information must be provided prior to Contract approval. Payment information will be reported to the Internal Revenue Service (IRS) under the name and taxpayer I.D. number provided above. (See IRS 1099 for additional instructions regarding taxpayer ID numbers.)

Contractor understands that all exhibits and attachments are an integral part of this Contract and agrees to perform the Work in accordance with the terms and conditions of this Contract.

Contractor agrees the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

Contractor is familiar with all federal, state and local Laws and Regulations that may affect cost, progress, performance of the Work.

Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (c) Contractor's safety precautions and programs.

Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.

Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Contract:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;
2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and
4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

The Contractor acknowledges to and for the benefit of South Fork Water Board and the United States Environmental Protection Agency ("EPA") that it understands the goods and services under this Contract are being funded with monies made available by the Water Infrastructure Finance and Innovation Act program of the EPA that has statutory requirements commonly known as "American Iron and Steel" that requires all of the iron and steel products used in the project to be produced in the United States ("American Iron and Steel Requirement") including iron and steel products provided by the Contactor pursuant to this Contract.

The Contractor hereby represents, warrants and covenants to and for the benefit of the Board and the EPA that (a) the Contractor has reviewed and understands the American Iron and Steel Requirement, (b) all of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is approved, and (c) the Contractor will provide all further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by the Board or the EPA.

Notwithstanding any other provision of this Contract, any failure to comply with this paragraph by the Contractor shall permit the Board or the EPA to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney's fees) incurred by the Board or the EPA resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the EPA or any damages owed to the EPA by the Board). While the Contractor has no direct contractual privity with the EPA, as a lender to the Board for the funding of its project, the Board and the Contractor agree that the EPA is a third- party beneficiary and neither this paragraph (nor any other provision of this Contract necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the EPA.

Contractor represents and warrants to Board that: (a) Contractor has the power and authority to enter into and perform the Contract; (b) the Contract, when executed and delivered, shall be a valid and binding obligation of Contractor enforceable in accordance with its terms.

By its signature Contractor acknowledges it has read and understands this Contract and agrees to be bound by its terms and conditions.

Signed by Contractor:

_____

Signature/Title Date

NOTICE TO CONTRACTOR: This Contract does not bind the South Fork Water Board unless and until the Board's Chief Executive Officer has executed it.

SOUTH FORK WATER BOARD SIGNATURE

Approved: _____

Chief Executive Officer Date

Date of Board Approval: _____

EXHIBIT A – STATEMENT OF WORK AND PAYMENT SCHEDULE

Contractor agrees to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

Contractor shall perform all Work at the unit prices included in Contractor's Bid submitted in Section 00 41 13 – Bid Form.

Contractor shall pay the appropriate state, and if applicable, federal prevailing wage rates for labor and include those charges as part of progress payments, subject to certified payroll and required reporting documentation.

Payment shall be made within thirty (30) calendar days after receipt of invoice and Board approval of services rendered. The invoice shall state the contract number from page 1 of this contract and describe the work performed.

EXHIBIT B – STANDARD TERMS AND CONDITIONS

1. DEFINITIONS.

Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1.1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.

1.2. *Application for Payment*—The document prepared by Contractor, in a form acceptable to the Board, to request progress or final payments, and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

1.3. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

1.4. *Bidder*—An individual or entity that submits a Bid to Owner.

1.5. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.

1.6. *Bidding Requirements*—The Advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.

1.7. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.

1.8. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.

1.9. *Board or Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.

1.10. *Board Authorized Representative or Owner Authorized Representative*-- As defined pursuant to the Contract.

1.11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations

regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

1.12. *Contract*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties, and designates the specific items that are Contract Documents.

1.13. *Contract Documents*— As defined pursuant to the Contract.

1.14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work.

1.15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work pursuant to the Contract Documents.

1.16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.

1.17. *Contractor Authorized Representative* -- As defined pursuant to the Contract.

1.18. *Cost of the Work*—See Section 18.1 for definition.

1.19. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.

1.20. *Effective Date of the Contract*—The date, indicated in the Contract, on which the Contract becomes effective.

1.21. *Electronic Document*—Any Work-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.

1.22. *Electronic Means*—Electronic mail (email), upload/download from a secure Work website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the recipient; (d) the storage and archiving of the Electronic Document by sender and recipient; and (e) the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

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

1.24. *Hazardous Environmental Condition* —The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.

a) The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.

b) The presence of Constituents of Concern that are to be removed or remediated as part of the Work is not a Hazardous Environmental Condition.

c) The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.

1.25. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

1.26. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.

1.27. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date, or by a time prior to Substantial Completion of all the Work.

1.28. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.

1.29. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.

1.30. *Owner or Board*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.

1.31. *Owner Authorized Representative or Board Authorized Representative*—As defined pursuant to the Contract.

1.32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising Contractor's plan to accomplish the Work within the Contract Times.

1.33. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.

1.34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required Submittals and the time requirements for the Board's review of the Submittals.

1.35. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.36. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or *information that are specifically prepared or assembled by or for Contractor and* submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

1.37. *Site*—Lands or areas indicated in the Contract or Specifications as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands or areas furnished by Owner which are designated for the use of Contractor.

1.38. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.

1.39. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.

1.40. *Submittal*—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Owner, or that is indicated as a Submittal in the Schedule of Submittals accepted by Owner. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers' instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Work photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Owner, are not Contract Documents. Change Proposals, Change Orders, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.

1.41. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where 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 of such Work.

1.42. *Successful Bidder*—The Bidder to which the Owner makes an award of contract.

1.43. *Supplier*—A manufacturer, fabricator, supplier, distributor, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.

2. SUBCONTRACTS AND ASSIGNMENT.

   Contractor shall not enter into any subcontracts for any of the Work, or assign or transfer any of its interest in this Contract, without the prior written consent of Board. The provisions of this Contract shall be binding upon and shall inure to the benefit of the parties hereto, and their respective successors and assigns, if any.

3. THIRD PARTY BENEFICIARIES.

   Board and Contractor are the only parties to this Contract and are the only parties entitled to enforce its terms. Nothing in this contract gives, is intended to give, or shall be construed to give or provide any benefit or right, whether directly, indirectly, or otherwise, to third persons unless such third persons are individually identified by name herein and expressly described as intended beneficiaries of the terms of this Contract.

4. GOVERNING LAW/VENUE/ATTORNEY FEES.

   This Contract shall be governed and construed in accordance with the laws of the State of Oregon without regard to principles of conflicts of law. Any claim, action, suit or proceeding (collectively, "the claim") between Board and Contractor that arises from or relates to this Contract shall be brought and conducted solely and exclusively within the circuit court of Clackamas County for the State of Oregon. If the claim must be brought in a federal forum, then it shall be brought and conducted solely and exclusively within the United States District Court for the District of Oregon. Contractor, by its execution of this Contract, hereby consents to the in personal jurisdiction of said courts. If a suit or action is filed to enforce any of the terms of this Contract, each party is responsible for their respective costs and fees, including attorney fees.

5. REMEDIES CUMULATIVE.

   All rights and remedies of Board and Contractor shall be cumulative and may be exercised successively or concurrently. The foregoing is without limitation to or waiver of any other rights or remedies of Board according to law.

6. SEVERABILITY/WAIVER.

   Board and Contractor agree that, if any term or provision of this Contract is declared by a court of competent jurisdiction to be illegal or in conflict with any law, the validity of the remaining terms and provisions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the contract did not contain the particular term or provision held to be invalid. The failure of either party to enforce any provision of this contract shall not constitute a waiver by that party of that or any other provision of this contract.

7. ASSIGNMENT.

   Board or Contractor may not assign this Contract without prior written consent of the other party.

8. COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS.

8.1. Contractor shall comply with all federal, state and local laws, regulations, executive orders and ordinances applicable to the Contract. Without limiting the generality of the foregoing, Contractor expressly agrees to comply with the following laws, regulations and executive orders to the extent they are applicable to the Contract: (i) Titles VI and VII of the Civil Rights Act of 1964, as amended; (ii) Sections 503 and 504 of the Rehabilitation Act of 1973, as amended; (iii) the Americans with Disabilities Act of 1990, as amended; (iv) Executive Order 11246, as amended; (v) the Health Insurance Portability and Accountability Act of 1996; (vi) the Age Discrimination in Employment Act of 1967, as amended, and the Age Discrimination Act of 1975, as amended; (vii) the Vietnam Era Veterans' Readjustment Assistance Act of 1974, as amended; (viii) ORS Chapter 659, as amended; (ix) all regulations and administrative rules established pursuant to the foregoing laws; and (x) all other applicable requirements of federal, state and municipal civil rights and rehabilitation statutes, rules and regulations. These laws, regulations and executive orders are incorporated by reference herein to the extent that they are applicable to the Contract and required by law to be so incorporated. The Board's performance under the Contract is conditioned upon Contractor's compliance with the provisions of ORS 279C.505, 279C.510, 279C.515, 279C.520, and 279C.530, which are incorporated by reference herein.

8.2. Contractor shall comply with all applicable requirements of federal and state civil rights and rehabilitation statutes, rules and regulations; and Contractor shall not discriminate against Disadvantaged, Minority, Women or Emerging Small Business enterprises, as those terms are defined in ORS 200.005, in the awarding of subcontracts (ORS 279A.110).

8.3. Contractor shall maintain, in current and valid form, all licenses and certificates required by law, regulation, or this Contract when performing the Work. Contractor had a current license with the Construction Contractors Board in accordance with ORS 701.035 to 701.055 at the time Contractor's bid was submitted to Board.

8.4. Unless contrary to federal law, Contractor shall certify that it shall not accept a bid from Subcontractors to perform Work as described in ORS 701.005 under this Contract unless such Subcontractors have a current license with the Construction Contractors Board in accordance with ORS 701.035 to 701.055 at the time they submit their bids to the Contractor. Contractor shall not employ any Subcontractors currently listed on the Oregon Bureau of Labor and Industry's List of Debarred Contractors.

8.5. The following notice is applicable to Contractors who perform excavation Work. ATTENTION: Oregon law requires you to follow rules adopted by the Oregon Utility Notification Center. Those rules are set forth in OAR 952-001-0010 through OAR 952-001-0090. You may obtain copies of the rules by calling the center at (503) 232-1987.

8.6. For Contracts exceeding $10,000, non-resident Contractors shall promptly report to the Department of Revenue for the State of Oregon on forms provided by the Department, the total contract price, terms of payment, length of contract and other information that the Department may require. Contractor shall mail a copy of these forms filed with the Department of Revenue to the Board.

8.7. By signing this Contract, Contractor declares that it has complied with all of the State of Oregon's tax laws at the time of contract execution and will comply with same for the life of the Contract, including but not limited to ORS 305.620, and ORS Chapters 316, 317, and 318. Contractor acknowledges that failure to comply with the State of Oregon's tax laws before this Contract was executed or during the term of this Contract is considered a default for which the Board may terminate this Contract and seek damages and other relief available under the terms of this Contract or under applicable law. Failure to comply with any or all of the requirements listed above shall be a breach of Contract and constitute grounds for Contract termination. Damages or costs resulting from such noncompliance shall be the responsibility of Contractor.

8.8. This Contract is subject to prevailing rate of wage rules and regulations. Contractor shall comply fully with the provisions of ORS 279C.800 through 279C.870 and Contractor must pay workers not less than the applicable prevailing rate of wage in accordance with ORS 279C.838 and 279C.840. Documents establishing those conditions, as determined by the Commissioner of the Bureau of Labor and Industries (BOLI), can be downloaded from the State of Oregon's BOLI website, www.oregon.gov/boli. The rates that apply are those that are in effect on the date the project was first advertised to bidders. https://www.oregon.gov/boli/employers/Pages/prevailing-wage-rates.aspx. If both state and federal prevailing wage rates apply to the Work, Contractor must pay all laborers, including those working on behalf of Subcontractors, the higher of the applicable state or federal wage rate. Contractor will ensure that its Subcontractors also agree to do so in writing. If both state and federal wages apply to the Work, Contractor will ensure that its Subcontractors agree in writing to pay the higher of the applicable state or federal wage rate.

8.9. Payroll Certification and BOLI Fee Requirements.

8.9.1. In accordance with ORS 279C.830 and ORS 279C.845, the Contractor and every Subcontractor shall submit written certified statements to the Board's Authorized Representative, on the form prescribed by the Commissioner of the Bureau of Labor and Industries, certifying the hourly rate of wage paid each worker which the Contractor or the Subcontractor has employed on the completion of any work subject to prevailing wage and further certifying that no worker employed in such work has been paid less than the applicable state or federal prevailing rate of wage or less than the minimum hourly rate of wage specified in the Contract, which certificate and statement shall be verified by the oath of the Contractor or the Subcontractor that the Contractor or Subcontractor has read such statement and certificate and knows the contents thereof and that the same is true to the Contractor or Subcontractor's best knowledge and belief. The certified statements shall set out accurately and completely the payroll records for the prior week including the name and address of each worker, the worker's correct classification, rate of pay, daily and weekly number of hours worked, deductions made, and actual wages paid. Certified statements for each week during which the Contractor or Subcontractor has employed a worker on completion of the work shall be

submitted once a month or upon job completion, with the Contractor's invoice, by the fifth business day of the following month. If certified payroll statements are not submitted, Board will withhold 25% retainage of any amount earned by Contractor until such certified payroll statements are submitted. Once submitted, the 25% retainage will be paid to Contractor within 14 days of receipt of the certified payroll statements.

8.9.2. The Contractor and Subcontractors shall preserve the certified statements for a period of six years from the date of completion of the Contract.

8.9.3. Board will pay the required fee(s) to the Oregon Bureau of Labor and Industries, as applicable.

8.10. Pursuant to ORS 279C.505 and as a condition to Board's performance hereunder, the Contractor shall:

8.10.1. Make payment promptly, as due according to the applicable prevailing wage rates, to all persons supplying to Contractor labor or materials for the prosecution of the Work provided for in this Contract.

8.10.2. Pay all contributions or amounts due to the State Industrial Accident Fund from such Contractor or Subcontractor incurred in the performance of the Contract.

8.10.3. Not permit any lien or claim to be filed or prosecuted against the Board on account of any labor or material furnished. Contractor will not assign any claims that Contractor has against Board, or assign any sums due by Board, to Subcontractors, Suppliers, or manufacturers, and will not make any Contract or act in any way to give Subcontractors a claim or standing to make a claim against the Board.

8.10.4. Pay to the Department of Revenue all sums withheld from employees pursuant to ORS 316.167.

8.10.5. Contractor and Subcontractors must give written notice to all persons furnishing labor under this Contract, of the number of hours per day and the days of the week required for performance of the Work per OAR 839-025-0020 (2) (a).

8.11. Pursuant to ORS 279C.515, and as a condition to Board's performance hereunder, Contractor agrees:

8.11.1. If Contractor fails, neglects or refuses to make prompt payment of any claim for labor or services furnished to the Contractor or a Subcontractor by any person in connection with the project as such claim becomes due, the proper officer(s) representing the Board may pay the claim and charge the amount of the payment against funds due or to become due Contractor under this Contract. Payment of claims in this manner shall not relieve the Contractor or the Contractor's surety from obligation with respect to any unpaid claims.

8.11.2. If the Contractor or a first-tier Subcontractor fails, neglects or refuses to make payment to a person furnishing labor or materials in connection with the public contract for a public improvement within 30 Days after receipt of payment from Board or a contractor, the contractor or first-tier Subcontractor shall owe the person the amount due plus interest charges commencing at the end of the 10-Day period that payment is due under ORS 279C.580(3) and ending upon final payment, unless payment is subject to a good faith dispute as defined in ORS 279C.580. The rate of interest charged to the Contractor or first-tier Subcontractor on the amount due shall equal three times the discount rate on 90-Day commercial paper in effect at the Federal Reserve Bank in the Federal Reserve that includes Oregon on the date that is 30 Days after the date when payment was received from Board or from the Contractor, but the rate of interest shall not exceed 30 percent. The amount of interest may not be waived.

8.11.3. If the Contractor or a Subcontractor fails, neglects or refuses to make payment to a person furnishing labor or materials in connection with the Contract, the person may file a complaint with the Construction Contractors Board, unless payment is subject to a good faith dispute as defined in ORS 279C.580. Every contract related to this Contract shall contain a similar clause.

8.12. Pursuant to ORS 279C.580, Contractor shall include in each subcontract for property or services entered into by the Contractor and a first-tier Subcontractor, including a material Supplier, for the purpose of performing a construction contract:

8.12.1. A payment clause that obligates the Contractor to pay the first-tier Subcontractor for satisfactory performance under its subcontract within 10 Days out of such amounts as are paid to the Contractor by Board under the Contract.

8.12.2. An interest penalty clause that obligates the Contractor if payment is not made within 30 Days after receipt of payment from Board, to pay to the first-tier Subcontractor an interest penalty on amounts due in the case of each payment not made in accordance with the payment clause included in the subcontract pursuant to paragraph 8.1 of this subsection. Contractor or first-tier Subcontractor shall not be obligated to pay an interest penalty if the only reason that the Contractor or first-tier Subcontractor did not make payment when payment was due is that the Contractor or first-tier Subcontractor did not receive payment from Board or Contractor when payment was due. The interest penalty shall be for the period beginning on the day after the required payment date and ending on the date on which payment of the amount due is made; and shall be computed at the rate specified in ORS 279C.515(2).

8.12.3. A clause which requires each of Contractor's Subcontractor's to include, in each of their contracts with lower-tier Subcontractors or Suppliers, provisions to the effect that the first-tier Subcontractor shall pay its lower-tier Subcontractors and Suppliers in accordance with the provisions of subsections (a) and (b), above and

requiring each of their Subcontractors and Suppliers to include such clauses in their subcontracts and supply contracts.

8.13. All employers, including Contractor, that employ subject workers who work under this contract in the State of Oregon shall comply with ORS 656.017 and provide the required Workers' Compensation coverage, unless such employers are exempt under ORS 656.126. Contractor shall ensure that each of its Subcontractors complies with these requirements.

8.14. Contractor warrants that it is not delinquent in the filing or payment of any Oregon income taxes, Oregon personal property taxes, Oregon municipal taxes, or Oregon real property taxes and that it has otherwise complied with all Oregon tax laws and all tax laws of those Oregon municipalities to which Contractor is subject.

8.15. Pursuant to ORS 279C.530, and as a condition to Board's performance hereunder, Contractor shall promptly, as due, make payment to any person, partnership, association or corporation furnishing medical, surgical, and hospital care or other needed care and attention, incident to sickness or injury, to the employees of such Contractor, all sums of which the Contractor agrees to pay for such services and all moneys and sums which the Contractor has collected or deducted from the wages of personnel pursuant to any law, contract or contract for the purpose of providing or paying for such services.

8.16. Pursuant to ORS 279C.520 and as a condition to Board's performance hereunder, no person shall be employed to perform Work under this Contract for more than 10 hours in any one day or 40 hours in any one week, except in cases of necessity, emergency or where public policy absolutely requires it. In such instances, Contractor shall pay the employee at least time and a half pay:

8.16.1. For all overtime in excess of eight hours a day or 40 hours in any one week when the work week is five consecutive Days, Monday through Friday; or

8.16.2. For all overtime in excess of 10 hours a day or 40 hours in any one week when the work week is four consecutive Days, Monday through Friday; and

8.16.3. For all Work performed on Saturday and on any legal holiday specified in ORS 279C.540.

This section will not apply to Contractor's Work under this Contract if Contractor is currently a party to a collective bargaining contract with any labor organization. This Section shall not excuse Contractor from completion of the Work within the time required under this Contract.

8.17. Pursuant to ORS 279C.505, Contractor shall demonstrate that an employee drug testing program is in place. The Contractor shall demonstrate that it has a drug-testing program in place by executing a certification on a form provided by the Board, which shall become a term or condition of the Contract. Failure to maintain such a program shall constitute a material breach of Contract.

8.18. Bonds. Contractor will:

8.18.1. File a public works bond with the Construction Contractors Board pursuant to ORS 279C.836 before starting work, unless exempt under ORS 279C.836(2) (7) or (8), in an amount of not less than $30,000.

8.18.2. Include in every subcontract a provision requiring the Subcontractor to file a public works bond with the Contractors Board pursuant to ORS 279C.836 before starting work, unless exempt under ORS 279C.836(2), (7) or (8).

8.18.3. Furnish and maintain in effect at all times during the Contract Period, a performance bond and a payment bond on forms acceptable to Owner and in a sum equal to the Contract Price to cover Contractor's obligation to perform and complete the Work and Contractor's obligation to make payments to subcontractors, suppliers and others Contractor is obligated to pay. Bonds issued by a surety company authorized to do business in Oregon are the only acceptable form of security, unless otherwise agreed to by the Owner in writing.

8.19. Retainage.

8.19.1. Retainage shall be withheld and released in accordance with ORS 279C.550 to 279C.570.

8.19.2. Board may reserve as retainage from any progress payment an amount not to exceed five percent of the payment. As Work progresses, Board may reduce the amount of the retainage and may eliminate retainage on any remaining monthly Contract payments after 50 percent of the Work under the Contract is completed if, in the Board's opinion, such Work is progressing satisfactorily. Elimination or reduction of retainage shall be allowed only upon written application by the Contractor, which application shall include written approval of Contractor's surety; except that when the Work is 97-1/2 percent completed the Board may, at its discretion and without application by the Contractor, reduce the retained amount to 100 percent of the value of the Work remaining to be done. Upon receipt of written application by the Contractor, Board shall respond in writing within a reasonable time.

8.19.3. In accordance with the provisions of ORS 279C.560 and related Oregon administrative rules, Contractor may request in writing:

a) to be paid amounts which would otherwise have been retained from progress payments where Contractor has deposited acceptable bonds and securities of equal value with Board or in an escrow account, satisfactory to Board, with an approved bank or trust company to be held in lieu of the cash retainage for the benefit of Board;

b) that retainage be deposited in an interest-bearing account, in a bank, savings bank, trust company or savings association for the benefit of Board, with earnings from such account accruing to the Contractor; or

c) that the Board allow Contractor to deposit a surety bond for the benefit of Board, in a form acceptable to Board, in lieu of all or a portion of funds retained, or to be retained. Such bond and any proceeds therefrom shall be made subject to all claims and liens in the manner and priority as set forth for retainage under ORS 279C.550 to ORS 279C.570.

8.19.4. Where the Board has agreed to the Contractor's election of option (a) or (b), Board may recover from Contractor any additional costs incurred through such election by reducing Contractor's final payment. Where the Board has agreed to Contractor's election of option (c), Contractor shall accept like bonds from Subcontractors and Suppliers on the Project. If Contractor elects option (b), the Board will not place the retainage into an escrow account.

8.19.5. The retainage held by Board shall be included in and paid to the Contractor as part of any final payment of the Contract Price. The Board shall pay to Contractor interest at the rate of one and one-half percent per month on the final payment due Contractor, interest to commence 30 days after the Work under the Contract has been completed and accepted and to run until the date when final payment is tendered to Contractor. The Contractor shall notify Board in writing when the Contractor considers the Work complete and Board shall, within 15 days after receiving the written notice, either accept the Work or notify the Contractor of Work yet to be performed on the Contract. If Board does not within the time allowed notify the Contractor of Work yet to be performed to fulfill contractual obligations, the interest provided by this subsection shall commence to run 30 days after the end of the 15-day period.

8.19.6. In accordance with the provisions of ORS 279C.560, Board shall reduce the amount of the retainage if the Contractor notifies the Board that the Contractor has deposited in a bank or trust company, in a manner authorized by the Board, bonds and securities of equal value of a kind approved by the Board.

8.20. Contractor and its Subcontractors, if any, are subject to Oregon Workers' Compensation Law, which requires all employers that employ subject workers who work under this Contract in the State of Oregon to comply with ORS 656.017 and provide the required workers' compensation coverage, unless such employers are exempt under ORS 656.126.

8.21. Requirements for doing electrical work on new or existing Board facilities.

8.21.1. All contractors performing electrical work on Board facilities must comply with all applicable requirements of the NFPA 70E Standards.

8.21.2. Unless the Board determines in its sole discretion that a Contractor's attendance is not necessary, Contractors will be required to attend a Pre-Task Meeting with the Project Manager and Electrical Signing Supervisor or designee to discuss the hazards and safe work procedures for all electrical work to be performed on existing or new Board facilities.

8.21.3. If the work performed changes or alters the Arc Flash Analysis, contractor is required to provide an updated Arc Flash Analysis and any required labeling to the Operations Manager and the Department occupying the facility were the work was performed.

8.21.4. In addition to the above, Contractors performing electrical Work must:

A) Hold an electrical contractor license. This is a specialized license allowing a company to perform electrical Work. Oregon's Building Codes Division issues the electrical license.

B) Hold a valid General Contractor's license or a Specialty Contractors License from the State of Oregon Construction Contractors Board.

C) The person(s) actually installing or modifying any electrical system in accordance with the Work must possess a valid General Journeyman Electrical license issued by the State of Oregon.

8.22. During the performance of this Contract, Contractor shall comply with all federal, state and local laws, codes, regulations and ordinances applicable to the Work including but not limited to obtaining an applicable Business License. Failure to comply with such requirements shall constitute a breach of Contract and shall be grounds for Contract termination. Damages or costs resulting from noncompliance shall be the responsibility of Contractor. Contractor shall comply with all applicable requirements of federal and state civil rights and rehabilitation statutes, rules and regulations.

9. INDEPENDENT CONTRACTOR.

9.1. Contractor shall perform the work required by this contract as an "Independent Contractor." Although Board reserves the right to determine the delivery schedule for the work to be performed and to evaluate the quality of the completed performance, the Board cannot and will not control the means or manner of the Contractor's performance. The Contractor shall comply promptly with any requests by Board relating to the emphasis or relative emphasis to be placed on various aspects of the work or to such other matters pertaining to the work under this contract. Contractor is responsible for determining the appropriate means and manner of performing the work.

9.2. Contractor represents and warrants that Contractor is not an employee of the Board, is not currently employed by the Federal Government, meets the specific independent Contractor standards of ORS 670.600, and is not an "officer", "employee", or "agent" of the Board, as those terms are used in ORS 30.260 et. seq.

9.3. Contractor shall be responsible for all federal or state taxes applicable to any compensation or payments paid to Contractor under this contract. Contractor is not eligible for any federal Social Security, unemployment insurance, or workers' compensation benefits from compensation or payments paid to Contractor under this contract.

9.4. Contractor agrees to immediately provide Board notice of any claim made against Contractor by any third party. Contractor also agrees not to assign to any third party, without Board's written consent, any obligation of Board to indemnify Contractor for any actions under this contract.

10. NONDISCRIMINATION.

No person shall be denied or subjected to discrimination in receipt of the benefits of any services or activities made possible by or resulting from this contract on the grounds of race, color, religion, gender, sexual orientation, national origin, disability, age, or marital status. Any violation of this provision shall be considered a material defect and shall be grounds for cancellation, termination or suspension in whole or in part by the Board.

11. NON-APPROPRIATION OF FUNDS.

The continuance of this Contract is contingent upon the appropriation of funds by the Board's Board of Commissioners to fulfill the requirements of the Contract. If the Board's Board of Commissioners fails to appropriate sufficient monies to provide for the continuance of the Contract, or if such appropriation is reduced to prevent the total appropriation for the year from exceeding revenues for that year, or for any other lawful purpose, the effect of such reduction would provide insufficient monies for the continuation of the Contract, the Contract shall terminate on the date of the beginning of the first fiscal year for which the funds are not appropriated.

12. PRELIMINARY MATTERS.

12.1. Evidence of Insurance.

12.1.1. Evidence of Contractor's Insurance: When Contractor delivers the signed counterparts of the Contract to Owner, Contractor shall also deliver to Owner, with copies to each additional insured (as identified in the Contract), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with the Contract.

12.1.2. Evidence of Owner's Insurance: After receipt of the signed counterparts of the Agreement, and all required bonds and insurance documentation, as applicable, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in the Contract), the certificates and other evidence of insurance required to be provided by Owner under the terms of the Contract.

12.2. The Contractor hereby certifies that the Contractor is licensed with the Construction Contractors Board in accordance with ORS 701.035 to 701.055 and, further, that all Subcontractors performing work as described in ORS 701.025(2) (i.e., construction work) will be licensed with the Construction Contractors Board in accordance with ORS 701.035 to 701.055 before the Subcontractors commence Work under the Contract.

12.3. Copies of Documents.

12.3.1. Owner shall furnish to Contractor an electronic copy of the fully executed Contract Documents.

12.3.2. Owner shall maintain and safeguard the Contract, including Drawings and Specifications signed and sealed by a design professional, if applicable. Owner shall make such record of the Contract available to Contractor for review.

12.4. Before Starting Construction.

12.4.1. Preliminary Schedules: Within 10 days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Owner for timely review:

A) a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the applicable Work, including any Milestones specified in the Contract

B) a preliminary Schedule of Submittals; and

C) a preliminary Schedule of Values for all of the Work to be performed pursuant to the Contract, 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.

12.5. Electronic Transmittals

Electronic Documents Protocol: The parties shall conform to the following provisions referred to as the Electronic Documents Protocol ("EDP" or "Protocol") for exchange of electronic transmittals.

1. Basic Requirements

a. To the fullest extent practical, the parties agree to and will transmit and accept Electronic Documents in an electronic or digital format using the procedures described in this Protocol. Use of the Electronic Documents and any information contained therein is subject to the requirements of this Protocol and other provisions of the Contract.

b. The contents of the information in any Electronic Document will be the responsibility of the transmitting party.

c. Electronic Documents as exchanged by this Protocol may be used in the same manner as the printed versions of the same documents that are exchanged using non-electronic format and methods, subject to the same governing requirements, limitations, and restrictions, set forth in the Contract Documents.

d. Except as otherwise explicitly stated herein, the terms of this Protocol will be incorporated into any other agreement or subcontract between a party and any third party for any portion of the Work on the Project, or any Project-

related services, where that third party is, either directly or indirectly, required to exchange Electronic Documents with a party or with Engineer. Nothing herein will modify the requirements of the Contract regarding communications between and among the parties and their subcontractors and consultants.

e. When transmitting Electronic Documents, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the receiving party's use of software application packages, operating systems, or computer hardware differing from those established in this Protocol.

f. Nothing herein negates any obligation 1) in the Contract to create, provide, or maintain an original printed record version of Drawings and Specifications, signed and sealed according to applicable Laws and Regulations; 2) to comply with any applicable Law or Regulation governing the signing and sealing of design documents or the signing and electronic transmission of any other documents; or 3) to comply with the notice requirements of Paragraph 18.01 of Section 00 72 00, General Conditions.

2. System Infrastructure for Electronic Document Exchange

a. Each party will provide hardware, operating system(s) software, internet, e-mail, and large file transfer functions ("System Infrastructure") at its own cost and sufficient for complying with the EDP requirements. With the exception of minimum standards set forth in this EDP, and any explicit system requirements specified by attachment to this EDP, it is the obligation of each party to determine, for itself, its own System Infrastructure.

1) The maximum size of an email attachment for exchange of Electronic Documents under this EDP is 5 MB. Attachments larger than that may be exchanged using large file transfer functions or physical media.

2) Each Party assumes full and complete responsibility for any and all of its own costs, delays, deficiencies, and errors associated with converting, translating, updating, verifying, licensing, or otherwise enabling its System Infrastructure, including operating systems and software, for use with respect to this EDP.

b. Each party is responsible for its own system operations, security, back-up, archiving, audits, printing resources, and other Information Technology ("IT") for maintaining operations of its System Infrastructure during the Project, including coordination with the party's individual(s) or entity responsible for managing its System Infrastructure and capable of addressing routine communications and other IT issues affecting the exchange of Electronic Documents.

c. Each party will operate and maintain industry-standard, industry-accepted, ISO-standard, commercial-grade security software and systems that are

intended to protect the other party from: software viruses and other malicious software like worms, trojans, adware; data breaches; loss of confidentiality; and other threats in the transmission to or storage of information from the other parties, including transmission of Electronic Documents by physical media such as CD/DVD/flash drive/hard drive. To the extent that a party maintains and operates such security software and systems, it shall not be liable to the other party for any breach of system security.

d. In the case of disputes, conflicts, or modifications to the EDP required to address issues affecting System Infrastructure, the parties shall cooperatively resolve the issues; but, failing resolution, the Owner is authorized to make and require reasonable and necessary changes to the EDP to effectuate its original intent. If the changes cause additional cost or time to Contractor, not reasonably anticipated under the original EDP, Contractor may seek an adjustment in price or time under the appropriate process in the Contract.

e. Each party is responsible for its own back-up and archive of documents sent and received during the term of the contract under this EDP, unless this EDP establishes a Project document archive, either as part of a mandatory Project website or other communications protocol, upon which the parties may rely for document archiving during the specified term of operation of such Project document archive. Further, each party remains solely responsible for its own post-Project back-up and archive of Project documents after the term of the Contract, or after termination of the Project document archive, if one is established, for as long as required by the Contract and as each party deems necessary for its own purposes.

f. If a receiving party receives an obviously corrupted, damaged, or unreadable Electronic Document, the receiving party will advise the sending party of the incomplete transmission.

g. The parties will bring any non-conforming Electronic Documents into compliance with the EDP. The parties will attempt to complete a successful transmission of the Electronic Document or use an alternative delivery method to complete the communication.

h. The Owner will operate a Project information management system (also referred to in this EDP as "Project Website") for use of Owner, Engineer and Contractor during the Project for exchange and storage of Project-related communications and information. Except as otherwise provided in this EDP or the General Conditions, use of the Project Website by the parties as described in this Paragraph will be mandatory for exchange of Project documents, communications, submittals, and other Project-related information. The following conditions and standards will govern use of the Project Website:

    1) Describe the period of time during which the Project Website will be operated and be available for reliance by the parties;

2) Provide any minimum system infrastructure, software licensing and security standards for access to and use of the Project Website;

3) Describe the types and extent of services to be provided at the Project Website (such as large file transfer, email, communication and document archives, etc.); and

4) Include any other Project Website attributes that may be pertinent to Contractor's use of the facility and pricing of such use.

C. Software Requirements for Electronic Document Exchange; Limitations

1. Each party will acquire the software and software licenses necessary to create and transmit Electronic Documents and to read and to use any Electronic Documents received from the other party (and if relevant from third parties), using the software formats required in this section of the EDP.

   a. Prior to using any updated version of the software required in this section for sending Electronic Documents to the other party, the originating party will first notify and receive concurrence from the other party for use of the updated version or adjust its transmission to comply with this EDP.

2. The parties agree not to intentionally edit, reverse engineer, decrypt, remove security or encryption features, or convert to another format for modification purposes any Electronic Document or information contained therein that was transmitted in a software data format, including Portable Document Format (PDF), intended by sender not to be modified, unless the receiving party obtains the permission of the sending party or is citing or quoting excerpts of the Electronic Document for Project purposes.

3. Software and data formats for exchange of Electronic Documents will conform to the requirements set forth in Exhibit A to this EDP, including software versions, if listed.

12.6. Requests by Contractor for Electronic Documents in Other Formats

1. Release of any Electronic Document versions of the Project documents in formats other than those identified in the Electronic Documents Protocol (if any) or elsewhere in the Contract will be at the sole discretion of the Owner.

2. To extent determined by Owner, in its sole discretion, to be prudent and necessary, release of Electronic Documents versions of Project documents and other Project information requested by Contractor ("Request") in formats other than those identified in the Electronic Documents Protocol (if any) or elsewhere in the Contract will be subject to the provisions of the Owner's response to the Request, and to the following conditions to which Contractor agrees:

   a. The content included in the Electronic Documents created by Engineer and covered by the Request was prepared by Engineer as an internal working

document for Engineer's purposes solely, and is being provided to Contractor on an "AS IS" basis without any warranties of any kind, including, but not limited to any implied warranties of fitness for any purpose. As such, Contractor is advised and acknowledges that the content may not be suitable for Contractor's application or may require substantial modification and independent verification by Contractor. The content may include limited resolution of models, not-to-scale schematic representations and symbols, use of notes to convey design concepts in lieu of accurate graphics, approximations, graphical simplifications, undocumented intermediate revisions, and other devices that may affect subsequent reuse.

b. Electronic Documents containing text, graphics, metadata, or other types of data that are provided by Engineer to Contractor under the request are only for convenience of Contractor. Any conclusion or information obtained or derived from such data will be at the Contractor's sole risk and the Contractor waives any claims against Engineer or Owner arising from use of data in Electronic Documents covered by the Request.

c. Contractor shall indemnify and hold harmless Owner and Engineer and their subconsultants from all claims, damages, losses, and expenses, including attorneys' fees and defense costs arising out of or resulting from Contractor's use, adaptation, or distribution of any Electronic Documents provided under the Request.

d. Contractor agrees not to sell, copy, transfer, forward, give away or otherwise distribute this information (in source or modified file format) to any third party without the direct written authorization of Engineer, unless such distribution is specifically identified in the Request and is limited to Contractor's subcontractors. Contractor warrants that subsequent use by Contractor's subcontractors complies with all terms of the Contract Documents and Owner's response to Request.

3. In the event that Owner elects to provide or directs the Engineer to provide to Contractor any Contractor-requested Electronic Document versions of Project information that is not explicitly identified in the Contract Documents as being available to Contractor, the Owner shall be reimbursed by Contractor on an hourly basis (at $268 per hour) for all engineering costs necessary to create or otherwise prepare the data in a manner deemed appropriate by Engineer.

13. COMMENCEMENT AND PROGRESS OF THE WORK.

13.1. Commencement of Contract Times; Notice to Proceed. The Contract Times will commence to run on the Start Date indicated in the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed.

13.2. Starting the Work. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work provided in the Contract may be done at the Site prior to such date.

13.3. Reference Points. Owner shall provide engineering surveys to establish reference points for construction which in Owner's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Board whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

14. PROGRESS SCHEDULE.

14.1.1. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 12.4 as it may be adjusted from time to time as provided below.

a) Contractor shall submit to Owner for acceptance (to the extent indicated in Paragraph 12.4) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

b) Proposed adjustments in the Progress Schedule that will change the Contract Times must be submitted in accordance with the requirements of Section 8 of the Contract.

14.1.2. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner, unless otherwise expressly provided or directed by Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, or as Owner and Contractor may otherwise agree in writing.

14.2. Delays in Contractor's Progress

14.2.1. If Owner, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times.

14.2.2. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.

14.2.3. If Contractor's performance or progress is delayed, disrupted, or interfered with by unforeseeable causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Such an adjustment will be

Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:

a) Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;

b) Abnormal weather conditions;

c) Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Section 8 of the Contract); and

d) Acts of war or terrorism.

14.2.4. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:

a) Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.

b) Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.

c) The number of allowable abnormal weather days is 5 days. The existence of abnormal weather conditions will not relieve Contractor of the obligation to demonstrate and document that delays caused by abnormal weather are specific to the planned work activities or that such activities were on Contractor's then current Progress Schedule's critical path for the Project.

d) Adjustments of Contract Times or Contract Price are subject to the provisions of Article 18.

14.2.5. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:

a) The circumstances that form the basis for the requested adjustment;

b) The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;

c) The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;

d) The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and

e) The impact on Contract Price.

f) Contractor shall also furnish such additional supporting documentation as Owner may require including, where appropriate, a revised Progress Schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.

14.2.6. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 14, together with the provisions of Paragraphs 13.5.4 and 13.5.5.

14.2.7. Paragraph 16 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

15. SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

15.1. Availability of Lands.

15.1.1. Owner shall furnish the Site. Owner shall notify Contractor in writing of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.

15.1.2. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.

15.1.3. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

15.2. Use of Site and Other Areas

15.2.1. Limitation on Use of Site and Other Areas

A) Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through

construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.

B) If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 15.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, indemnify, defend, and hold harmless Owner, and the officers, directors, members, partners, employees, agents, consultants, elected and appointed officials, and Subcontractors of each and any of them, from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

15.2.2. Removal of Debris During Performance of the Work: During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris will conform to applicable Laws and Regulations.

15.2.3. Cleaning: Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

15.2.4. Loading of Structures: Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

15.3. Subsurface and Physical Conditions

15.3.1. Reports and Drawings: The Contract shall identify:

A) Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;

B) Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and

C) Technical Data contained in such reports and drawings.

15.3.2. Underground Facilities: Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 14.5, and not in the drawings referred to in Paragraph 14.3.1. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

15.3.3. Reliance by Contractor on Technical Data: Contractor may rely upon the accuracy of the technical data expressly identified in such reports and drawings, but such reports and drawings are not Contract Documents.

15.3.4. Limitations of Other Data and Documents: Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner, or any of their officers, directors, members, partners, employees, agents, consultants, or Subcontractors, with respect to:

A) the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;

B) other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;

C) the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or

D) any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

15.4. Differing Subsurface or Physical Conditions

15.4.1. Notice by Contractor: If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site:

A) is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 14.3 is materially inaccurate;

B) is of such a nature as to require a change in the Drawings or Specifications;

C) differs materially from that shown or indicated in the Contract Documents; or

D) is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 15.14), notify Owner in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

15.4.2. Owner's Review: After receipt of written notice as required by the preceding paragraph, Owner will promptly review the subsurface or physical condition in question; determine whether it is necessary for Owner to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing Site condition categories in Paragraph 14.4.1; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications.

15.4.3. Owner's Statement to Contractor Regarding Site Condition: After such written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting the written findings, conclusions, and recommendations, in whole or in part.

15.4.4. Early Resumption of Work: If at any time Owner determines that Work in connection with the subsurface or physical condition in question may resume prior to Owner's issuance of its statement to Contractor, because the condition in question has been adequately documented, and analyzed on a preliminary basis, then the Owner may at its discretion instruct Contractor to resume such Work.

15.4.5. Possible Price and Times Adjustments:

A) Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

1. Such condition must fall within any one or more of the categories described in Paragraph 14.4.1;
2. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 19.3; and,
3. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 13.5.1 and 13.5.2.

B) Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:

1) Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid, or becoming bound under a negotiated contract, or otherwise;
2) The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
3) Contractor failed to give the written notice required by Paragraph 14.4.1.

C) If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.

D) Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

15.4.6. Underground Facilities; Hazardous Environmental Conditions: Paragraph 14.5 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 14.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 14.3 and 14.4 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

15.5. Underground Facilities

15.5.1. Contractor's Responsibilities: Unless it is otherwise expressly provided in the Contract, the cost of all of the following shall be included in the Contract Price, and Contractor shall have full responsibility for:

A) reviewing and checking all information and data regarding existing Underground Facilities at the Site;

B) complying with applicable state and local utility damage prevention Laws and Regulations;

C) verifying the actual location of those Underground Facilities shown or indicated in the Contract Documents as being within the area affected by the Work, by exposing such Underground Facilities during the course of construction;

D) coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and

E) the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.

15.5.2. Notice by Contractor: If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, or was not shown or indicated on the Drawings with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 15.14), notify Owner in writing regarding such Underground Facility.

15.5.3. Owner's Review: Owner will:

A) promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy;

B) identify and communicate with the owner of the Underground Facility; prepare recommendations to Owner (and if necessary issue any preliminary instructions to Contractor) regarding the Contractor's resumption of Work in connection with the Underground Facility in question;

C) obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility.

During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

15.5.4. Owner's Statement to Contractor Regarding Underground Facility: After producing written findings, conclusions, and recommendations, Owner shall

issue a written statement to Contractor regarding the Underground Facility in question addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting the written findings, conclusions, and recommendations in whole or in part.

15.5.5. Early Resumption of Work: If at any time Owner determines that Work in connection with the Underground Facility may resume prior to Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then the Owner may at its discretion instruct Contractor to resume such Work.

15.5.6. Possible Price and Times Adjustments:

A) Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown or indicated on the Drawings, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

B) With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 19.3;

C) Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 13.5.4 and 13.5.5; and

D) Contractor gave the notice required in Paragraph 14.5.2.

15.5.7. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.

15.5.8. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

15.5.9. The information and data shown or indicated on the Drawings with respect to existing Underground Facilities at the Site is based on information and data (a) furnished by the owners of such Underground Facilities, or by others, (b) obtained from available records, or (c) gathered in an investigation conducted in accordance with the current edition of ASCE 38, Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data, by the American Society of Civil Engineers. If such information or data is incorrect or incomplete, Contractor's remedies are limited to those set forth in this Paragraph 14.5.6.

15.6. Hazardous Environmental Conditions at Site

15.6.1. Reports and Drawings: The Contract shall identify:

A) those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;

B) drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and

C) Technical Data contained in such reports and drawings.

15.6.2. Reliance by Contractor on Technical Data Authorized: Contractor may rely upon the accuracy of the technical data expressly identified in such reports and drawings, but such reports and drawings are not Contract Documents. Except for such reliance on technical data, Contractor may not rely upon or make any claim against Owner, or any of their officers, directors, members, partners, employees, agents, consultants, or Subcontractors, with respect to:

A) the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;

B) other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

C) any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.

15.6.3. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.

15.6.4. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.

15.6.5. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 15.14); and (3) notify Owner (and promptly thereafter confirm such notice in writing). Owner shall take such actions as are necessary to permit Owner to timely

obtain required permits and provide Contractor the written notice required by Paragraph 14.6.6. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

15.6.6. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.

15.6.7. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, as a result of such Work stoppage, such special conditions under which Work is agreed to be resumed by Contractor, or any costs or expenses incurred in response to the Hazardous Environmental Condition, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off. Entitlement to any such adjustment is subject to the provisions of Paragraphs 13.5.4, 13.5.5, 18.7, and 18.8.

15.6.8. If, after receipt of such written notice, Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 18. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 16.

15.6.9. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify, defend, and hold harmless Owner, and the officers, directors, members, partners, employees, agents, consultants, elected and appointed officials, and Subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 14.6.9 obligates Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

15.6.10. The provisions of Paragraphs 14.3,14.4, and 14.5 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

16. CONTRACTOR'S RESPONSIBILITIES.

16.1. Contractor's Means and Methods of Construction

16.1.1. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.

16.1.2. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and Owner has no responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

16.2. Supervision and Superintendence

16.2.1. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.

16.2.2. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner except under extraordinary circumstances.

16.3. Labor; Working Hours

16.3.1. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall maintain good discipline and order at the Site.

16.3.2. Contractor shall be fully responsible to Owner for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.

16.3.3. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site will be performed during regular working hours, 7:00 a.m. to 5:00 p.m., Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with

Owner's written consent, which will not be unreasonably withheld. The South Fork Water Board observes the following twelve (12) holidays: New Year's Day, Martin Luther King Jr Holiday, Presidents' Day, Memorial Day, Juneteenth, Independence Day, Labor Day, Veterans Day, Thanksgiving Day, the Friday after Thanksgiving, Christmas Eve Day, and Christmas Day.

16.4. Services, Materials, and Equipment

16.4.1. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.

16.4.2. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will expressly run to the benefit of Owner.

16.4.3. All materials and equipment must be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

16.5. "Or Equals"

16.5.1. Contractor's Request; Governing Criteria: Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Owner authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.

A) If Owner in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Owner will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:

1) in the exercise of reasonable judgment Owner determines that the proposed item:

a. is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

b. will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Work as a functioning whole;

c. has a proven record of performance and availability of responsive service; and

d. is not objectionable to Owner.

2) Contractor certifies that, if the proposed item is approved and incorporated into the Work:

a. there will be no increase in cost to the Owner or increase in Contract Times; and

b. the item will conform substantially to the detailed requirements of the item named in the Contract Documents.

16.5.2. Contractor's Expense: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.

16.5.3. Owner's Evaluation and Determination: Owner will be allowed a reasonable time to evaluate each "or-equal" request. Owner may require Contractor to furnish additional data about the proposed "or-equal" item. Owner will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Owner's review is complete and Owner determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Owner will advise Contractor in writing of any negative determination.

16.5.4. Effect of Owner's Determination: Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. The Owner's denial of an "or-equal" request will be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.

16.5.5. Treatment as a Substitution Request: If Owner determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Owner consider the item a proposed substitute pursuant to Paragraph 15.6.

16.6. Substitutes

16.6.1. Contractor's Request; Governing Criteria: Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Owner authorize the use of other items of equipment or material under the circumstances described below. To the extent

possible such requests must be made before commencement of related construction at the Site.

A) Contractor shall submit sufficient information as provided below to allow Owner to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Owner will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.

B) The requirements for review by Owner will be as set forth in Paragraph 15.6.1, as supplemented by the Specifications, and as Owner may decide is appropriate under the circumstances.

C) Contractor shall make written application to Owner for review of a proposed substitute item of equipment or material that Contractor seeks to furnish or use. The application:

1) will 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 the item specified; and

c. be suited to the same use as the item specified.

2) will state:

a. the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;

b. whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Work) to adapt the design to the proposed substitute item; and

c. whether 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 the item specified; and

b. available engineering, sales, maintenance, repair, and replacement services.

4) will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.

16.6.2. Owner's Evaluation and Determination: Owner will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Contractor. Owner may require Contractor to furnish additional data about the proposed substitute item. Owner will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Owner's review is complete and Owner determines that the proposed item is an acceptable substitute. Owner's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Owner will advise Contractor in writing of any negative determination.

16.6.3. Special Guarantee: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

16.6.4. Reimbursement of Owner's Cost: Owner will record Owner's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Owner approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Owner for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Owner for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

16.6.5. Contractor's Expense: Contractor shall provide all data in support of any proposed substitute at Contractor's expense.

16.6.6. Effect of Owner's Determination: If Owner approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Owner's denial of a substitution request will be final and binding, and may not be reversed through an appeal under any provision of the Contract. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 15.6.4, by timely submittal of a Change Proposal.

16.7. Concerning Subcontractors and Suppliers

16.7.1. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.

16.7.2. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.

16.7.3. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or

Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.

16.7.4. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.

16.7.5.

A) Contractor shall not assign, sell, dispose of, or transfer rights, or delegate duties under the Contract, either in whole or in part, without the Board's prior written consent. Unless otherwise agreed by the Board in writing, such consent shall not relieve the Contractor of any obligations under the Contract. Any assignee or transferee shall be considered the agent of the Contractor and be bound to abide by all provisions of the Contract. If the Board consents in writing to an assignment, sale, disposal or transfer of the Contractor's rights or delegation of Contractor's duties, the Contractor and its surety, if any, shall remain liable to the Board for complete performance of the Contract as if no such assignment, sale, disposal, transfer or delegation had occurred unless the Board otherwise agrees in writing.

B) Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.

16.7.6. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.

16.7.7. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

16.7.8. On a monthly basis, Contractor shall submit to Owner a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.

16.7.9. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.

16.7.10. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.

16.7.11.

A) Contractor further agrees that if Subcontractors are employed in the performance of this contract, the Contractor and its Subcontractors are subject to the requirements and sanction of ORS Chapter 656, Workers' Compensation.

B) All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner.

16.7.12. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.

16.7.13. Contractor shall restrict all Subcontractors and Suppliers from communicating with Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in these Contract Documents.

16.8. Patent Fees and Royalties

16.8.1. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If an invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights will be disclosed in the Contract Documents.

16.8.2. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify, defend, and hold harmless Owner, and the officers, directors, members, partners, employees, agents, consultants, elected and appointed officials, and Subcontractors of each and any of them, from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting

from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

16.9. Permits: Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits, licenses, and certificates of occupancy. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

16.10. Taxes: Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Work which are applicable during the performance of the Work

16.11. Laws and Regulations

16.11.1. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Owner shall not be responsible for monitoring Contractor's compliance with any Laws or Regulations.

16.11.2. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify, defend, and hold harmless Owner, and its officers, directors, members, partners, employees, agents, consultants, elected and appointed officials, 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 such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under the Contract Documents.

16.11.3. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such written notice Contractor may submit a Change Proposal.

16.12. Safety and Protection

16.12.1. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations.

16.12.2. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs.

16.12.3. 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, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

16.12.4. All damage, injury, or loss to any property referred to in Paragraph 15.12.2 or 15.12.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or 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).

16.12.5. 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.

16.12.6. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.

16.12.7. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.

16.12.8. Contractor shall inform Owner of the specific requirements of Contractor's safety program with which Owner's employees and representatives must comply while at the Site.

16.12.9. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Owner has issued a written notice to Contractor in accordance with Paragraph 21.6.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).

16.12.10. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

16.13. Hazard Communication Programs: Contractor shall be responsible for coordinating any exchange of safety data sheets (formerly known as 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.

16.14. 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 damage, injury, or loss. Contractor shall give Owner prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused by an emergency, or are required as a result of Contractor's response to an emergency. If Owner determines that a change in the Contract Documents is required because of an emergency or Contractor's response, a Work Change Directive or Change Order will be issued.

16.15. Submittals

16.15.1. Shop Drawing and Sample Requirements

A) Before submitting a Shop Drawing or Sample, Contractor shall:

1) review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

2) determine and verify:

a. 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) confirm that the Submittal is complete with respect to all related data included in the Submittal.

B) Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.

C) With each Shop Drawing or Sample, Contractor shall give Owner specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.

16.15.2. Submittal Procedures for Shop Drawings and Samples: Contractor shall label and submit Shop Drawings and Samples to Owner for review and approval in accordance with the accepted Schedule of Submittals.

A) Shop Drawings

1) Contractor shall submit the number of copies required in the Specifications.

2) Data shown on the Shop Drawings must be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Owner the services, materials, and equipment Contractor proposes to provide, and to enable Owner to review the information for the limited purposes required by Paragraph 15.15.C.

B) Samples

1) Contractor shall submit the number of Samples required in the Specifications.

2) Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Owner may require to enable Owner to review the Submittal for the limited purposes required by Paragraph 15.15.C.

C) Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Owner's review and approval of the pertinent Submittal will be at the sole expense and responsibility of Contractor.

16.15.3. Owner's Review of Shop Drawings and Samples

A) Owner will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. Owner's review and approval will be only to determine if the items covered by the Submittals will, after installation or incorporation in the Work, comply with the requirements of the Contract Documents, and be compatible with the design concept of the completed Work as a functioning whole as indicated by the Contract Documents.

B) Owner's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction, or to safety precautions or programs incident thereto.

C) Owner's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

D) Owner's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 15.15.1.C and Owner has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Owner will document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.

E) Owner's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 15.15.1 and 15.15.2.

F) Owner's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.

G) Neither Owner's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.

H) Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 15.15.3.D.

16.15.4. Resubmittal Procedures for Shop Drawings and Samples

A) Contractor shall make corrections required by Owner and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Owner on previous Submittals.

B) Contractor shall furnish required Shop Drawing and Sample Submittals with sufficient information and accuracy to obtain required approval of an item with

no more than two resubmittals. Owner will record Owner's time for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample, and Contractor shall be responsible for Owner's charges to Owner for such time. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.

C) If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Owner's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

16.15.5. Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs

A) The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:

1) Contractor shall submit all such Submittals to the Owner in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.

2) Owner will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.

3) Owner's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.

4) If any such Submittal is not accepted, Contractor shall confer with Owner regarding the reason for the non-acceptance, and resubmit an acceptable document.

B) Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraph 12.4.

16.16. Contractor's General Warranty and Guarantee

16.16.1. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective in materials and workmanship and shall in all material respects comply with the terms of the Contract Documents.

16.16.2. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 21.8. The time in which Owner may enforce its warranty and guarantee rights under Articles 20 and 21 is limited only by applicable Laws and

Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 21.8, Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective.

16.16.3. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

A) abuse, or improper modification, maintenance, or operation, by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or

B) normal wear and tear under normal usage.

16.16.4. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under Articles 20 and 21:

A) Observations by Owner;

B) Recommendation by Owner or payment by Owner of any progress or final payment;

C) The issuance of a certificate of Substantial Completion by Owner or any payment related thereto by Owner;

D) Use or occupancy of the Work or any part thereof by Owner;

E) Any review and approval of a Shop Drawing or Sample Submittal;

F) The issuance of a notice of acceptability by Owner;

G) The end of the correction period established in Paragraph 21.8;

H) Any inspection, test, or approval by others; or

I) Any correction of defective Work by Owner.

16.16.5. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

17. OTHER WORK AT SITE.

17.1. Other Work

17.1.1. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be

performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.

17.1.2. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.

17.1.3. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.

17.1.4. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Owner and the others whose work will be affected.

17.1.5. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, Contractor shall inspect such other work and promptly report to Owner in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

17.1.6. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 13.5.3.C.

17.2. Legal Relationships

17.2.1. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal

seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 13.5.4 and 13.5.5.

17.2.2. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.

A) If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 16.2.2.

B) When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.

17.2.3. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, or Owner, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify, defend, and hold harmless Owner, and the officers, directors, members, partners, employees, agents, consultants, elected and appointed officials, and Subcontractors of each and any of them from and against any such claims, and against all costs,

losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

18. OWNER'S RESPONSIBILITIES.

18.1. Furnish Data. Owner shall promptly furnish the data required of Owner under the Contract Documents.

18.2. Pay When Due. Owner shall make payments to Contractor when they are due as provided the Contract Documents.

18.3. Lands and Easements; Reports, Tests, and Drawings

18.3.1. Owner's duties with respect to providing lands and easements are set forth in Paragraph 14.1.

18.3.2. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 13.3.

18.3.3. Article 14 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

18.4. Insurance. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 29.

18.5. Change Orders. Owner's responsibilities with respect to Change Orders are set forth in Article 18.

18.6. Inspections, Tests, and Approvals. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 20.2.3.

18.7. Limitations on Owner's Responsibilities. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

18.8. Undisclosed Hazardous Environmental Condition. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 14.6.

19. CHANGES TO THE CONTRACT.

19.1. Amending and Supplementing the Contract

19.1.1. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.

19.1.2. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.

19.1.3. All changes to the Contract that involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, must be supported by Owner's recommendation. Owner and Contractor may amend other terms and conditions of the Contract without the recommendation of the Owner.

19.2. Change Orders

19.2.1. Owner and Contractor shall execute appropriate Change Orders covering:

A) Changes in Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;

B) Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;

C) Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 18.5, (b) required because of Owner's acceptance of defective Work under Paragraph 20.4 or Owner's correction of defective Work under Paragraph 20.7, or (c) agreed to by the parties, subject to the need for Owner's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters; and

D) Changes that embody the substance of any final and binding results under: Paragraph 18.3.2, resolving the impact of a Work Change Directive; Paragraph 18.9, concerning Change Proposals; Paragraph 19.2.4, final adjustments resulting from allowances; Paragraph 19.3.4, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.

19.2.2. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 18.2.1, it will be deemed to be of full force and effect, as if fully executed.

19.3. Work Change Directives

19.3.1. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 18.7 regarding change of Contract Price.

19.3.2. If Owner has issued a Work Change Directive and:

A) Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.

B) Owner believes that an adjustment in Contract Times or Contract Price is necessary, then Owner shall submit any claim seeking such an adjustment no later than 60 days after issuance of the Work Change Directive.

19.4. Field Orders

19.4.1. Owner may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Work as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly.

19.4.2. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

19.5. Owner-Authorized Changes in the Work

19.5.1. Without invalidating the Contract, and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Changes involving the design (as set forth in the Drawings, Specifications, or otherwise) or other engineering or technical matters will be supported by Owner's recommendation.

19.5.2. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.

19.5.3. Nothing in this Paragraph 18.5 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

19.6. Unauthorized Changes in the Work: Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or

supplemented, except in the case of an emergency as provided in Paragraph 15.14 or in the case of uncovering Work as provided in Paragraph 20.5.3.B.

19.7. Change of Contract Price

19.7.1. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 18.9.

19.7.2. An adjustment in the Contract Price will be determined as follows:

A) Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 19.3);

B) Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 18.7.3.B); or

C) Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 19.1) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 18.7.3).

19.7.3. Contractor's Fee: When applicable, the Contractor's fee for overhead and profit will be determined as follows:

A) A mutually acceptable fixed fee; or

B) If a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

1) For costs incurred under Paragraphs 19.1.2.A and 19.1.2.B, the Contractor's fee will be 15 percent;

2) For costs incurred under Paragraph 19.1.2.C, the Contractor's fee will be 5 percent;

3) 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 18.7.3.B.1 and 18.7.3.B.2 is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 19.1.2.A and 13.1.2.B by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27

percent of the costs incurred by the Subcontractor that actually performs the Work;

4) No fee will be payable on the basis of costs itemized under Paragraphs 19.1.2.D, 19.1.2.E, and 19.1.3;

5) The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and

6) When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 19.1.2 (specifically, payroll costs, Paragraph 19.1.2.A; incorporated materials and equipment costs, Paragraph 19.1.2.B; Subcontract costs, Paragraph 19.1.2.C; special consultants costs, Paragraph 19.1.2.D; and other costs, Paragraph 19.1.2.E) and applying to each such cost category sum the appropriate fee from Paragraphs 18.7.3.B.1 through 18.7.3.B.6, inclusive.

19.8. Change of Contract Times

19.8.1. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 18.9.

19.8.2. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 13.5.

19.9. Change Proposals

19.9.1. Purpose and Content: Contractor shall submit a Change Proposal to Owner to request an adjustment in the Contract Times or Contract Price; contest an initial decision by Owner concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; challenge a set-off against payment due; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.

19.9.2. Change Proposal Procedures

A) Submittal: Contractor shall submit each Change Proposal to Owner within 30 days after the start of the event giving rise thereto, or after such initial decision.

B) Supporting Data: The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Owner and Owner within 15 days after the submittal of the Change Proposal.

1) Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 13.5.4 and 13.5.5.

2) Change Proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

The supporting data must be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event.

C) Owner's Initial Review: If in its discretion Owner concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Owner may request that Contractor submit such additional supporting data by a date specified by Owner, prior to Owner beginning its full review of the Change Proposal.

D) Owner's Full Review and Action on the Change Proposal: Upon receipt of Contractor's supporting data (including any additional data requested by Owner), Owner will conduct a full review of each Change Proposal and, within 30 days after such receipt of the Contractor's supporting data, either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing, with a copy provided to Contractor. If Owner does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Owner's inaction the Change Proposal is deemed denied.

19.9.3. Resolution of Certain Change Proposals: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Owner will notify the parties in writing that the Owner is unable to resolve the Change Proposal.

19.9.4. Post-Completion: Contractor shall not submit any Change Proposals after Owner issues a written recommendation of final payment pursuant to Paragraph 21.6.2.

19.10. Notification to Surety. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

20. COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK.

20.1. Cost of the Work

20.1.1. Purposes for Determination of Cost of the Work: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue in a the Contract, as further defined below. The provisions of this Paragraph 19.1 are used for two distinct purposes:

A) To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or

B) When needed to determine the value of a Change Order, Change Proposal, claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.

20.1.2. Costs Included: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Work, will not include any of the costs itemized in Paragraph 19.1.3, and will 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 Owner and Contractor in advance of the subject Work. Such employees include, without limitation, superintendents, foremen, safety managers, safety representatives, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will be included in the above to the extent authorized by Owner.

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 accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will accrue to Owner, 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 Owner, Contractor shall obtain competitive Bids

from Subcontractors acceptable to Owner and Contractor and shall deliver such Bids to Owner, which will then determine 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 will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 19.1.

D) Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed or retained for services specifically related to the Work.

E) Other costs consisting of 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, 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. In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.

3) Construction Equipment Rental

a. Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.

b. Costs for equipment and machinery owned by Contractor or a Contractor-related entity will be paid at a rate shown for such equipment in the equipment rental rate book specified in the Supplementary Conditions. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs.

c. With respect to Work that is the result of a Change Order, Change Proposal, claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or

machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.

4) 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.

5) Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of builder's risk or other property insurance established in accordance with Article 29), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.

6) The cost of utilities, fuel, and sanitary facilities at the Site.

7) Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.

20.1.3. Costs Excluded: The term Cost of the Work does not include any of the following items:

A) Payroll costs and other compensation of Contractor's officers, executives, principals, general 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 19.1.2.A or specifically covered by Paragraph 19.1.2.D. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.

B) The cost of purchasing, renting, or furnishing small tools and hand tools.

C) Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

D) Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

E) 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.

F) Expenses incurred in preparing and advancing claims.

G) Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 19.1.2.

20.1.4. Contractor's Fee

A) When the Work as a whole is performed on the basis of cost-plus-a-fee, then:

1) Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract.

2) for any Work covered by a Change Order, Change Proposal, claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:

a. When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.

b. When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 18.7.3.B.

B) When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 18.7.3.B.

20.1.5. Documentation and Audit: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 19, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such

access to Owner, and preserve such documents, to the same extent required of Contractor.

20.2. Allowances

20.2.1. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner.

20.2.2. Cash Allowances: Contractor agrees that:

A) the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and

B) Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment for any of the foregoing will be valid.

20.2.3. Owner's Contingency Allowance: Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

20.2.4. Prior to final payment, an appropriate Change Order will be issued as recommended by Owner to reflect actual amounts due Contractor for Work covered by allowances, and the Contract Price will be correspondingly adjusted.

20.3. Unit Price Work

20.3.1. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Contract.

20.3.2. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.

20.3.3. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

20.3.4. Owner will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Owner will review with Contractor the Owner's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Owner's written decision thereon will be final and binding (except as modified by Owner to reflect changed factual conditions or more accurate data) upon Owner and

Contractor, and the final adjustment of Contract Price will be set forth in a Change Order.

21. TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK.

21.1. Access to Work. Owner, and consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply with such procedures and programs as applicable.

21.2. Tests, Inspections, and Approvals

21.2.1. Contractor shall give Owner timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.

21.2.2. Contractor shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspection and tests expressly required by the Contract Documents as identified in Paragraph 20.2.4.

21.2.3. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Owner the required certificates of inspection or approval.

21.2.4. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:

A) by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;

B) to attain Owner's acceptance of materials or equipment to be incorporated in the Work;

C) by manufacturers of equipment furnished under the Contract Documents;

D) for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and

E) for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests will be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner.

21.2.5. If the Contract Documents require the Work (or part thereof) to be approved by Owner or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.

21.2.6. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Owner, Contractor shall, if requested by Owner, uncover such Work for observation. Such uncovering will be at Contractor's expense unless Contractor had given Owner timely notice of Contractor's intention to cover the same and Owner had not acted with reasonable promptness in response to such notice.

21.3. Defective Work

21.3.1. Contractor's Obligation: It is Contractor's obligation to assure that the Work is not defective in materials or workmanship, and otherwise complies with all requirements of the Contract Documents.

21.3.2. Owner's Authority: Owner has the authority to determine whether Work is defective, and to reject defective Work.

21.3.3. Notice of Defects: Prompt written notice of all defective Work of which Owner has actual knowledge will be given to Contractor.

21.3.4. Correction, or Removal and Replacement: Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Owner has rejected the defective Work, remove it from the project and replace it with Work that is not defective.

21.3.5. Preservation of Warranties: When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

21.3.6. Costs and Damages: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 21.

21.4. Acceptance of Defective Work: If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Owner's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs,

losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Owner as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work will be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 21. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

21.5. Uncovering Work

21.5.1. Owner has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

21.5.2. If any Work is covered contrary to the written request of Owner, then Contractor shall, if requested by Owner, uncover such Work for Owner's observation, and then replace the covering, all at Contractor's expense.

21.5.3. If Owner considers it necessary or advisable that covered Work be observed by Owner or inspected or tested by others, then Contractor, at Owner's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Owner may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.

A) If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 21.

B) If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

21.6. Owner May Stop the Work. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work will not give rise to any duty on the part of Owner to exercise this right for the

benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

21.7. Owner May Correct Defective Work

21.7.1. If Contractor fails within a reasonable time after written notice from Owner to correct defective Work, or to remove and replace defective Work as required by Owner, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.

21.7.2. In exercising the rights and remedies under this Paragraph 20.7, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Owner and Owner's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.

21.7.3. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 20.7 will be charged against Contractor as set-offs against payments due under Article 21. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

21.7.4. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 20.7.

22. PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD.

22.1. Progress Payments

22.1.1. Basis for Progress Payments: The Schedule of Values established as provided in Article 12 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Owner. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 19.3. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.

22.1.2. Applications for Payments

A) At least 20 days before the date established in the Contract for each progress payment (but not more often than once a month), Contractor shall submit to Owner for review an Application for Payment filled out and signed by Contractor

covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.

B) 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 must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other documentation establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

C) Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

D) The amount of retainage with respect to progress payments will be as stipulated in the Contract.

22.1.3. Review of Applications

A) Owner will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment, or return the Application to Contractor indicating in writing Owner's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

B) Owner will recommend reductions in payment (set-offs) necessary its opinion to protect Owner from loss because:

1) the Work is defective, requiring correction or replacement;

2) the Contract Price has been reduced by Change Orders;

3) Owner has been required to correct defective Work in accordance with Paragraph 20.7, or has accepted defective Work pursuant to Paragraph 20.4;

4) Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

5) Owner has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

22.1.4. Payment Becomes Due: Thirty days after presentation of the Application for Payment to Owner, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

22.1.5. Reductions in Payment by Owner

A) In addition to any reductions in payment (set-offs) recommended by Owner, Owner is entitled to impose a set-off against payment based on any of the following:

1) Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

2) Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the project Site;

3) Contractor has failed to provide and maintain required bonds or insurance;

4) Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;

5) Owner has incurred extra charges or engineering costs related to Submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

6) The Work is defective, requiring correction or replacement;

7) Owner has been required to correct defective Work in accordance with Paragraph 20.7, or has accepted defective Work pursuant to Paragraph 20.4;

8) The Contract Price has been reduced by Change Orders;

9) An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;

10) Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;

11) Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens; or

12) Other items entitle Owner to a set-off against the amount recommended.

B) If Owner imposes any set-off against payment, whether based on its own knowledge, Owner will give Contractor immediate written notice stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment

thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

C) Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 21.1.4.A and subject to interest as provided in the Contract.

22.2. Contractor's Warranty of Title. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

22.3. Substantial Completion

22.3.1. When Contractor considers the entire Work provided for pursuant to the Contract is ready for its intended use, Contractor shall notify Owner in writing that such entire Work is substantially complete and request that Owner issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner an initial draft of punch list items to be completed or corrected before final payment.

22.3.2. Promptly after Contractor's notification, Owner and Contractor shall make an inspection of the Work to determine the status of completion. If Owner does not consider the Work substantially complete, Owner will notify Contractor in writing giving the reasons therefor.

22.3.3. If Owner considers the Work substantially complete, Owner will deliver to Contractor a preliminary certificate of Substantial Completion which will fix the date of Substantial Completion. Owner shall attach to the certificate a punch list of items to be completed or corrected before final payment. If Owner concludes that the Work is not substantially complete, Owner will notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, then Owner will execute and deliver to 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 Owner believes justified.

22.3.4. 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.

22.3.5. 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.

22.3.6. 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.

22.4. Partial Use or Occupancy

Prior to Substantial Completion of the Work pursuant to the Contract, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner 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:

22.4.1. 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 and Owner will follow the procedures of Paragraph 21.3.A through 21.3.E for that part of the Work.

22.4.2. At any time, Contractor may notify Owner in writing that Contractor considers any such part of the Work substantially complete and shall issue a certificate of Substantial Completion for that part of the Work.

22.4.3. Within a reasonable time after either such request, Owner and Contractor shall make an inspection of that part of the Work to determine its status of completion. If Owner does not consider that part of the Work to be substantially complete, Owner will notify Contractor in writing giving the reasons therefor. If Owner considers that part of the Work to be substantially complete, the provisions of Paragraph 21.3 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

22.4.4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Article 29 regarding liability or other property insurance.

22.5. Final Inspection. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Owner will promptly make a final inspection with Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

22.6. Final Payment

22.6.1. Application for Payment

A) After Contractor has, in the opinion of Owner, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 15.11), and other documents, Contractor may make application for final payment.

B) The final Application for Payment must be accompanied (except as previously delivered) by:

1) all documentation called for in the Contract Documents;

2) consent of the surety, if any, to final payment;

3) satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment;

4) a list of all duly pending Change Proposals and claims; and

5) complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.

C) In lieu of the releases or waivers of Liens specified in Paragraph 21.6.1.B and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in Liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

22.6.2. Completion of Work: The Work, or applicable portion thereof, is complete (subject to surviving obligations) when it is ready for final payment as established by the Owner’s final inspection and issuance of notice of the acceptability of the Work.

22.6.3. Final Payment Becomes Due: Upon final inspection and issuance of notice of the acceptability of the Work, Owner shall set off against the amount recommended by Owner for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the

resulting balance due to Contractor within 30 days of Owner's final inspection and issuance of notice of the acceptability of the Work.

22.7. Waiver of Claims

22.7.1. By making final payment, Owner waives its claim or right to liquidated damages or other damages for late completion by Contractor, set-off, or express reservation of rights by Owner. Owner reserves all other claims or rights after final payment.

22.7.2. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted as a claim.

22.8. Correction Period

22.8.1. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

A) correct the defective repairs to the Site or such adjacent areas;

B) correct such defective Work;

C) remove the defective Work from the project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and

D) satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.

22.8.2. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 15.16.2.

22.8.3. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).

22.8.4. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

22.8.5. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

22.8.6. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

23. TERMINATION OR SUSPENSION.

23.1. Contractor may Suspend Work. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times directly attributable to any such suspension. Any Change Proposal seeking such adjustments must be submitted no later than 30 days after the date fixed for resumption of Work.

23.2. Termination of Contract. This Contract may be terminated under the following conditions:

23.2.1. By mutual consent of both parties.

23.2.2. Contractor may terminate this Contract upon a material default of Board; however, Contractor must provide written notice to the Board Contract Administrator and provide Board with thirty (30) days to cure the default.

23.2.3. Board may at any time terminate, the whole or any part of, this Contract for default if Contractor fails to perform any of the provisions of this contract, or so fails to pursue the work as to endanger performance of this contract in accordance with its terms, and after receipt of written notice from the Board, fails to correct such failures within seven calendar days or such other period as the Board may authorize or require.

23.3. Termination of the Contract. The Contract may be terminated under the following conditions:

23.3.1. By mutual consent of both parties.

23.3.2. Contractor may terminate the Contract upon a material default of Board; however, Contractor must provide written notice to the Board Contract Administrator and provide Board with thirty (30) days to cure the default.

23.3.3. Board may at any time terminate, the whole or any part of, the Contract for default if Contractor fails to perform any of the provisions of the Contract, or so fails to pursue the work as to endanger performance of the Contract in accordance with its terms, and after receipt of written notice from the Board, fails to correct such failures within seven calendar days or such other period as the Board may authorize or require.

23.4. Upon receiving a notice of termination issued by Board, Contractor shall immediately cease all activities under this Contract, as applicable, unless expressly directed otherwise by Board in the notice of termination. Board will pay Contractor for the services rendered. Such payment will be based on the rates outlined in the Contract, or where the Contract cannot be applied, payment will be based on a reasonable estimate as mutually agreed, but in no case, will anticipated profit be paid for Work not performed.

23.5. Board has sufficient funds currently available and authorized for expenditure to finance the costs of this Contract, during the current fiscal year. Contractor recognizes that the funding of services pursuant to this Contract is subject to annual appropriation by the Board as required by the Oregon Local Budget Law, ORS 294.323 and related provisions, which appropriation may not be made in subsequent fiscal years. As such, the Board may terminate this agreement at any time based on the Board's non-appropriation of funds required to perform its obligations under this Contract.

23.6. In addition to its other rights to terminate, the Board may terminate this Contract in whole or in part upon thirty days' notice to Contractor when it is determined to be in the best interests of the Board. During this thirty-day period, Contractor shall wind down and cease its Contract related operations as quickly and efficiently as possible, without performing unnecessary services or activities and by minimizing negative effects on the Board from such winding down and cessation of services.

23.7. The rights and remedies of the Board provided in this section, are not exclusive and are in addition to any other rights and remedies provided by law or under this contract.

23.8. If this Contract is terminated under subsections Article 11, Board shall be liable only for payment in accordance with the terms of this contract for services satisfactorily rendered prior to the effective date of termination.

23.9. Upon termination, Contractor shall deliver to Board all Contract Documents, information, works-in-progress, and other property that are or would be deliverables had the contract been completed.

24. **TIME IS OF THE ESSENCE.**

Contractor and Owner recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not completed within the times specified in in this Contract, plus any extensions that Owner permits in accordance with the General

Conditions. The parties also recognize the delays, expense and difficulties involved in proving the precise, actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, the parties have negotiated and ultimately agree that as liquidated damages for delay, but not as a penalty, Contractor will pay Owner, or Owner may withhold from any sums due Contractor, $1,000.00 for each day that expires after the Substantial Completion date set forth in this contract until the Work is substantially complete. After Substantial Completion, if Contractor neglects, refuses or fails to complete the remaining Work within the Contract Time or any extensions thereof permitted by Owner, Contractor will pay Owner, or Owner may withhold from any sums due Contractor, an additional $1,000.00 for each day that expires after the final completion date set forth in this contract and readiness for final payment until the Work is completed and ready for final payment.

25. **FORCE MAJEURE.**
Neither Board nor Contractor shall be held responsible for delay or damages due to unforeseeable causes beyond their reasonable control, including by fire, pandemics, riot, acts of God, or war. Contractor shall make all reasonable efforts to remove or eliminate such a cause of delay or default and shall, upon the cessation of the cause, diligently pursue performance of its obligations under this contract. Each party shall notify the other immediately upon discovering any event that the notifying party believes will result in such a delay.

26. **USE OF BOARD FACILITIES.**
Contractor and its employees, Subcontractors, or agents shall have the right to use only those facilities of the Board that are necessary to perform the Work under this Contract and shall have no right of access to any facility of the Board without prior approval of Board Contract Administrator. The Board shall have no responsibility for the loss, theft, mysterious disappearance of or damage to equipment, tools, materials, supplies, and other personal property of Contractor or its employees, Subcontractors or agents which may be stored on Board premises.

27. **PUBLICITY.**
Contractor shall not use in its external advertising, marketing programs or other promotional efforts, any data, pictures, or other representations of the Board except on prior specific written authorization from the Board Contract Administrator.

28. **RECORDS.**
Contractor shall maintain all fiscal records relating to this contract in accordance with generally accepted accounting principles. In addition, Contractor shall maintain any other records pertinent to this contract in such a manner as to clearly document Contractor's performance hereunder. Contractor acknowledges and agrees that the Board and its duly authorized representatives shall have access to such fiscal records and all other books, documents, papers, plans, and writings of the Contractor that are pertinent to this contract. All such fiscal records, books, documents, papers, plans, and writing shall be retained by Contractor and kept accessible for a minimum of three (3) years, except as required longer

by law, following final payment and termination of this contract, or until the conclusion of any audit, controversy, or litigation arising out of or related to this contract, whichever date is later. All subcontracts shall also comply with these provisions.

29. **WORK PRODUCT.**
All work products of the Contractor which result from this contract ("the work products"), except material previously and mutually identified as confidential or proprietary, shall be provided to Board upon request and shall be considered the exclusive property of the Board. In addition, if any of the work products contain intellectual property of the Contractor that is or could be protected by federal copyright, patent, or trademark laws, or state trade secret laws, Contractor hereby grants the Board a perpetual, royalty-free, fully paid-up, nonexclusive and irrevocable license to copy, reproduce, perform, dispose of, use and re-use, in whole or in part, and to authorize others to do so. Such work products include, but are not limited to: databases, templates, file formats, scripts, links, procedures, materials, training manuals and other training materials, specially created key commands, and any other information, designs, plans, or works provided or delivered to the Board or produced by Contractor under this contract. Use of any work product of the Contractor by the Board for any purpose other than the use intended by this Contract is at the risk of the Board.

30. **INSURANCE.**
Contractor shall obtain prior to beginning any work under this Contract and shall maintain in full force and effect for the term of this Contract, at Contractor's expense:

- comprehensive general liability to include bodily injury and property damage for at least $2,000,000 per occurrence and at least $3,000,000 aggregate per project
- $1,000,000 Professional Liability for engineering design services required by the Contract.
- Automobile liability with a combined single limit coverage of not less than $1,000,000 to include bodily injury and property damage and shall include coverage for owned, hired and non-owned vehicles, as applicable, for the protection of the Contractor and the Board.

Contractor shall name the Board, its elected and appointed officials, officers, agents, employees and volunteers as additional insureds. The policies shall be primary to and non-contributory with any insurance or self- insurance carried by the Board, issued by a company authorized to do business in the State of Oregon. The Contractor shall provide the Board written notice within thirty (30) days of cancellation or material modification of the insurance contract at the address listed above. Contractor shall provide certificates of insurance and additional insured policy endorsement to Board prior to commencement of any work under this Contract. If requested, complete copies of insurance policies shall be provided to Board. Contractor shall be financially responsible for all pertinent deductibles, self-insured retentions and/or self-insurance used to satisfy these requirements.

Workers' Compensation and Employers' Liability Insurance (If Applicable). Contractor and its Subcontractors, if any, are subject to Oregon Workers' Compensation Law, which requires all

employers that employ subject workers who work under this Contract in the State of Oregon to comply with ORS 656.017 and provide the required Workers' Compensation coverage, unless such employers are exempt under ORS 656.126. Contractor shall ensure that each of its Subcontractors, if any, complies with these requirements (ORS 279B.230(2)). Unless otherwise exempt, Contractor shall provide the Board with certification of Workers' Compensation Insurance and shall maintain Employers' Liability Insurance with limits not less than $1,000,000 for each accident, $1,000,000 for disease each employee and $1,000,000 each policy limit.

31. **INDEMNIFICATION.**
Contractor shall indemnify, defend, save and hold harmless the Board, its elected and appointed officials, officers, agents, employees and volunteers against all liability, claims, suits or actions of whatsoever nature, loss or expenses, including attorney fees, and against all claims, actions, judgments based upon or arising out of an act or omission by the Contractor or any of Contractor's Subcontractors, agents, or employees, in connection with, or incidental to, this Contract or the Work to be performed hereunder; provided, however, that nothing herewith shall be construed to require indemnification of Board attributable to its own negligence. In addition, Contractor expressly agrees to defend, indemnify and hold the Board, its elected and appointed officials, officers, agents, employees and volunteers against all liability, claims, suits, actions, loss or expenses, including attorney fees, arising out of or related to any claims that the Work, the Work Product, or any other tangible or intangible items delivered to Board by Contractor may be the subject of protection under any state or federal intellectual property law or doctrine, or the Board's use thereof, infringes any patent, copyright, trade secret, trademark, trade dress, mask work, utility design or other proprietary right of any third party. Contractor shall obtain similar indemnification for anyone acting on Contractor's behalf in connection with, or incidental to, this Contract for the Work to be performed hereunder for that person or entity's negligence.

32. **PRICE ESCALATION.**
A request for escalation of Contract pricing may be made under the following conditions:

32.1. Offered prices must be firm for a least one (1) consecutive year after execution of the Contract.

32.2. The Contractor shall provide written notice to the Board of any requested price increases and all requests for price increases shall be accompanied by:

32.2.1. A letter from the Contractor's Supplier certifying the price increase to the Contractor; or

32.2.2. Evidence of verifiable market conditions resulting in increased costs such as mandated labor rate increases and significant fuel or energy cost increases.

32.3. All revisions to Contract pricing shall become effective when they have been received and approved by the Board and executed by both parties as an amendment to the Contract.

32.4. The Board reserves the right to cancel a Contract if a requested price escalation is unacceptable to the Board.

32.5. All approved price changes resulting from this escalation clause shall be firm for a period of one (1) calendar year after approval of the escalation by the Board and execution of an amendment.

32.6. Contractors are obligated to treat price decreases as equally as price increases during the term of the Contract. Contractor shall notify the Board within ten (10) working days of subsequent price de-escalations from its Supplier or cost reductions in areas where pricing increases were previously implemented. The Contractor will reduce its pricing to the Board immediately to pass on such de-escalations and reductions unless otherwise agreed by the parties.

32.7. The Board reserves the right to approve pricing increases requested by the Contractor other than those described in this subsection, if in the best interest of the Board.

32.8. All approvals required by this subsection must be in writing by the Board Contract Administrator.

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SECTION 00 61 13.13 - PERFORMANCE BOND

Contractor Name: Address *(principal place of business)*:	**Surety** Name: Address *(principal place of business)*:
Owner Name: South Fork Water Board Mailing address *(principal place of business)*: 15962 Hunter Ave, Oregon City, OR 97045	**Contract** Water Quality Systems Building, CIP-01 15962 Hunter Ave, Oregon City, OR 97045 Contract Price: Effective Date of Contract:

Bond
Bond Amount:
Date of Bond:
(Date of Bond cannot be earlier than Effective Date of Contract)
Modifications to this Bond form: ☐ None ☐ See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Performance Bond, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

Contractor as Principal	Surety
(Full formal name of Contractor)	*(Full formal name of Surety) (corporate seal)*
By: _____ *(Signature)*	By: _____ *(Signature)(Attach Power of Attorney)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____
Attest: _____ *(Signature)*	Attest: _____ *(Signature)*
Name: _____ *(Printed or typed)*	Name: _____ *(Printed or typed)*
Title: _____	Title: _____

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond will arise after:

   3.1. The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice may indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 will be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement does not waive the Owner's right, if any, subsequently to declare a Contractor Default;

   3.2. The Owner declares a Contractor Default, terminates the Construction Contract, and notifies the Surety; and

   3.3. The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a Contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 does not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

   5.1. Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

   5.2. Undertake to perform and complete the Construction Contract itself, through its agents or independent Contractors;

   5.3. Obtain bids or negotiated proposals from qualified Contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a Contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

   5.4. Waive its right to perform and complete, arrange for completion, or obtain a new Contractor, and with reasonable promptness under the circumstances:

      5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment, or the Surety has denied liability, in whole or in part, without further notice, the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner will not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety will not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

   7.1. the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

   7.2. additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

   7.3. liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price will not be reduced or set off on account of any such unrelated obligations. No right of action will accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

11. Any proceeding, legal or equitable, under this Bond must be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and must be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit will be applicable.

12. Notice to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted therefrom and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.

14. Definitions

    14.1. *Balance of the Contract Price*—The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

    14.2. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

    14.3. *Contractor Default*—Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

    14.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

    14.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.

16. Modifications to this Bond are as follows: _____

END OF SECTION

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SECTION 00 61 13.16 - PAYMENT BOND

Contractor Name: Address *(principal place of business)*:	**Surety** Name: Address *(principal place of business)*:
Owner Name: South Fork Water Board Mailing address *(principal place of business)*: 15962 Hunter Ave, Oregon City, OR 97045	**Contract** Water Quality Systems Building, CIP 01 15962 Hunter Ave, Oregon City, OR 97045 Contract Price: Effective Date of Contract:

Bond
Bond Amount:
Date of Bond:
(Date of Bond cannot be earlier than Effective Date of Contract)
Modifications to this Bond form: ☐ None ☐ See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Payment Bond, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

Contractor as Principal	Surety
(Full formal name of Contractor)	*(Full formal name of Surety) (corporate seal)*
By: _____	By: _____
(Signature)	*(Signature)(Attach Power of Attorney)*
Name: _____	Name: _____
(Printed or typed)	*(Printed or typed)*
Title: _____	Title: _____
Attest: _____	Attest: _____
(Signature)	*(Signature)*
Name: _____	Name: _____
(Printed or typed)	*(Printed or typed)*
Title: _____	Title: _____

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond will arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.

4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.

5. The Surety's obligations to a Claimant under this Bond will arise after the following:

    5.1. Claimants who do not have a direct contract with the Contractor

        5.1.1. have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and

        5.1.2. have sent a Claim to the Surety (at the address described in Paragraph 13).

    5.2. Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).

6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.

7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

    7.1. Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

    7.2. Pay or arrange for payment of any undisputed amounts.

    7.3. The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 will not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim,

except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

8. The Surety's total obligation will not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond will be credited for any payments made in good faith by the Surety.

9. Amounts owed by the Owner to the Contractor under the Construction Contract will be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfying obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.

11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

12. No suit or action will be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit will be applicable.

13. Notice and Claims to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, will be sufficient compliance as of the date received.

14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted here from and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond.

15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. Definitions

    16.1. Claim—A written statement by the Claimant including at a minimum:

16.1.1. The name of the Claimant;

16.1.2. The name of the person for whom the labor was done, or materials or equipment furnished;

16.1.3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;

16.1.4. A brief description of the labor, materials, or equipment furnished;

16.1.5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;

16.1.6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;

16.1.7. The total amount of previous payments received by the Claimant; and

16.1.8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2. Claimant—An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond is to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3. Construction Contract—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4. Owner Default—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5. Contract Documents—All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond will be deemed to be subcontractor and the term Owner will be deemed to be Contractor.

18. Modifications to this Bond are as follows: _____

END OF SECTION

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Section 00 62 76 - Contractor's Application for Payment

Owner: _____ **Owner's Project No.:** _____
Engineer: _____ **Engineer's Project No.:** _____
Contractor: _____ **Contractor's Project No.:** _____
Project: _____
Contract: _____

Application No.: _____ **Application Date:** _____
Application Period: **From** _____ **to** _____

1. Original Contract Price				$ -
2. Net change by Change Orders				$ -
3. Current Contract Price (Line 1 + Line 2)				$ -
4. Total Work completed and materials stored to date (Sum of Column G Lump Sum Total and Column J Unit Price Total)				$ -
5. Retainage				
a. _____	X	$ -	Work Completed	$ -
b. _____	X	$ -	Stored Materials	$ -
c. Total Retainage (Line 5.a + Line 5.b)				$ -
6. Amount eligible to date (Line 4 - Line 5.c)				$ -
7. Less previous payments (Line 6 from prior application)				
8. Amount due this application				$ -
9. Balance to finish, including retainage (Line 3 - Line 4)				$ -

Contractor's Certification

The undersigned Contractor certifies, to the best of its knowledge, the following:
(1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;
(2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such liens, security interest, or encumbrances); and
(3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

Contractor: _____
Signature: _____ **Date:** _____

Recommended by Engineer		**Approved by Owner**	
By:	_____	**By:**	_____
Title:	_____	**Title:**	_____
Date:	_____	**Date:**	_____
Approved by Funding Agency			
By:	_____	**By:**	_____
Title:	_____	**Title:**	_____
Date:	_____	**Date:**	_____

Progress Estimate - Lump Sum Work | **Contractor's Application for Payment**

Owner: _____ **Owner's Project No.:** _____
Engineer: _____ **Engineer's Project No.:** _____
Contractor: _____ **Contractor's Project No.:** _____
Project: _____
Contract: _____

Application No.: _____ **Application Period:** From _____ to _____ **Application Date:** _____

A	B	C	D	E	F	G	H	I
			Work Completed					
Item No.	Description	Scheduled Value ($)	(D + E) From Previous Application ($)	This Period ($)	Materials Currently Stored (not in D or E) ($)	Work Completed and Materials Stored to Date (D + E + F) ($)	% of Scheduled Value (G / C) (%)	Balance to Finish (C - G) ($)
			Original Contract					
			-			-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
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						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
	Original Contract Totals	$ -	$ -	$ -	$ -	$ -		$ -

Progress Estimate - Lump Sum Work | **Contractor's Application for Payment**

Owner: _____ **Owner's Project No.:** _____
Engineer: _____ **Engineer's Project No.:** _____
Contractor: _____ **Contractor's Project No.:** _____
Project: _____
Contract: _____

Application No.: _____ **Application Period:** From _____ to _____ **Application Date:** _____

A	B	C	D	E	F	G	H	I
			Work Completed					
Item No.	Description	Scheduled Value ($)	(D + E) From Previous Application ($)	This Period ($)	Materials Currently Stored (not in D or E) ($)	Work Completed and Materials Stored to Date (D + E + F) ($)	% of Scheduled Value (G / C) (%)	Balance to Finish (C - G) ($)
			Change Orders					
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
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						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
						-		-
	Change Order Totals	$ -	$ -	$ -	$ -	$ -		$ -
			Original Contract and Change Orders					
	Project Totals	$ -	$ -	$ -	$ -	$ -		$ -

Progress Estimate - Unit Price Work | **Contractor's Application for Payment**

Owner: _____ Owner's Project No.: _____
Engineer: _____ Engineer's Project No.: _____
Contractor: _____ Contractor's Project No.: _____
Project: _____
Contract: _____

Application No.: _____ Application Period: From _____ to _____ Application Date: _____

A	B	C	D	E	F	G	H	I	J	K	L
		Contract Information				Work Completed					
Bid Item No.	Description	Item Quantity	Units	Unit Price ($)	Value of Bid Item (C X E) ($)	Estimated Quantity Incorporated in the Work	Value of Work Completed to Date (E X G) ($)	Materials Currently Stored (not in G) ($)	Work Completed and Materials Stored to Date (H + I) ($)	% of Value of Item (J / F) (%)	Balance to Finish (F - J) ($)
Original Contract											
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
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					-		-		-		-
					-		-		-		-
					-		-		-		-
				Original Contract Totals	$ -		$ -	$ -	$ -		$ -

Progress Estimate - Unit Price Work | **Contractor's Application for Payment**

Owner: _____ Owner's Project No.: _____
Engineer: _____ Engineer's Project No.: _____
Contractor: _____ Contractor's Project No.: _____
Project: _____
Contract: _____

Application No.: _____ Application Period: From _____ to _____ Application Date: _____

A	B	C	D	E	F	G	H	I	J	K	L
		Contract Information				Work Completed					
Bid Item No.	Description	Item Quantity	Units	Unit Price ($)	Value of Bid Item (C X E) ($)	Estimated Quantity Incorporated in the Work	Value of Work Completed to Date (E X G) ($)	Materials Currently Stored (not in G) ($)	Work Completed and Materials Stored to Date (H + I) ($)	% of Value of Item (J / F) (%)	Balance to Finish (F - J) ($)
Change Orders											
					-		-		-		-
					-		-		-		-
					-		-		-		-
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					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
				Change Order Totals	$ -		$ -	$ -	$ -		$ -
Original Contract and Change Orders											
				Project Totals	$ -		$ -	$ -	$ -		$ -

Stored Materials Summary **Contractor's Application for Payment**

Owner:
Engineer:
Contractor:
Project:
Contract:

Owner's Project No.:
Engineer's Project No.:
Contractor's Project No.:

Application No.: Application Period: From to Application Date:

A	B	C	D	E	F	G	H	I	J	K	L	M
						Materials Stored			Incorporated in Work			
Item No. (Lump Sum Tab) or Bid Item No. (Unit Price Tab)	Supplier Invoice No.	Submittal No. (with Specification Section No.)	Description of Materials or Equipment Stored	Storage Location	Application No. When Materials Placed in Storage	Previous Amount Stored ($)	Amount Stored this Period ($)	Amount Stored to Date (G+H) ($)	Amount Previously Incorporated in the Work ($)	Amount Incorporated in the Work this Period ($)	Total Amount Incorporated in the Work (J+K) ($)	Materials Remaining in Storage (I-L) ($)
								-			-	-
								-			-	-
								-			-	-
								-			-	-
								-			-	-
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								-			-	-
								-			-	-
								-			-	-
					Totals	$ -	$ -	$ -	$ -	$ -	$ -	$ -

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SECTION 00 65 16 – CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner:	South Fork Water Board	Owner's Project No.:	CIP-01
Engineer:	Consor, N.A.	Engineer's Project No.:	W253326OR.00
Contractor:		Contractor's Project No.:	
Project:	Water Quality Systems Building		
Contract Name:	South Fork Water Board Water Quality Systems Building		

This ☐ Preliminary ☐ Final Certificate of Substantial Completion applies to:

☐ All Work ☐ The following specified portions of the Work:_____

_____

_____

Date of Substantial Completion: _____

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work must be as provided in the Contract, except as amended as follows:

Amendments to Owner's Responsibilities: ☐ None ☐ As follows:

_____

_____

Amendments to Contractor's Responsibilities: ☐ None ☐ As follows:

_____

_____

The following documents are attached to and made a part of this Certificate:

_____

_____

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Engineer

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

END OF SECTION

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SECTION 00 65 20 – NOTICE OF ACCEPTABILITY OF WORK

Owner:	South Fork Water Board	Owner's Project No.:	CIP-01
Engineer:	Consor N.A.	Engineer's Project No.:	W253326OR.00
Contractor:		Contractor's Project No.:	
Project:	Water Quality Systems Building		
Contract Name:	South Fork Water Board – Water Quality Systems Building.		
Notice Date:		Effective Date of the Construction Contract:	

The Engineer hereby gives notice to the Owner and Contractor that Engineer recommends final payment to Contractor, and that the Work furnished and performed by Contractor under the Construction Contract is acceptable, expressly subject to the provisions of the Construction Contract's Contract Documents ("Contract Documents") and of the Agreement between Owner and Engineer for Professional Services dated _____ ("Owner-Engineer Agreement"). This Notice of Acceptability of Work (Notice) is made expressly subject to the following terms and conditions to which all who receive and rely on said Notice agree:

1. This Notice has been prepared with the skill and care ordinarily used by members of the engineering profession practicing under similar conditions at the same time and in the same locality.

2. This Notice reflects and is an expression of the Engineer's professional opinion.

3. This Notice has been prepared to the best of Engineer's knowledge, information, and belief as of the Notice Date.

4. This Notice is based entirely on and expressly limited by the scope of services Engineer has been employed by Owner to perform or furnish during construction of the Project (including observation of the Contractor's Work) under the Owner-Engineer Agreement, and applies only to facts that are within Engineer's knowledge or could reasonably have been ascertained by Engineer as a result of carrying out the responsibilities specifically assigned to Engineer under such Owner-Engineer Agreement.

5. This Notice is not a guarantee or warranty of Contractor's performance under the Construction Contract, an acceptance of Work that is not in accordance with the Contract Documents, including but not limited to defective Work discovered after final inspection, nor an assumption of responsibility for any failure of Contractor to furnish and perform the Work thereunder in accordance with the Contract Documents, or to otherwise comply with the Contract Documents or the terms of any special guarantees specified therein.

6. This Notice does not relieve Contractor of any surviving obligations under the Construction Contract and is subject to Owner's reservations of rights with respect to completion and final payment.

Engineer

By *(signature)*: _____

Name *(printed)*: _____

Title: _____

END OF SECTION

SECTION 00 73 43
OREGON PREVAILING WAGE RATE FLYSHEET

This is a public works project and is subject to both state and federal prevailing wage rate laws. The Contractor and Subcontractors shall pay the higher of either the state or federal prevailing wage rates for the type of work being performed.

The applicable Oregon prevailing wage rates are contained in the publications *Definitions of Covered Occupations for Public Work Contracts in Oregon Effective October 5, 2024* and *Prevailing Wage Rate Book Effective July 5, 2026*, including the Amendment effective on date this Contract was advertised for bid, and are incorporated herein as though fully set forth as of the date the Bidding Documents are first advertised.

(See Oregon Bureau of Labor and Industries website links at:
http://www.oregon.gov/BOLI)
BOLI : Prevailing Wage : For Employers : State of Oregon
BOLI : Prevailing Wage Rates : For Employers : State of Oregon)

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SECTION 00 73 44
DAVIS-BACON WAGE RATE FLYSHEET

This is a public works project and is subject to both state and federal prevailing wage rate laws. The Contractor and Subcontractors shall pay the higher of either the state or federal prevailing wage rates for the type of work being performed.

The applicable Davis-Bacon requirements are contained in the following Section 00 73 45, WIFIA Requirements of these Contract Documents, and are incorporated herein as fully set forth in the Bidding Documents.

The Davis-Bacon prevailing wages applicable to the project will be those in effect at the time of Contract Award.

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SECTION 00 73 45 - WIFIA REQUIREMENTS

This project is expected to be partially funded through federal funds under the Water Infrastructure Finance and Innovation Act (WIFIA). As such, attention is drawn to the following federal laws which will apply to this contract. All references to the Owner shall be synonymous with the South Fork Water Board or any of its delegates.

ITEM 1 AMERICAN IRON AND STEEL (AIS) REQUIREMENT

The goods and services under this Agreement are being funded with monies made available by the Water Infrastructure Finance and Innovation Act program of the EPA that has statutory requirements commonly known as "American Iron and Steel" that requires all of the iron and steel products used in the project to be produced in the United States ("American Iron and Steel Requirement") including iron and steel products provided by the Contactor pursuant to this Agreement.

All of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is approved, and the Contractor will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by the Purchaser or the EPA.

The Contractor shall adhere to all requirements stated within the Specifications and other WIFIA requirements and provide documentation that every iron and steel item used on this project meets AIS requirements.

Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Purchaser or the EPA to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney's fees) incurred by the Purchaser or the EPA resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the EPA or any damages owed to the EPA by the Purchaser). While the Contractor has no direct contractual privity with the EPA, as a lender to the Purchaser for the funding of its project, the Purchaser and the Contractor agree that the EPA is a third- party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the EPA.

ITEM 2: LABOR LAWS AND STANDARDS

a) *Required contract clauses.*

(1) *Minimum wages —*

(i) *Wage rates and fringe benefits.* All laborers and mechanics employed or working upon the site of the work (or otherwise working in construction or development of the project under a development statute), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of basic hourly wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be

alleged to exist between the contractor and such laborers and mechanics. As provided in paragraphs (d) and (e) of this section, the appropriate wage determinations are effective by operation of law even if they have not been attached to the contract. Contributions made or costs reasonably anticipated for bona fide fringe benefits under the Davis-Bacon Act (40 U.S.C. 3141(2)(B)) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(v) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics must be paid the appropriate wage rate and fringe benefits on the wage determination for the classification(s) of work actually performed, without regard to skill, except as provided in paragraph (a)(4) of this section. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided,* That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classifications and wage rates conformed under paragraph (a)(1)(iii) of this section) and the Davis-Bacon poster (WH-1321) must be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii) Frequently recurring classifications.

(A) In addition to wage and fringe benefit rates that have been determined to be prevailing under the procedures set forth in 29 CFR part 1, a wage determination may contain, pursuant to § 1.3(f), wage and fringe benefit rates for classifications of laborers and mechanics for which conformance requests are regularly submitted pursuant to paragraph (a)(1)(iii) of this section, provided that:

(1) The work performed by the classification is not performed by a classification in the wage determination for which a prevailing wage rate has been determined;

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

(3) The wage rate for the classification bears a reasonable relationship to the prevailing wage rates contained in the wage determination.

(B) The Administrator will establish wage rates for such classifications in accordance with paragraph (a)(1)(iii)(A)(*3*) of this section. Work performed in such a classification must be paid at no less than the wage and fringe benefit rate listed on the wage determination for such classification.

(iii) Conformance.

(A) The contracting officer must require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract be classified in conformance with the wage determination. Conformance of an additional classification and wage rate and fringe benefits is appropriate only when the following criteria have been met:

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

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

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

(B) The conformance process may not be used to split, subdivide, or otherwise avoid application of classifications listed in the wage determination.

(C) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken will be sent by the contracting officer by email to *DBAconformance@dol.gov*. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer will, by email to *DBAconformance@dol.gov,* refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(E) The contracting officer must promptly notify the contractor of the action taken by the Wage and Hour Division under paragraphs (a)(1)(iii)(C) and (D) of this section. The contractor must furnish a written copy of such determination to each affected worker or it must be posted as a part of the wage determination. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph (a)(1)(iii)(C) or (D) of this section must be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

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

(v) *Unfunded plans.* If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided,* That the Secretary of Labor has found, upon the written request of the contractor, in accordance with the criteria set forth in § 5.28, that the applicable

standards of the Davis- Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(vi) *Interest.* In the event of a failure to pay all or part of the wages required by the contract, the contractor will be required to pay interest on any underpayment of wages.

(2) *Withholding —*

(i) *Withholding requirements.* The [write in name of Federal agency or the recipient of Federal assistance] may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for the full amount of wages and monetary relief, including interest, required by the clauses set forth in paragraph (a) of this section for violations of this contract, or to satisfy any such liabilities required by any other Federal contract, or federally assisted contract subject to Davis-Bacon labor standards, that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to Davis-Bacon labor standards requirements and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld. In the event of a contractor's failure to pay any laborer or mechanic, including any apprentice or helper working on the site of the work (or otherwise working in construction or development of the project under a development statute) all or part of the wages required by the contract, or upon the contractor's failure to submit the required records as discussed in paragraph (a)(3)(iv) of this section, the [Agency] may on its own initiative and after written notice to the contractor, sponsor, applicant, owner, or other entity, as the case may be, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(ii) *Priority to withheld funds.* The Department has priority to funds withheld or to be withheld in accordance with paragraph (a)(2)(i) or (b)(3)(i) of this section, or both, over claims to those funds by:

(A) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;

(B) A contracting agency for its reprocurement costs;

(C) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;

(D) A contractor's assignee(s);

(E) A contractor's successor(s); or

(F) A claim asserted under the Prompt Payment Act, 31 U.S.C. 3901-3907.

(3) *Records and certified payrolls —*

(i) *Basic record requirements —*

(A) *Length of record retention.* All regular payrolls and other basic records must be maintained by the contractor and any subcontractor during the course of the work and preserved for all laborers and mechanics working at the site of the work (or otherwise working in construction or development of the project under a development statute) for a period of at least 3 years after all the work on the prime contract is completed.

(B) *Information required.* Such records must contain the name; Social Security number; last known address, telephone number, and email address of each such worker; each worker's correct classification(s) of work actually performed; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 40 U.S.C. 3141(2)(B) of the Davis-Bacon Act); daily and weekly number of hours actually worked in total and on each covered contract; deductions made; and actual wages paid.

(C) *Additional records relating to fringe benefits.* Whenever the Secretary of Labor has found under paragraph (a)(1)(v) of this section that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in 40 U.S.C. 3141(2)(B) of the Davis-Bacon Act, the contractor must maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits.

(D) *Additional records relating to apprenticeship.* Contractors with apprentices working under approved programs must maintain written evidence of the registration of apprenticeship programs, the registration of the apprentices, and the ratios and wage rates prescribed in the applicable programs.

(ii) *Certified payroll requirements —*

(A) *Frequency and method of submission.* The contractor or subcontractor must submit weekly, for each week in which any DBA- or Related Acts-covered work is performed, certified payrolls to the Environmental Protect Agency, if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the certified payrolls to the applicant, sponsor, owner, or other entity, as the case may be, that maintains such records, for transmission to the Environmental Protect Agency. The prime contractor is responsible for the submission of all certified payrolls by all subcontractors. A contracting agency or prime contractor may permit or require contractors to submit certified payrolls through an electronic system, as long as the electronic system requires a legally valid electronic signature; the system allows the contractor, the contracting agency, and the Department of Labor to access the certified payrolls upon request for at least 3 years after the work on the prime contract has been completed; and the contracting agency or prime contractor permits other methods of submission in situations where the contractor is unable or limited in its ability to use or access the electronic system.

(B) *Information required.* The certified payrolls submitted must set out accurately and completely all of the information required to be maintained under paragraph (a)(3)(i)(B) of this section, except that full Social Security numbers and last known addresses, telephone numbers, and email addresses must not be included on weekly transmittals. Instead, the certified payrolls need only include an individually identifying number for each worker (*e.g.,* the last four digits of the worker's Social Security number). The required weekly certified payroll information may be submitted using Optional Form WH-347 or in any other format desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division website at *https://www.dol.gov/sites/dolgov/files/WHD/legacy/files/wh347/.pdf* or its successor website. It is not a violation of this section for a prime contractor to require a subcontractor to provide full Social Security numbers and last known addresses, telephone numbers, and email addresses to the prime contractor for its own records, without weekly submission by the subcontractor to the sponsoring government agency (or the applicant, sponsor, owner, or other entity, as the case may be, that maintains such records).

(C) *Statement of Compliance.* Each certified payroll submitted must be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor, or the contractor's or subcontractor's agent who pays or supervises the payment of the persons working on the contract, and must certify the following:

(1) That the certified payroll for the payroll period contains the information required to be provided under paragraph (a)(3)(ii) of this section, the appropriate information and basic records are being maintained under paragraph (a)(3)(i) of this section, and such information and records are correct and complete;

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

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

(D) *Use of Optional Form WH-347.* The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 will satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(C) of this section.

(E) *Signature.* The signature by the contractor, subcontractor, or the contractor's or subcontractor's agent must be an original handwritten signature or a legally valid electronic signature.

(F) *Falsification.* The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under 18 U.S.C. 1001 and 31 U.S.C. 3729.

(G) *Length of certified payroll retention.* The contractor or subcontractor must preserve all certified payrolls during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

(iii) *Contracts, subcontracts, and related documents.* The contractor or subcontractor must maintain this contract or subcontract and related documents including, without limitation, bids, proposals, amendments, modifications, and extensions. The contractor or subcontractor must preserve these contracts, subcontracts, and related documents during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

(iv) *Required disclosures and access —*

(A) *Required record disclosures and access to workers.* The contractor or subcontractor must make the records required under paragraphs (a)(3)(i) through

(iii) of this section, and any other documents that the [write the name of the agency] or the Department of Labor deems necessary to determine compliance with the labor standards provisions of any of the applicable statutes referenced by § 5.1, available for inspection, copying, or transcription by authorized representatives of the [write the name of the agency] or the Department of Labor, and must permit such representatives to interview workers during working hours on the job.

(B) *Sanctions for non-compliance with records and worker access requirements.* If the contractor or subcontractor fails to submit the required records or to make them available, or refuses to permit worker interviews during working hours on the job, the Federal agency may, after written notice to the contractor, sponsor, applicant, owner, or other entity, as the case may be, that maintains such records or that employs such workers, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available, or to permit worker interviews during working hours on the job, may be grounds for debarment action pursuant to § 5.12. In addition, any contractor or other person that fails to submit the required records or make those records available to WHD within the time WHD requests that the records be produced will be precluded from introducing as evidence in an administrative proceeding under 29 CFR part 6 any of the required records that were not provided or made available to WHD. WHD will take into consideration a reasonable request from the contractor or person for an extension of the time for submission of records. WHD will determine the reasonableness of the request and may consider, among other things, the location of the records and the volume of production.

(C) *Required information disclosures.* Contractors and subcontractors must maintain the full Social Security number and last known address, telephone number, and email address of each covered worker, and must provide them upon request to the [write in name of appropriate Federal agency] if the agency is a party to the contract, or to the Wage and Hour Division of the Department of Labor. If the Federal agency is not such a party to the contract, the contractor, subcontractor, or both, must, upon request, provide the full Social Security number and last known address, telephone

number, and email address of each covered worker to the applicant, sponsor, owner, or other entity, as the case may be, that maintains such records, for transmission to the [write in name of agency], the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or other compliance action.

(4) *Apprentices and equal employment opportunity —*

(i) *Apprentices —*

(A) *Rate of pay.* Apprentices will be permitted to work at less than the predetermined rate for the work they perform when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship (OA), or with a State Apprenticeship Agency recognized by the OA. A person who is not individually registered in the program, but who has been certified by the OA or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice, will be permitted to work at less than the predetermined rate for the work they perform in the first 90 days of probationary employment as an apprentice in such a program. In the event the OA or a State Apprenticeship Agency recognized by the OA withdraws approval of an apprenticeship program, the contractor will no longer be permitted to use apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(B) *Fringe benefits.* Apprentices must be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringe benefits must be paid in accordance with that determination.

(C) *Apprenticeship ratio.* The allowable ratio of apprentices to journeyworkers on the job site in any craft classification must not be greater than the ratio permitted to the contractor as to the entire work force under the registered program or the ratio applicable to the locality of the project pursuant to paragraph (a)(4)(i)(D) of this section. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated in paragraph (a)(4)(i)(A) of this section, must be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under this section must be paid not less than the applicable wage rate on the wage determination for the work actually performed.

(D) *Reciprocity of ratios and wage rates.* Where a contractor is performing construction on a project in a locality other than the locality in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyworker's hourly rate) applicable within the locality in which the construction is being performed must be observed. If there is no applicable ratio or wage rate for the locality of the project, the ratio and wage rate specified in the contractor's registered program must be observed.

(ii) *Equal employment opportunity.* The use of apprentices and journeyworkers under this part must be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

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

(6) *Subcontracts.* The contractor or subcontractor must insert in any subcontracts the clauses contained in paragraphs (a)(1) through (11) of this section, along with the applicable wage determination(s) and such other clauses or contract modifications as the [write in the name of the Federal agency] may by appropriate instructions require, and a clause requiring the subcontractors to include these clauses and wage determination(s) in any lower tier subcontracts. The prime contractor is responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this section. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and may be subject to debarment, as appropriate.

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

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

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

(10)Certification of eligibility.

(i) By entering into this contract, the contractor certifies that neither it nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of 40 U.S.C. 3144(b) or § 5.12(a).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of 40 U.S.C. 3144(b) or § 5.12(a).

(iii) The penalty for making false statements is prescribed in the U.S. Code, Title 18 Crimes and Criminal Procedure, 18 U.S.C. 1001.

(11)*Anti-retaliation.* It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any

person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

(i) Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the DBA, Related Acts, this part, or 29 CFR part 1 or 3;

(ii) Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under the DBA, Related Acts, this part, or 29 CFR part 1 or 3;

(iii) Cooperating in any investigation or other compliance action, or testifying in any proceeding under the DBA, Related Acts, this part, or 29 CFR part 1 or 3; or

(iv) Informing any other person about their rights under the DBA, Related Acts, this part, or 29 CFR part 1 or 3.

b) *Contract Work Hours and Safety Standards Act (CWHSSA).* The Agency Head must cause or require the contracting officer to insert the following clauses set forth in paragraphs (b)(1) through (5) of this section in full, or (for contracts covered by the Federal Acquisition Regulation) by reference, in any contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses must be inserted in addition to the clauses required by paragraph (a) of this section or 29 CFR 4.6. As used in this paragraph (b), the terms "laborers and mechanics" include watchpersons and guards.

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

(2) *Violation; liability for unpaid wages; liquidated damages.* In the event of any violation of the clause set forth in paragraph (b)(1) of this section the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages and interest from the date of the underpayment. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchpersons and guards, employed in violation of the clause set forth in paragraph (b)(1) of this section, in the sum of $32 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1).

(3) *Withholding for unpaid wages and liquidated damages —*

(i) *Withholding process.* The [write in the name of the Federal agency or the recipient of Federal assistance] may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for any

unpaid wages; monetary relief, including interest; and liquidated damages required by the clauses set forth in this paragraph (b) on this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract subject to the Contract Work Hours and Safety Standards Act that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to the Contract Work Hours and Safety Standards Act and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld.*Priority to withheld funds.* The Department has priority to funds withheld or to be withheld in accordance with paragraph (a)(2)(i) or (b)(3)(i) of this section, or both, over claims to those funds by:

(A) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;

(B) A contracting agency for its reprocurement costs;

(C) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;

(D) A contractor's assignee(s);

(E) A contractor's successor(s); or

(F) A claim asserted under the Prompt Payment Act, 31 U.S.C. 3901-3907.

(4) *Subcontracts.* The contractor or subcontractor must insert in any subcontracts the clauses set forth in paragraphs (b)(1) through (5) of this section and a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor is responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b)(1) through (5). In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and associated liquidated damages and may be subject to debarment, as appropriate.

(5) Anti-retaliation.

(i) It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for: Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the Contract Work Hours and Safety Standards Act (CWHSSA) or its implementing regulations in this part;

(ii) Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under CWHSSA or this part;

(iii) Cooperating in any investigation or other compliance action, or testifying in any proceeding under CWHSSA or this part; or

(iv) Informing any other person about their rights under CWHSSA or this part.

c) *CWHSSA required records clause.* In addition to the clauses contained in paragraph (b) of this section, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other laws referenced by § 5.1, the Agency Head must cause or require the contracting officer to insert a clause requiring that the contractor or subcontractor must maintain regular payrolls and other basic records during the course of the work and must preserve them for a period of 3 years after all the work on the prime contract is completed for all laborers and mechanics, including guards and watchpersons, working on the contract. Such records must contain the name; last known address, telephone number, and email address; and social security number of each such worker; each worker's correct classification(s) of work actually performed; hourly rates of wages paid; daily and weekly number of hours actually worked; deductions made; and actual wages paid. Further, the Agency Head must cause or require the contracting officer to insert in any such contract a clause providing that the records to be maintained under this paragraph must be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview workers during working hours on the job.

d) *Incorporation of contract clauses and wage determinations by reference.* Although agencies are required to insert the contract clauses set forth in this section, along with appropriate wage determinations, in full into covered contracts, and contractors and subcontractors are required to insert them in any lower-tier subcontracts, the incorporation by reference of the required contract clauses and appropriate wage determinations will be given the same force and effect as if they were inserted in full text.

e) *Incorporation by operation of law.* The contract clauses set forth in this section (or their equivalent under the Federal Acquisition Regulation), along with the correct wage determinations, will be considered to be a part of every prime contract required by the applicable statutes referenced by § 5.1 to include such clauses, and will be effective by operation of law, whether or not they are included or incorporated by reference into such contract, unless the Administrator grants a variance, tolerance, or exemption from the application of this paragraph. Where the clauses and applicable wage determinations are effective by operation of law under this paragraph, the prime contractor must be compensated for any resulting increase in wages in accordance with applicable law.

ITEM 3: PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT (EFFECTIVE AUGUST 13, 2020)

The John S. McCain National Defense Authorization Act for Fiscal Year 2019 (P.L. 115- 232), at Section 889, prohibits EPA financial assistance recipients, including WIFIA borrowers, from expending loan funds to procure or obtain; extend or renew a contract to procure or obtain; or enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that use covered telecommunications equipment or services as a substantial or essential component of any system, or as

critical technology as part of any system. As described in the Act, "covered telecommunications equipment or services" means:

a) Telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).

b) For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).

c) Telecommunications or video surveillance services provided by such entities or using such equipment.

d) Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

e) The Act does not prohibit:

f) Procuring with an entity to provide a service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements.

g) Telecommunications equipment that cannot route or redirect user data traffic or permit visibility into any user data or packets that such equipment transmits or otherwise handles.

ITEM 4: DEBARMENT AND SUSPENSION AND PROHIBITIONS RELATING TO VIOLATIONS OF CWA AND CAA WITH RESPECT TO FEDERAL CONTRACTS, GRANTS, OR LOANS

Debarment and Suspension. Contractor certifies that it will not knowingly enter into a contract with anyone who is ineligible under the 2 CFR part 180 and part 1532 (per Executive Order 12549, 51 FR 6370, February 21, 1986) or who is prohibited under Section 306 of the Clean Air Act or Section 508 of the Clean Water Act to participate in the [Project]. Suspension and debarment information can be accessed at http://www.sam.gov. Contractor represents and warrants that it has or will include a term or conditions requiring compliance with this provision in all of its subcontracts under this Agreement.

ITEM 5 FEDERAL LOBBYING RESTRICTIONS (31 U.S.C 1352)

Recipients of federal financial assistance may not pay any person for influencing or attempting to influence any officer or employee of a federal agency, a member of Congress, an officer or employee of Congress, or an employee of a member of Congress with respect to the award, continuation, renewal, amendment, or modification of a federal grant, loan, or contract. These requirements are implemented for USEPA in 40 CFR Part 34, which also describes types of activities, such as legislative liaison activities and professional and technical services, which are not subject to this prohibition. Upon award of this contract, Contractor shall complete and submit to the Owner the certification and disclosure forms in Appendix A and Appendix B to 40 CFR Part 34. Contractor shall also require all subcontractors and suppliers of any tier awarded a subcontract over $100,000 to similarly complete and submit the certification and disclosure forms pursuant to the process set forth in 40 CFR 34.110.

ITEM 6 AGE DISCRIMINATION ACT, SECTION 504 OF THE REHABILITATION ACT, TITLE VI OF THE CIVIL RIGHTS ACT OF 1964, AND SECTION 13 OF THE CLEAN WATER ACT

CIVIL RIGHTS OBLIGATIONS. Contractor shall comply with the following federal non-discrimination requirements:

- Title VI of the Civil Rights Act of 1964, which prohibits discrimination based on race, color, and national origin, including limited English proficiency (LEP). (42 U.S.C 2000D, *et. seq)*
- Section 504 of the Rehabilitation Act of 1973, which prohibits discrimination against persons with disabilities. (29 U.S.C. 794, supplemented by EO 11914, 41 FR
- 17871, April 29, 1976 and EO 11250, 30 FR 13003, October 13, 1965)
- The Age Discrimination Act of 1975, which prohibits age discrimination. (42 U.S.C 6101 *et. seq)*
- Section 13 of the Federal Water Pollution Control Act Amendments of 1972, which prohibits discrimination on the basis of sex.
- 40 CFR Part 7, as it relates to the foregoing.

ITEM 7 EQUAL EMPLOYMENT OPPORTUNITY

Equal Employment Opportunity (EEO). The Contractor shall comply with Executive Order 11246, entitled 'Equal Employment Opportunity,' as amended by Executive Order 11375, and as supplemented in Department of Labor regulations (41 CFR Part 60). (EO 11246, 30 FR 12319, September 28, 1965)

Contractor's compliance with Executive order 11246 shall be based on implementation of the Equal Opportunity Clause, and specific affirmative active obligations required by the Standard Federal Equal Employment Opportunity Construction Contract Specifications, as set forth in 41 CFR Part 60-4.

During the performance of this contract, the contractor agrees as follows:

1. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.
2. The contractor will, in all solicitations or advancements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.
3. The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed,

or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

4. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under Section 202 of Executive Order No. 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

5. The contractor will comply with all provisions of Executive Order No. 11246 of Sept. 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

6. The contractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

7. In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of such rules, regulations, or orders, this contract may be cancelled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of Sept. 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

8. The contractor will include the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as may be directed by the Secretary of Labor as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that in the event the contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, the contractor may request the United States to enter into such litigation to protect the interests of the United States. [Sec. 202 amended by EO 11375 of Oct. 13, 1967, 32 FR 14303, 3 CFR, 1966–1970 Comp., p. 684, EO 12086 of Oct. 5, 1978, 43 FR 46501, 3 CFR, 1978 Comp., p. 230, EO 13665 of April 8, 2014, 79 FR 20749, EO 13672 of July 21, 2014, 79 FR 42971]

2) As used in these specifications:

   f) "Covered area" means the geographical area described in the solicitation from which this contract resulted;

g) "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;

h) "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.

i) "Minority" includes:

i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);

iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East,

Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2) Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3) If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4) The Contractor shall implement the specific affirmative action standards provided in paragraphs 7 a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance

Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5) Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6) In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7) The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

   a) Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

   b) Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

   c) Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.

   d) Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

   e) Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs,

especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.

f) Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g) Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h) Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

i) Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j) Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.

k) Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR part 60-3.

l) Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m) Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n) Ensure that all facilities and company activities are non-segregated except that separate or single- user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o) Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p) Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8) Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9) A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).

10) The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, sexual orientation, gender identity, or national origin.

11) The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12) The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13) The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the

implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14) The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15) Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

Segregated Facilities. (41 CFR 60-1.8) The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensuring that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. This obligation extends to all contracts containing the equal opportunity clause regardless of the amount of the contract. The term “facilities,” as used in this section, means waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, wash rooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees; Provided, That separate or single-user restrooms and necessary dressing or sleeping areas shall be provided to assure privacy between the sexes.

END OF SECTION

SECTION 01 11 00 – SUMMARY OF WORK

PART 1 GENERAL

1.1 SUMMARY

A. This Summary of Work supplements and amplifies certain sections of the General Conditions. The General Conditions shall apply except as modified herein. The Summary of Work and additional technical specifications may contain occasional requirements not pertinent to the Project. However, these specifications shall apply in all particulars insofar as they are applicable to this Project.

B. This Project is anticipated to be partially funded by the United States Environmental Protection Agency (EPA)'s Water Infrastructure Finance and Innovation Act (WIFIA). As such, all work on this Project is subject to the Federal American Iron and Steel (AIS) requirements, as well as all other WIFIA requirements. Materials specified to be incorporated into this Project shall meet the AIS requirement of P.L. 113-76, Consolidated Appropriations Act, 2014. The Contractor shall adhere to all requirements stated within the Specifications and other WIFIA requirements. See Section 00 73 45 WIFIA Requirements.

1.2 APPLICABLE STANDARDS SPECIFICATIONS AND DETAILS

A. The following references apply, depending on the jurisdiction of the project component, except as may be modified herein. In the case of discrepancy, unless noted otherwise herein, the more restrictive provisions shall apply.

1. City of Oregon City Standard, latest revision.

2. Oregon State Standard Drawings, latest revisions.

1.3 SCOPE OF WORK

A. The work to be performed under these specifications and drawings consists of furnishing of all services, materials, equipment, and labor necessary for the construction of the Water Quality Systems Building. Project location is 15962 Hunter Avenue, Oregon City, Oregon.

B. The Project includes, but is not limited to, the following:

1. Construction of Water Quality Systems Building Chemical Process piping, tanks, pumps and valving.

2. Construction of Water Quality Systems Building of concrete masonry unit (CMU) and steel-framed roof construction, including metal roofing, HVAC, electrical, and plumbing;

3. Furnish and install site stormwater conveyance and treatment facilities;

4. Construction of a Common Utility Trench and connections between the existing facilities and the new Water Quality Systems Building;

5. Furnish and install site sanitary sewer conveyance facilities;

6. Site clearing, including tree removal, grading, and earthwork;

7. Excavation for and backfilling of above components as required for a complete installation;

8. Furnish and install restrained, ductile iron water piping, diameter sizes as shown on the Drawings, including valves and appurtenances;

9. Construction of Swan Avenue Half-street improvements including curb ramps, AC Paving, concrete sidewalks, driveway, and curb ramps, storm facilities, electrical, fencing and gates, driveway construction, traffic control, and retaining wall construction.

10. Connection of the new water mains to existing main lines, including transmission mains, distribution mains, and reservoir site piping connections;

11. Site access roadway including curbing, grading, AC Paving, parking areas, signage and striping.

12. Landscaping and site screening;

13. Street lighting improvements;

14. Electrical improvements at the site;

15. Abandonment of existing utilities and miscellaneous structures; and

16. Restoration of work site areas to original or better condition, including grading, temporary and permanent paving, erosion control, and other measures as required.

C. The above general outline of principal features of the work does not in any way limit the responsibility of the Contractor(s) to perform all work and furnish all equipment, labor and materials required by the specifications and drawings. The drawings and specifications shall be considered and used together. Anything appearing as a requirement of either shall be accepted as applicable to both even though not so stated therein or shown.

D. No attempt has been made in these specifications or drawings to segregate work covered by any trade or subcontract under one specification. Such segregation and establishment of subcontract limits will be solely a matter of specific agreement between the Contractor and its subcontractors and shall not be based upon any inclusion, segregation, or arrangement in or of these specifications.

1.4 SITE ACCESS

A. General

1. Contractor shall have limited use of Project site for construction operations as indicated on Drawings and as indicated by requirements of this Section.

B. Use of Site: Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Driveways, Walkways and Entrances: Keep driveways, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

a. Schedule deliveries to minimize use of driveways and entrances by construction operations.

b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Condition of Existing Buildings: Maintain portions of existing buildings affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.5 WORK BY OWNER OR OTHERS

A. Owner will self-perform or **will award a contract** for integration of controls for the project.

B. If Owner integration work interferes with Contractors work due to work being performed at the same time, Owner will determine the sequence of work under all contracts according to "Work Sequence" and "Contractor's Use of Site ‘Articles in this Section.

C. Coordinate Work with utilities of Owner and public or private agencies.

D. Unless otherwise indicated in the Contract Documents, all castings, pipe, equipment, demolition debris, spoil or any other discarded material or equipment shall become the property of the Contractor and shall be disposed of in a manner compliant with applicable Federal, State, and local laws and regulations governing disposal of such waste products. No burning of debris or any other discarded material will be permitted.

1.6 OWNER-FURNISHED PRODUCTS

A. Not Used.

1.7 CONTRACTOR’S USE OF SITE

A. The Work included in the Contract Documents is to be performed on a water treatment plant that must continue in operation during construction. The Contractor shall always cooperate fully with the Owner and the Engineer to ensure that the production capability of the plant will continue and that any interruption to plant operations are minimized.

1. The specific major requirements for maintaining plant operations are listed below. These requirements are not necessarily complete in every detail:

2. Five day’s-notice shall be given to the Owner by the Contractor when any interruption of or modification to the operation of the existing plant and/or piping is desired.

B. Follow the sequence of construction requirements as described in this section Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or

obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.

C. Provide not less than 7-day notice to Owner of activities that will affect Owner's operations.

D. Utility Outages and Shutdown:

1. Coordinate and schedule electrical and other utility outages with Owner.

E. Construction Plan: Before start of construction, submit electronic file to owner regarding access to Work, use of Site, and utility outages for acceptance by Owner. After acceptance of plan, construction operations shall comply with accepted plan unless deviations are accepted by Owner in writing.

F. All work shall be conducted during hours allowed by the City of Oregon City for commercial construction.

1.8 PERMITS

A. Unless provided for otherwise in these Contract Documents, all permits, licenses, and fees shall be obtained by the Contractor and all costs shall be borne by the Contractor. Contractor shall pay all plan check fees and other fees necessary to obtain permits and shall accommodate special inspections required thereof. Contractor shall be responsible for compliance with all permit provisions and shall accommodate all special inspections required thereof, all at no additional expense to the Owner beyond prices as bid.

B. Furnish necessary permits for construction of Work including the following:

1. Trade Permits
2. Building permit.
3. Stormwater permit.

1.9 PREVAILING WAGE RATES FOR PUBLIC WORKS CONTRACTS IN OREGON

The Contractor shall abide by ORS 279C.800 through 279C.870 which relate to the prevailing wage rates for the building and construction trades in the State of Oregon. These prevailing wage rates are shown in the Bureau of Labor and Industries document which is included elsewhere in these contract documents.

1.10 OREGON PRODUCTS

Contractor's attention is directed to the provisions of Oregon Law, ORS 279A.120 regarding the preference for products that have been manufactured or produced in Oregon. Contractor shall use Oregon-produced or manufactured materials with respect to common building materials such as cement, sand, crushed rock, gravel, plaster, etc., and Oregon-manufactured products in all cases where price, fitness, availability, and quality are otherwise equal.

1.11 CONTAMINATED MATERIAL

A. General

It is possible that the Contractor may encounter contaminated material (soil and/or water) during excavation activities. This specification identifies requirements for handling and disposing contaminated media.

B. Definitions

1. "Contaminated material" is defined as soil, water, free product, Underground Storage Tanks (UST), buried abandoned utility lines containing residual or free product, solid waste, treated wood waste, chemical containers, or other solid, liquid, or gas substances with contamination levels above background levels.

2. "Hazardous substances" shall mean those substances or materials defined in the ORS 465.200, as amended.

3. "Release" shall have the meaning as defined in ORS 465.200, as amended.

4. "Environmental laws" shall mean any applicable statute, law, ordinance, order, consent decree, judgment, permit, license, code, covenant, deed, common law, treaty, convention, or other requirement pertaining to protection of the environment, health or safety, natural resources, conservation, wildlife, waste management or disposal, hazardous substances, or pollution, including but not limited to regulation of releases to air, land, water, and groundwater.

C. Execution

1. Discovery of Contaminated Material

In the event that the Contractor, during the course of construction or during any other activities authorized under this contract, should encounter suspected contaminated material or any other materials suspected of posing a threat to human health and the environment, the Contractor shall notify the Engineer immediately and manage according to requirements identified below.

2. Discovery of Contaminated Soil

Contractor shall note evidence of contamination (odor, visual staining of soil, free liquid product seeping from soil, sheen on groundwater, etc.) and note location of evidence on a sketch of the excavation and provide to the Engineer.

Contractor shall report the discovery to the Engineer immediately. Contractor shall stop all excavation activities and secure the site to prevent entry by the public. The excavation shall not be backfilled. Protect all open excavations with berms, plates, and fencing. Contractor may continue with work in other non-contaminated areas.

Contractor shall assist Engineer in collecting sample(s) of suspected contaminated media for testing and characterization. Contractor shall allow 21 days, at no cost to Owner, for testing, results, and instructions as to how to proceed with contaminated materials.

The Contractor shall obtain a copy of an approved soil disposal/acceptance permit (Disposal/Treatment Facility requires transporter to have a copy of the permit.)

Contractor will transport and dispose of contaminated material at an approved disposal/treatment facility.

Contractor shall provide the Engineer with a copy of the contaminated soil disposal receipt.

3. Handling of Contaminated Soil

After approval from the Engineer, excavate the soil in a manner that prevents commingling of contaminated and non-contaminated soil. Engineer will make determination (based on soil saturation) if contaminated soil can be directly transported to a treatment or disposal facility, or if soil needs to be stockpiled to reduce water content. Engineer will determine when stockpiled soil can be transported off-site.

Contractor will be responsible for stockpiling contaminated soil in containers or on impervious surface to prevent the spread of contamination. Any water runoff from the contaminated soil stockpile area(s) must be contained by Contractor and handled as contaminated water.

Minimize movement of excavation equipment over or through contaminated soil to prevent movement of contaminated soil into areas where no contaminated soil exists.

Stockpiles will be created on an approved site and shall be surrounded by a fence to limit access. The stockpiles must be covered and bermed during periods of rainfall to prevent run-on and run-off. The stockpiles shall be covered with a minimum 10-mil high density polyethylene (HDPE) plastic during periods of strong winds, nightfall, over the weekends, or during extended work stoppages. If dust is observed coming from the stockpiles, the stockpiles shall be either covered or the dust controlled with water.

Maintain excavation equipment in good working order. Prevent spillage of oil, fuel, or hazardous substances from equipment. In particular, promptly repair oil leaks from equipment and clean up any contaminated soil.

4. Transport of Contaminated Materials

Contractor shall comply with all applicable Federal, State, or local laws, codes, and ordinances that govern or regulate contaminated substance transportation. Contaminated soils placed in stockpiles shall be loaded into trucks in a manner that prevents the spilling or tracking of contaminated soil into areas of the site with uncontaminated soil. Loose material falling onto the exterior of the truck during loading shall be removed before the truck leaves the loading area. Any material collected in the loading area shall either be placed back into the truck or back into the stockpile. If loading areas are unpaved, the surface soil shall be sampled at the conclusion of the loading activities to confirm that contaminated soil is not present. If loading areas are paved, any loose soil shall be cleaned from the pavement at the conclusion of the loading activities.

Specific truck haul routes shall be established before beginning off-site contaminated media transport. On-site truck routes shall be established to minimize or prevent movement of trucks over contaminated soils. Off-site truck routes shall be established to

reduce the risk of releases of contaminated soils and impact on local traffic. The Contractor shall be responsible for ensuring that loaded truck weights are within acceptable limits. All trucks shall be covered before they leave the loading area.

The Contractor shall ensure that all drivers of vehicles transporting contaminated substances have in their possession during transport all applicable Oregon State and local vehicle insurance requirements, valid driver's license, and vehicle registration and license. The Contractor shall be responsible for informing all drivers of transport vehicle about:

a. The nature of the material transported.

b. Required routes to and from the off-site thermal treatment or disposal facility.

c. Applicable County street regulations and requirements, and State of Oregon Department of Transportation codes, regulations, and requirements.

d. The County's requirement for proper handling and transportation of the substances.

The Contractor shall not allow contaminated substances to be spilled or tracked off-site at any time during the Project. Trucks used for the transportation of contaminated substances off-site shall be watertight, substance compatible, licensed, insured, and permitted pursuant to federal, state, and local statutes, rules, regulations, and ordinances.

If contaminated media is discarded prior to removal of contaminated material, the price per cubic yard of soil materials and price per 100 gallons of contaminated water will be negotiated with Owner.

1.12 NPDES 1200-C STORMWATER DISCHARGE PERMIT ACQUISITION BY CONTRACTOR

The Contractor shall prepare and submit an application to the Oregon Department of Environmental Quality and obtain a 1200-C stormwater discharge permit for the Project. This permit must be obtained before construction can commence.

1.13 WORK WITH EXISTING ASBESTOS WATER PIPELINES

The Contractor shall comply with all requirements of the State of Oregon, Department of Environmental Quality (DEQ) with respect to the safe handling, removal, and disposal of asbestos cement pipe, including all reporting requirements. A DEQ fact sheet, DEQ guidelines, and DEQ notification and report forms are included as supplementary information in Volume 3 – Supplementary Information of these specifications.

1.14 INADVERTENT DISCOVERY PLAN FOR CULTURAL RESOURCES

The Contractor shall follow this Inadvertent Discovery Plan (IDP) if cultural material including human remains are encountered during construction. In addition to the requirements below, the Contractor shall comply in all respects to the requirements of **Standard Specifications for Construction, Oregon Department of Transportation (ODOT)].**

The IDP for the Project is as follows:

A. Protocol for Coordination in the Event of Inadvertent Discovery

1. In the event of an inadvertent discovery of possible archaeological materials, all work will stop immediately in the vicinity of the find.

2. The area will be secured and protected.

3. The Owner will be notified. The Owner will notify the appropriate authorities which shall be Rural Development (RD), USDA State Environmental Coordinator (SEC) and the State Historic Preservation Office (SHPO). If possible human remains are encountered, the RD SEC and the Clackamas County Coroner will be notified immediately. The RD SEC will then notify the SHPO and the appropriate Tribes.

   a. [Rural Development, USDA: Charlotte Rollier, State Environmental Coordinator (RD SEC) – 503-414-3356]

   b. [State Historic Preservation Office: Dennis Griffin, Archeologist – 503-986-0674]

   c. Clackamas County Coroner

4. No work may resume until the Owner is on site and able to assess the situation.

5. If human remains are encountered, do not disturb them in any way. Do not call 911. Do not speak with the media. Secure the location. Do not take photos.

6. The City's Archeologist will consult with the RD SEC and SHPO, who will then contact the appropriate Tribal Governments and determine an appropriate course of action.

7. Additional archeological excavations may be required. This work will be handled on a case-by-case basis by the City's Archaeologist in consultation with the RD SEC and SHPO and appropriate Tribes.

B. When to Stop Work

Construction work may uncover previously unidentified Native American or Euro-American artifacts. This may occur for a variety of reasons but may be associated with access restrictions during project development, or if the area contains impervious surfaces throughout most of the Project area which would have prevented standard archaeological site discovery methods.

1. Work must stop when the following types of artifacts and/or features are encountered:

   a. Native American artifacts may include (but are not limited to):

      1) Flaked stone tools (arrowheads, knives, scrapers, etc.)

      2) Waste flakes that resulted from the construction of flaked stone tools.

      3) Ground stone tools like mortars and pestles.

4) Layers (strata) of discolored earth resulting from fire hearths. May be black, red, or mottled brown and often contain discolored cracked rocks or dark soil with broken shell

5) Human remains

6) Structural remains- wooden beams, post holes, fish weirs

b. Euro-American artifacts my include (but are not limited to):

1) Glass (from bottles, vessels, windows, etc.)

2) Ceramic (from dinnerware, vessels, etc.)

3) Metal (nails, drink/food cans, tobacco tins, industrial parts, etc.)

4) Building materials (bricks, shingles, etc.)

5) Building remains (foundations, architectural components, etc.)

6) Old wooden posts, pilings, or planks (these may be encountered above or below water)

7) Even what looks to be old garbage could very well be an important archaeological resource

8) Remains of ships or sea-going vessels, marine hardware, etc.

9) Old farm equipment may indicate historic resources in the area

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 20 20 - MEASUREMENT AND PAYMENT

PART 1 GENERAL

Measurement and payment will be on a unit price basis in accordance with the prices set forth in the proposal for individual work items. Where work is required but does not appear as a separate item in the proposal, the cost for that work shall be included and absorbed in the unit prices named in the proposal. Contractor shall make a careful assessment when preparing the bid. Payment for Lump Sum (LS) items shall be based on percentage complete.

Common Items

1. Mobilization, Bonds, Insurance, and Demobilization: Payment for mobilization, bonds, insurance, and demobilization will be on a lump sum basis. The amounts paid for mobilization in the contract progress payment will be based on the percent of the original contract amount that is earned from other contract items, as follows:

    a. When 5 percent is earned, either 100 percent of the amount for mobilization or 5 percent of the original contract amount, whichever is the least.

    b. When all work is completed, amount of mobilization exceeding 5 percent of the original contract amount.

    This schedule of mobilization progress payments will not limit or preclude progress payments otherwise provided by the contract.

2. Traffic control: Payment for traffic maintenance and protection, flagging, temporary fencing, and safety barricades, including all coordination, materials, and equipment, as required, will be on a lump sum basis.

3. Erosion control: Payment for installation of approved erosion control devices (silt fencing, straw bales, and other items), as required, including all labor, materials, and equipment, as required, will be on a lump sum basis.

4. Construction survey and staking: Payment for construction survey and staking, including all coordination, materials, labor, and equipment, as required, will be on a lump sum basis.

5. Extra work as authorized: Payment for extra work as authorized by the Engineer in writing, including all coordination, materials, labor, and equipment, as required, will be on a lump sum basis.

Site Work

6. Demolition of Existing Facilities: Measurement and payment for demolition and removal of existing structures will be made on a single lump sum basis.

7. Shop drawings and approvals: Measurement and payment for shop drawings and approvals will be on a lump sum basis.

8. Tree protection and removal, clearing, and grubbing: Measurement and payment for tree protection and removal, clearing, and grubbing shall be paid on a lump sum basis and includes all materials, labor, and equipment to install protective devices around trees to remain, remove trees

and stumps (or grind stumps as approved) for trees noted to be removed where indicated in the Drawings, including loading and removal of trees and waste materials from site. If stumps are ground, stumps shall be ground to 8 inches below ground surface. Item also includes clearing and grubbing within the project disturbance limits as indicated on the Drawings.

9. Dewatering: Payment for dewatering, including all coordination, materials, labor, and equipment, as required, will be on a lump sum basis.

10. Clearing and Grubbing: Payment for clearing and rubbing shall be paid on a lump sum basis and includes all required general site preparation for construction, materials, labor, and equipment within the project disturbance limits as indicated on the Drawings.

11. Backfill with imported material: Measurement and payment for backfill with imported material shall be paid on a per cubic yard basis and shall include all imported crushed granular material rock, complete, as shown on the Drawings and specified in Section 32 11 23, Aggregate Base Courses.

12. Excavation: Payment for excavation shall include all required excavation, grading, and hauling of site soils as required for construction of site facilities and establishment of finished grades, complete, shall be paid on a lump sum basis.

13. Sawcutting: Measurement and payment for sawcutting shall include the initial trench width cuts and subsequent tee-cuts as shown on the standard trench detail as well as all other cuts required for onsite or improvements within the right of way. Payment for sawcutting existing surfacing, which includes AC and concrete surfaces, for cuts up to 3 inches in depth and for each 1-inch depth beyond 3-inch thickness will be on a per linear foot basis.

14. Subgrade Stabilization: Payment for subgrade stabilization will only be considered as approved by the Engineer in writing. When such pre-approval is obtained, payment will be made on a per square yard basis.

15. Cold Plane Pavement Removal, 2 inches: Payment for the 2-inch-thick grinding of existing AC pavement will be on a per square yard basis. Payment shall include cold plane pavement removal and disposal, as specified in the Oregon Department of Transportation, Standard Specifications for Highway Construction. Payment shall include all work and materials, hauling, and disposal. Measurement shall be based on the quantity of AC removed and shall not include excavated area. Saw cuts for cold plan pavement removal shall be considered incidental.

16. Asphalt Concrete Paving (ACP) – Swan Avenue: Payment for the Asphalt Concrete Paving (ACP) on Swan Avenue shall be as follows:

    a. Level 2, ½-Inch ACP, 4-inch depth: Payment for HMAC trench resurfacing or inlay work shall be on a per ton basis. Payment for HMAC resurfacing shall include furnishing and installing the compacted aggregate base materials, tack coat, asphaltic concrete, compaction, process control, acceptance testing, and other incidental work required to provide permanent HMAC pavement as shown on the Drawings and specified in Section 32 12 16, Asphaltic Concrete Pavement.

    b. Grind and Inlay, 2-Inch ACP: Payment for 2-inch grind and AC pavement overlay in the right-of-way required for pipe installation will be made on a per square yard basis. The unit price bid per square yard shall constitute full compensation for all labor, materials, tools, and equipment necessary to grind and overlay pavement to the limits shown on the Drawings, complete, in

place, tested and ready for use. The unit price shall include, but not be limited to, grinding, removal and disposal of existing asphalt; furnishing, placing, and compacting HMAC, Class ½-inch, dense graded, performance grade 58-H-22 to a compacted depth of 2 inches; tack-oil; testing of asphalt concrete pavement; restoration of disturbed pavement markings and striping; and adjustment of utilities to grade.

c. Crushed Aggregate 3/4-Inch (leveling course) – Swan Avenue Roadway: Payment for furnishing and installing crushed aggregate 3/4-inch, as shown on the drawings and standard details, will be on a cubic yard basis.

d. Crushed Aggregate 1/2-Inch (base) – Swan Avenue Roadway: Payment for furnishing and installing crushed aggregate 1/2-inch, as shown on the drawings and standard details, will be on a cubic yard basis.

e. Geotextile Fabric, Woven: Payment for furnishing and installing geotextile fabric, as shown on the Drawings and standard details, shall be on a square yard basis.

17. Concrete Curb and Gutter – Swan Avenue: Payment for the concrete curb and gutter on Swan Avenue shall be as follows:

    a. Concrete Curb and Gutter – Swan Avenue: Payment for furnishing and installing new concrete curb and gutter, for the dimensions and thicknesses to match the existing curb in the field, will be on a per linear foot basis.

    b. Crushed Aggregate 3/4-Inch – Swan Avenue Curb and Gutter: Payment for furnishing and installing crushed aggregate 3/4-inch, as shown on the drawings and standard details, will be on a cubic yard basis.

18. Concrete Sidewalk – Swan Avenue: Payment for the concrete sidewalk on Swan Avenue shall be as follows:

    a. Concrete Sidewalk – Swan Avenue: Payment for furnishing and installing concrete sidewalk, for the dimensions and thicknesses to match the existing sidewalk in the field, will be on a per square foot basis.

    b. Crushed Aggregate 3/4-Inch – Concrete Sidewalk – Swan Avenue: Payment for furnishing and installing crushed aggregate 3/4-inch, as shown on the drawings and standard details, will be on a cubic yard basis.

    c. Extra Curb Ramps: Payment for furnishing and installing will be made on a per each basis. Payment shall include all labor, tools, materials, and equipment necessary to complete concrete curb ramps to meet ADA standards as shown on the Drawings and standard details, including detectable warning surfaces. Payment includes all labor and material for any rework required to meet ADA standards.

19. Concrete Driveway – Swan Avenue: Payment for the concrete driveway on Swan Avenue shall be as follows:

    a. Concrete Driveway – Swan Avenue: Payment for concrete driveway will be made on a square foot basis. Payment shall include all labor, tools, materials and equipment necessary to complete work, where shown on the Drawings, and in accordance with standard details.

Payment shall include furnishing and installing reinforcement and replacement concrete to the dimensions and thicknesses.

b. Crushed Aggregate 3/4-Inch – Concrete Driveway – Swan Avenue: Payment for furnishing and installing crushed aggregate 3/4-inch, as shown on the drawings and standard details, will be on a cubic yard basis.

20. Asphalt Concrete Paving (ACP) – On Site: Payment for the Asphalt Concrete Paving (ACP) on site shall be as follows:

    a. Level 2, ½-Inch ACP, 4-inch depth: Payment for HMAC trench resurfacing or inlay work shall be on a per ton basis. Payment for HMAC resurfacing shall include furnishing and installing the compacted aggregate base materials, tack coat, asphaltic concrete, compaction, process control, acceptance testing, and other incidental work required to provide permanent HMAC pavement as shown on the Drawings and specified in Section 32 12 16, Asphaltic Concrete Pavement.

    b. Crushed Aggregate 3/4-Inch – Access Road and Parking: Payment for furnishing and installing crushed aggregate 3/4-inch, as shown on the drawings and standard details, will be on a cubic yard basis.

    c. Geotextile Fabric, Woven: Payment for furnishing and installing geotextile fabric, as shown on the Drawings and standard details, shall be on a square yard basis.

21. Concrete Curb – On Site: Payment for the concrete curb on site shall be as follows:

    a. Concrete Curb – On Site: Payment for furnishing and installing concrete curb and gutter, for the dimensions and thicknesses to match the existing curb in the field, will be on a per linear foot basis.

    b. Crushed Aggregate 3/4-Inch – On Site: Payment for furnishing and installing crushed aggregate 3/4-inch, as sown on the drawings and standard details, will be on a cubic yard basis.

22. Concrete Sidewalk – On Site: Payment for the concrete sidewalk on site shall be as follows:

    a. Concrete Sidewalk – On Site: Payment for furnishing and installing concrete sidewalk, for the dimensions and thicknesses to match the existing sidewalk in the field, will be on a per square foot basis.

    b. Crushed Aggregate 3/4-Inch – Concrete Sidewalk – On Site: Payment for furnishing and installing crushed aggregate 3/4-inch, as shown on the drawings and standard details, will be on a cubic yard basis.

23. Chemical Containment Pad – On Site: Payment for the chemical containment pad on site shall be as follows:

    a. Concrete Driveway – On Site: Payment for concrete driveway will be made on a square foot basis. Payment shall include all labor, tools, materials and equipment necessary to complete work, where shown on the Drawings, and in accordance with standard details. Payment shall include furnishing and installing reinforcement and replacement concrete to the dimensions and thicknesses.

b. Crushed Aggregate 3/4-Inch – Concrete Sidewalk – On Site: Payment for furnishing and installing crushed aggregate 3/4-inch, as sown on the drawings and standard details, will be on a cubic yard basis.

24. Furnish and Install chain link gate and fence, complete: Payment for furnishing and installing the site chain link access gate, shall be on a lump sum basis for furnishing and placing the fencing, and for furnishing all equipment, labor, and incidentals necessary to complete the work as specified. Payment for furnishing and installing the perimeter fencing shall be on a linear foot basis for furnishing and placing the fencing, and for furnishing all equipment, labor, and incidentals necessary to complete work as specified:

    a. 7-foot Chain Link Fencing with Barbed Wire
    b. Motorized Chain Link Access Gate, 20'-wide, Swing

25. Furnish and install Class 52, ductile iron pipe with Class B (imported granular backfill) trench backfill: Payment for furnishing and installing Class 52 ductile iron (DI) pipe with Class B trench backfill, including all work and materials and excavation, all required joint restraint systems for pipe, fittings, valves, polyethylene encasement, and appurtenances, thrust blocks (including concrete, excavation, and thrust plates), dewatering, Class D bedding and pipe zone backfill, and Class B trench backfill will be on a per linear foot basis for the pipe diameters shown. Measurement will be based on total length of piping constructed with restrained joints as indicated on the Drawings without deduction for fittings and valves. Bedding and pipe zone material is understood to be imported granular material, compacted in place as shown on the Drawings. Trench backfill material is understood to be imported granular material, compacted in place as shown. Class B and Class D fill material shall be as specified within Section 31 23 17, Trenching.

    a. 10-inch diameter
    b. 12-inch diameter

26. Furnish and install 4-inch PVC Stormwater Pipe: Payment for furnishing and installing 4-inch PVC stormwater pipe with Class B trench backfill, including all work and materials and excavation, all required joint restraint systems for pipe, fittings, valves, and appurtenances, dewatering, and Class B trench backfill will be on a per linear foot basis for the 4-inch diameter pipe. Measurement will be based on total length of piping constructed with joints as indicated on the Drawings without deduction for fittings and valves. Bedding and pipe zone material is understood to be imported granular material, compacted in place as shown on the Drawings. Trench backfill material is understood to be imported granular material, compacted in place as shown. Class B and Class D fill material shall be as specified within Section 31 23 17, Trenching.

27. Furnish and install 8-inch PVC pipe with Class B (imported granular material) trench backfill: Payment for furnishing and installing 8-inch PVC pipe with Class B (imported granular material) will be on a per linear foot basis and shall include all work and materials; Contractor inspection and acceptance; storage and transport of pipe; excavation to depths shown in the Drawings; all required joint restraint systems for pipe, fittings, valves, and appurtenances where shown in the Drawings; dewatering; and Class B pipe bedding, pipe zone backfill, and trench backfill materials; and general surface restoration. Pipe bedding, pipe zone, and trench backfill is understood to be imported granular material, compacted in place as shown in the Drawings. Class B fill material shall be as specified within Section 31 23 17, Trenching.

28. Furnish and install 10-inch PVC pipe with Class B (imported granular material) trench backfill:

Payment for furnishing and installing 10-inch PVC pipe with Class B (imported granular material) will be on a per linear foot basis and shall include all work and materials; Contractor inspection and acceptance; storage and transport of pipe; excavation to depths shown in the Drawings; all required joint restraint systems for pipe, fittings, valves, and appurtenances where shown in the Drawings; dewatering; and Class B pipe bedding, pipe zone backfill, and trench backfill materials; and general surface restoration. Pipe bedding, pipe zone, and trench backfill is understood to be imported granular material, compacted in place as shown in the Drawings. Class B fill material shall be as specified within Section 31 23 17, Trenching.

29. Furnish and install 18-inch Concrete Storm Culvert, Class V, Complete: Payment for furnishing and installing 18-inch concrete storm culvert, class V will be on a lump sum basis and shall include all work and materials; contractor inspection and acceptance; storage and transport of pipe; saw cutting, excavation to depths shown in the drawings, demolition and removal of the existing 12-inch culvert; asphalt driveway paving and general surface restoration.

30. Site stormwater system testing and start-up: Payment will be made on a lump sum basis for all work required to properly test and start-up the storm drainage portion of this project.

31. Furnish and install NW Rain Garden, Complete: Payment for all work required to construct the NW rain garden, complete, other than as provided for under separate unit prices, will be made on a lump sum basis. General work includes, but is not limited to, 3/4inch – 1/4inch graded aggregate separation layer and washed drain rock; growing medium; rip rap outfalls; 24-inch beehive; 6-inch stormwater cleanout; 6-inch PVC pipe; furnishing all equipment , labor, and incidentals necessary to complete the work as specified, and any other work shown on the drawings.

32. Furnish and install NE Rain Garden, Complete: Payment for all work required to construct the NW rain garden, complete, other than as provided for under separate unit prices, will be made on a lump sum basis. General work includes, but is not limited to, 3/4inch – 1/4inch graded aggregate separation layer and washed drain rock; growing medium; rip rap outfalls; 24-inch beehive; 6-inch stormwater cleanout; 6-inch PVC pipe; furnishing all equipment , labor, and incidentals necessary to complete the work as specified, and any other work shown on the drawings.

33. Furnish and install Stormwater Planter, Complete: Payment for all work required to construct the stormwater planter, complete, other than as provided for under separate unit prices, will be made on a lump sum basis. General work includes, but is not limited to, 3/4inch – 1/4inch graded aggregate separation layer and washed drain rock; growing medium; check dam; scupper & sediment basin; 18-inch beehive; 1-way stormwater cleanout; 2-way stormwater cleanout; 6-inch PVC pipe; furnishing all equipment, labor, and incidentals necessary to complete the work as specified, and any other work shown on the drawings.

34. Furnish and install 2-foot Wide Roadway Drainage Ditch, Complete: Payment for furnishing and installing 2-foot wide roadway drainage ditch, complete, all excavation, backfill, geotextile fabric, crushed rock, grading, and other incidental work as shown on the Drawings and described in the contract documents, shall be made on a lump sum basis.

35. Furnish and install manholes: Payment for furnishing and installing manholes shall be made at the unit price for each manhole at the depth as shown on the Drawings. The unit price shall be full

compensation for the manhole installation to include excavation and backfill, cover and frame as specified, grade rings, piping connections, and any other work shown on the Drawings, complete.

a. 48-inch diameter Stormwater Manhole
b. 60-inch diameter Stormwater Manhole
c. 72-inch diameter Stormwater Manhole

36. Furnish and install stormwater inlets: Payment for furnishing and installing ditch inlets, curb inlets, and catch basins, complete, including concrete basin, frame and grate, excavation, backfill, adjustments for setting to final grade, and other incidental work as shown on the Drawings and described in the contract documents, shall be made on a per each basis.

37. Polydrain PDX H-20: Payment for furnishing and installing the polydrain PDX H-20 shall be made on a linear foot basis as shown on the Drawings. The price shall be full compensation for the installation to include fittings and apparatuses.

38. Existing Ditch Connection: Payment for furnishing and installing Class 50 rip rap outfalls will be on a lump sum basis. Payment will be payment in full for furnishing and placing all materials, and for furnishing all equipment, labor, and incidentals necessary to complete the work as specified. The unit price shall be full compensation for furnishing and installing the rip rap outfall including excavation and backfill, rip rap, geotextile fabric, pipe mitering, beveled end, and any other work shown on the Drawings, complete.

39. Furnish and install 24-inch Class 52 ductile iron pipe with Class B trench backfill: Payment for furnishing and installing Class 52 ductile iron (DI) pipe with Class B trench backfill shall include all work and materials and excavation, all required joint restraint systems for pipe, fittings, valves, polyethylene encasement, and appurtenances, thrust blocks (including concrete, excavation, and thrust plates), dewatering, Class D bedding and pipe zone backfill, and Class B trench backfill will be on a per linear foot basis for the pipe diameters shown. Connections to existing waterline and fittings shall be incidental. Measurement will be based on total length of piping constructed with restrained joints as indicated on the Drawings without deduction for fittings and valves. Bedding and pipe zone material is understood to be imported granular material, compacted in place as shown on the Drawings. Trench backfill material is understood to be imported granular material, compacted in place as shown. Class B and Class D fill material shall be as specified within Section 31 23 17, Trenching.

40. Common Utility Trench, complete: Measurement and payment for furnishing and installing common utility trench work will be on a lump sum basis and shall Include all work, materials, and excavation required for installation of chemical feed tubing, PVC conduit casings, PVC fittings, control conduits, casing spacers, utility water, excavation, and CDF trench backfill, complete.

41. Hydrostatic testing, flushing, and disinfection of water mains: Payment for hydrostatic testing, flushing, and disinfection of water mains will be on a lump sum basis and shall include furnishing, installing, removal of temporary blow-off piping, including miscellaneous piping, valves, fittings, and thrust restraint. The Owner shall provide off-site laboratory analysis. Payment for any retesting shall be paid by the Contractor.

42. Furnish and install Fire Hydrant Assembly: Payment for furnishing and installing fire hydrant assemblies will be on a per each basis. The unit price for hydrants shall include all costs for shackles, tie rods, pier blocks, gravel, painting, and all other items for the complete installation of the hydrant

including the pipe connecting the hydrant to the main. Hydrant isolation valves and tees will be paid for at the unit contract price each under the appropriate bid items.

43. All work required to construct landscape items, complete, including all incidental work as specified and necessary: Payment for final landscaping shall include all work required to prepare for, place, and guarantee all landscaping. This will be made on a lump sum basis. The price shall be full compensation for stripping and stockpiling topsoil (with imported topsoil as necessary), furnishing and placing all plantings, hydroseeding and groundcover establishment, and establishment of all landscaping through the maintenance guarantee period, and any other work shown on the Drawings, complete, unless specified under other bid items.

Process

44. Alum Bulk Tank, HDPE, (6,000 gal): Measurement and payment for all work required to install a 6,000-gallon alum bulk tank, HDPE, complete, other than as provided for under separate unit prices, will be made on a per each basis, as specified in Section 43 41 43, Polyethylene Tanks.

45. Coagulant Polymer Aid Bulk Tank, HDPE (6,000 gal): Measurement and payment for all work required to install a 6,000-gallon coagulant polymer aid bulk tank, complete, other than as provided for under separate unit prices, will be made on a per each basis, as specified in Section 43 41 43, Polyethylene Tanks.

46. Brine Tank, FRP (7,100 gal): Measurement and payment for installing brine tank, FRP (10,000-gallons) will be on a per each basis. The price presented in the bid proposal will include installation cost of the brine tank, complete including salt level sensor, including coordination with the supplier and start-up and testing by the contractor, as specified in Section 43 40 02, Fiberglass Reinforced Plastic Tank.

47. Sodium Hypochlorite Tank, FRP (10,000 gal): Measurement and payment for installing sodium hypochlorite tank, FRP (10,000-gallons) will be on a per each basis. The price presented in the bid proposal will include installation cost of the brine tank, complete, including coordination with the supplier and start-up and testing by the contractor, as specified in Section 46 33 13, Onsite Hypochlorite Generation System.

48. Sodium hypochlorite Generator, (2) 900 PPD units & Accessories: Measurement and payment for installing sodium hypochlorite generator units will be on a lump sum basis. The price presented in the bid proposal will include all labor, equipment, and material necessary to manufacture the onsite sodium hypo generation system, and include, but not be limited to, all the elements and components needed to assembled the systems meeting the specification and performance requirements as specified in Section 46 33 13, Onsite Hypochlorite Generation System. Price shall also include shipping, spare parts, cleaning equipment, testing, factory service support, training services, start-up, installation cost of the sodium hypochlorite generator units, complete, including coordination with the supplier and start-up and testing by the contractor, and warranty. The cost for the units will be determined once the owner has selected the sodium hypochlorite generator equipment manufacturer at bid.

49. Soda Ash Batching System: Measurement and payment for installing soda ash batching system will be on a per each basis. The price presented in the bid proposal will include the installation cost of the soda ash batching system, complete, including piping, valving, and all appurtenances as

required to provide a complete and functional soda ash batching system, as specified in Section 46 36 33, Soda Ash Bulk Bag Unloader System.

50. Metering Pump Assemblies: Measurement and payment for furnishing and installing metering pump assemblies will be on a per each basis. The price presented in the bid proposal will include installation cost of the metering pump assemblies, complete, including flow meter and metering pumps for all chemicals, and coordination with the supplier and start-up and testing by the contractor.

51. Air Compressor: Measurement and payment for furnishing and installing an air compressor will be on a per each basis. The price presented in the bid proposal will include installation cost of the air compressor, complete, including air piping, valving, and all appurtenances as required to provide a complete and functional compressed air system for the chemical fill station.

52. Chemical Feed Piping: Payment for furnishing and installing chemical feed piping at the sizes listed in items (a) through (h) below and shown in the Drawings, including all work and materials, all required fittings, valves, and appurtenances, including connections in the existing facility, complete will be on a per linear foot basis.

    a. ½-Inch, PVC
    b. 1-Inch, PVC
    c. 2-Inch, PVC
    d. 3-Inch, PVC
    e. 4-Inch, PVC
    f. 8-Inch, PVC
    g. 3/8-Inch, Poly-Braided Tubing
    h. 1/4-Inch, Poly-Braided Tubing
    i. 1-Inch, Poly-Braided Tubing
    j. 1-½-Inch, Poly-Braided Tubing

53. Valves: Payment for furnishing and installing valves at the sizes shown on the Drawings and not included in other pay items, complete will be on a per each basis.

    a. ½-Inch
    b. ¾-Inch
    c. 1-1/2-Inch
    d. 2-Inch
    e. 3-Inch

54. Utility Water Twin Booster Pumps & Accessories: Measurement and payment for furnishing and installing utility water pumps will be on a per each basis. The price presented in the bid proposal will include installation cost of the utility water centrifugal pumps, complete, including concrete pump pads, suction and discharge piping, valving, misc ductile iron piping, piping connection to Pipeline B, utility water magnetic flow meter, and backflow preventers.
55. and all appurtenances required to provide a complete and functional utility water system.

56. Hydropneumatics Tanks: Measurement and payment for furnishing and installing hydropneumatics tanks will be on a per each basis. The price presented in the bid proposal will include installation cost of the hydropneumatics tanks, complete, including piping, valving, and all appurtenances as required to provide a complete and functional utility water system.

Water Quality Systems Building

57. All work and materials required to construct the architectural facilities for water quality systems building, complete, including all incidental work as specified and necessary: Payment shall be on a lump sum basis and include all work required to construct the architectural facilities of the water quality systems building, complete, other than as provided, including all incidental work as specified and necessary:

    a. CMU Wall Systems, Complete
    b. Doors and Fenestration, Complete
    c. Architectural Roof System, Complete
    d. Finishings, Coatings, and Paint, Complete
    e. Furniture and Devices, Complete

58. All work and materials required to construct the structural facilities for water quality systems building, complete, including all incidental work as specified and necessary: Payment shall be on a lump sum basis and include all work required to construct the structural facilities of the water quality systems building, complete, other than as provided, including all incidental work as specified and necessary:

    a. Concrete Foundations and Slab-On-Grade, Complete
    b. Structural Roof Support and Steel, Complete

59. All work and materials required to construct the HVAC facilities for water quality systems building, complete, including all incidental work as specified: Payment shall be on a lump sum basis and include all work required to construct the HVAC facilities of the water quality systems building, complete, other than as provided, including all incidental work as specified and necessary:

    a. VRF Packaged Heat Pump System, Complete
    b. Makeup Air Handing Unit, Complete
    c. Ducting and Conveyance Systems, Complete

60. All work and materials required to construct the plumbing facilities for water quality systems building, complete, including all incidental work as specified and necessary: Payment shall be on a lump sum basis and include all work required to construct the plumbing facilities of the water quality systems building, complete, other than as provided, including all incidental work as specified and necessary:

    a. Water Service Piping and Fixtures, Complete
    b. Sewer Collection System, Complete
    c. Emergency Shower and Eyewash Systems, Complete

61. All work required to construct the electrical facilities for the water quality systems building, complete, including all incidental work as specified and necessary: Payment shall be on a lump sum basis and include all work required to construct the electrical facilities of the water quality systems building, complete, other than as provided, including all incidental work as specified and necessary:

    a. Service & Distribution
    b. Controls / PLC / SCADA / Comms
    c. Lighting & Devices
    d. Equipment Connections

e. Raceway / Wire / Installation

END OF SECTION

SECTION 01 26 00 - CONTRACT MODIFICATIONS PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Documentation and requirements for executing a change in the Work.

1.2 PRELIMINARY REQUIREMENTS

A. Change Order Cost Basis Summary Form:

1. Submit a sample to Engineer for review within 15 calendar days following Notice to Proceed.

   a. Items will be reviewed and their value, percentage, or calculation method mutually agreed to by the Contractor and Owner prior to executing a Change Order on the Project.

2. Used by the Contractor for pricing each Change Order required for additions, deletions, or revisions in the Work.

3. Include the following information:

   a. Agreed upon markups, percentages, and procedures for calculating surcharges, etc. associated with the Cost of the Change Order Work.

   b. References for unit price information and special unit price information.

   c. Attachments with the following information:

      1) Certified labor rates breakdown.
      2) Equipment rates.
      3) Bond and insurance rates.

1.3 REQUEST FOR INFORMATION

A. The Contractor may submit a RFI for the one of following reasons:

1. The Contractor believes there is information missing from the Contract Documents.

2. The Contractor believes a clarification of one or more of the Contract requirements is necessary.

3. The Contractor needs to repair or otherwise correct a deficiency in the Work that requires a Change to the Contract to be acceptable. Submit requests in accordance with Claims found in this Specification.

4. The Contractor needs to substitute a material that provides an equal or better level of performance as the one specified in the Contract Documents. Indicate the location(s),

quantity, and describe how the material provides an equal or better level of performance as the material originally specified.

a. Refer to Section 01 60 00, Product Requirements for substitution requirements.

5. The Contractor may submit a RFI that requests a change to the Contract requirements for a reason other than one listed. To be considered, describe how the change is beneficial to the Project.

B. General Instructions:

1. Number RFIs consecutively.

a. Add a consecutive letter to the RFI number on modified submittals of the same RFI (i.e., RFI 4B).

2. Provide one RFI for each individual item.

a. There may be exceptions when multiple items are so functionally related that expediency indicates review of the group of items as a whole.

b. RFIs with multiple items will be rejected without review.

3. Contractor sign and date RFIs indicating review and approval.

a. Contractor’s signature indicates that they have satisfied RFI review responsibilities and constitutes Contractor's written approval of RFI.

b. RFIs without Contractor's signature will be returned to the Contractor unreviewed. Subsequent submittal of this information will be counted as the first resubmittal.

C. The Engineer will respond, in writing, to RFIs within 14 calendar days in the order they are received. This does not relieve the Contractor of its responsibility to request a time extension. Indicate prioritization of the RFI, if required.

1. Oral explanations, interpretations, or instructions given by anyone other than the Engineer will not be binding on the Owner.

2. A response to a RFI is considered a written determination.

1.4 PRELIMINARY PROCEDURES

A. Owner or Engineer may initiate changes by submitting a Request for Proposal (RFP) to Contractor including the following information:

1. Detailed description of the Change, Products, and location of the change in the Project.

2. Supplementary or revised drawings or specifications.

3. Projected time span for making the change, and a specific statement if overtime work is authorized.

4. A specific period of time during which the requested price will be considered valid.

5. Such request is for information only, and is not an instruction to execute the changes, or to stop work in progress.

B. Contractor may initiate changes by submitting a Change Proposal to Engineer containing the following:

1. Description of proposed changes.

2. Reason for making changes.

3. Specific period of time during which requested price will be considered valid.

4. Effect on Total Contract Cost and/or Contract Time.

5. Documentation supporting any change in Total Contract Cost and/or Contract Time, as appropriate.

1.5 WORK CHANGE DIRECTIVE AUTHORIZATION

A. In lieu of a Request for Proposal (RFP), Engineer may issue a Work Change Directive Authorization for Contractor to proceed with a change for subsequent inclusion in a Change Order.

B. Authorization will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change and will designate method of determining any change in the Contract Sum and/or the Contract Time, as appropriate.

C. Owner and Engineer will sign and date the Work Change Directive Authorization as authorization for the Contractor to proceed with the changes.

D. Contractor may sign and date the Work Change Directive Authorization to indicate agreement with the terms.

1.6 CHANGE PROPOSAL REQUEST

A. Change proposal request will include reference number for tracking purposes.

1. Support with sufficient substantiating data to allow Engineer to evaluate the quotation.

a. Lump sum.

b. Unit prices: Use previously established unit prices.

c. Time and material account basis:

1) Name of the Owner's authorized agent who ordered the work, and date of the order.

2) Dates and times work was performed, and by whom.

3) Time record, summary of hours worked, and hourly rates paid.

4) Receipts and invoices for:

a) Equipment used, listing dates and times of use.
b) Products used, listing of quantities.
c) Subcontracts.

2. Provide additional data to support time and cost computations:

a. Labor required.

b. Equipment required.

c. Products required:

1) Recommended source of purchase and unit cost.
2) Quantities required.

d. Taxes, insurance, and bonds.

e. Credit for work deleted from Contract, similarly documented.

f. Overhead and profit.

g. Justification for change to Contract Time.

B. Change proposal request is for information only; Contractor is neither authorized to execute proposed change nor to stop Work in progress as result of such request.

C. Transmit contractor's written proposal to Engineer promptly, but not later than 30 days after start of the event giving rise thereto, or after such initial decision.

D. Proposal remains firm for a maximum period of 30 days after receipt of the Contractor’s supporting data by Engineer.

E. Owner's request for proposal or Contractor's failure to submit such proposal within the required time period will not justify a claim.

1.7 FIELD ORDER PROCEDURES

A. Field Orders: Minor changes in the Work without changes in Contract Price or Contract Times.

B. The date of signature by Engineer is the effective date, unless otherwise indicated thereon.

C. Sign and return original copy to Engineer.

1.8 CHANGE ORDER PROCEDURES

A. Change Orders:

1. Will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change.

2. Will provide an accounting of the adjustment in the Contract Sum and in the Contract Time.

3. Recommendation of Change Proposal is indicated by Engineer's signature.

4. Upon signature and execution by Owner, the Change Proposal becomes a Change Order altering the Contract Time and Total Contract Cost, as indicated.

    a. Owner’s Representative will transmit one signed copy each to Contractor and Engineer.

5. Contractor may only request payment for changes in the Work against an approved Change Order.

6. If either Engineer or Owner’s Representative does not approve the Change Proposal, the reason for disapproval will be stated.

    a. A request for a revised proposal or cancellation of the proposal will be shown.

B. Lump-sum price change order

1. Content of Change Orders will be based on, either:

    a. Engineer’s Proposal Request and Contractor’s responsive Change Proposal as mutually agreed between Owner and Contractor.

    b. Contractor’s Change Proposal for a change, as recommended by Engineer.

2. Owner and Engineer will sign and date the Change Order to establish the change in Contract Sum and in Contract Time and serve as authorization for the Contractor to proceed with the changes.

3. Contractor will sign and date the Change Order to indicate agreement with the terms.

C. Unit price change order

1. Content of Change Orders will be based on, either:

    a. Engineer’s definition of the scope of the required changes.
    b. Contractor’s Change Proposal for a change, recommended by Engineer.
    c. Survey of completed work.

2. The amounts of the unit prices to be:

    a. Those stated in the Contract.
    b. Those mutually agreed upon between Owner and Contractor.

3. When quantities of each of the items affected by the Change Order can be determined prior to start of the work:

    a. Owner and Engineer will sign and date the Change Order as authorization for Contractor to proceed with the changes.

    b. Contractor will sign and date the Change Order to indicate agreement with the terms.

4. When quantities of the items cannot be determined prior to start of the work:

    a. Engineer or Owner will issue a Work Change Directive authorization directing Contractor to proceed with the change on the basis of unit prices and will cite the applicable unit prices.

    b. At completion of the change, Engineer will determine the cost of such work based on the unit prices and quantities used.

    c. Submit documentation to establish the number of units of each item and any claims for a change in Contract Time.

5. Owner and Engineer will sign and date the Change Order to establish the change in Contract Sum and in Contract Time and serve as authorization for the Contractor to proceed with the changes.

6. Contractor will sign and date the Change Order to indicate their agreement with the terms.

1.9 CORRELATION WITH CONTRACTOR'S SUBMITTALS

A. Periodically revise Schedule of Values and Applications for Payment forms to record each Change Order as a separate item of Work, and to record the adjusted Contract Sum.

B. Periodically revise the Construction Schedule to reflect each change in Contract Time.

C. Upon completion of work under a Change Order, enter pertinent changes in Record Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 26 13 - REQUEST FOR INFORMATION (RFI)

RFI No.: _____ RFI Date: _____

Owner Job No.: _____ Consor Job No.: W253326OR.00

Project Name: Water Quality Systems Building

Owner: South Fork Water Board

Contractor: _____

Subject: _____

Specification/Drawing Nos.: _____

Information Request:

Potential Cost Impact? YES ❑ NO ❑ UNKNOWN ❑

Potential Schedule Impact? YES ❑ NO ❑ UNKNOWN ❑

Date Reply Requested By: _____

Requested By: _____ Date: _____

Response:

Response Action:

❑ Above is consistent with the intent and reasonably inferable from Contract Documents.

❑ The above is considered a change. The following documents will be used for processing:

Response By: _____ Date: _____

cc: _____

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SECTION 01 26 39 - FIELD ORDER NO.: [NUMBER]

Owner:	*South Fork Water Board*	**Owner's Project No.:**	*[Number]*
Engineer:	Consor	**Engineer's Project No.:**	*W253326OR.00*
Contractor:	*[Name]*	**Contractor's Project No.:**	*[Number]*
Project:	*Water Quality Systems Building*		
Date Issued:	*[MONTH, DATE, YEAR]*	**Effective Date:**	*[MONTH, DATE, YEAR]*

Contractor is hereby directed to promptly perform the Work described in this Field Order, issued in accordance with Paragraph 11.04 of the General Conditions, for minor changes in the Work without changes in Contract Price or Contract Times. If Contractor considers that a change in Contract Price or Contract Times is required, submit a Change Proposal before proceeding with this Work.

Reference:

Specification(s):

Drawing(s):

Description:

[Description of the change to the Work]

Attachments:

[List documents supporting change]

Issued by Engineer

By: _____

Title: _____

Date: _____

Copy to Owner

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SECTION 01 26 49 - WORK CHANGE DIRECTIVE NO.:___

Owner:	*South Fork Water Board*	**Owner's Project No.:**	*[Number]*
Engineer:	Consor	**Engineer's Project No.:**	*W253326OR.00*
Contractor:	*[Name]*	**Contractor's Project No.:**	*[Number]*
Project:	*Water Quality Systems Building*		
Date Issued:	*[MONTH, DATE, YEAR]*	**Effective Date:**	*[MONTH, DATE, YEAR]*

Contractor is directed to proceed promptly with the following change(s):

Description:

[Description of the change to the Work]

Attachments:

[List documents related to the change to the Work]

Purpose for the Work Change Directive:

[Describe the purpose for the change to the Work]

Directive to proceed promptly with the Work described herein, prior to agreeing to change in Contract Price and Contract Time, is issued due to:

☐ Non-agreement on pricing of proposed change. ☐ Necessity to proceed for schedule or other reasons.

Estimated Change in Contract Price and Contract Times (non-binding, preliminary):

Contract Price: $ _____ **[increase] [decrease] [not yet estimated].**

Contract Time: _____ days [**increase**] [**decrease**] [**not yet estimated**].

Basis of estimated change in Contract Price:

☐ Lump Sum ☐ Unit Price ☐ Cost of the Work ☐ Other

	Engineer	Authorized by Owner	Authorized by _____
By:	_____	_____	_____
Title:	_____	_____	_____
Date:	_____	_____	_____

END OF SECTION

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SECTION 01 26 53 - PROPOSAL REQUEST NO. ____

Project Name:	Water Quality Systems Building	Project No.:
Owner:	South Fork Water Board	Regulatory Agency Project No. (if applicable):
Engineer:	Consor	Initiated by: ☐ Engineer ☐ Contractor
Contractor:		Date:

Attention: The following change in the contract on this project is proposed. Please provide the proposed price for the cost of this change.

1. A full breakdown of labor, equipment, and material costs shall be provided.
2. Work shall not commence until authorized by the Owner.

Description of the Proposed Change:

By

All work shall be in accordance with the terms, stipulations, and conditions of the original Contract Documents. If the work herein provided for is Approved by Change Order, the time of completion will be:

☐ Increased ☐ Decreased ☐ Unchanged

by _____ calendar days.

This change will: ☐ Add ☐ Deduct ☐ No Change

$

Engineer Recommendation:

☐ Recommend Acceptance

☐ Do Not Recommend Acceptance

Engineer

Date

Owner's Action:

☐ Accepted ☐ Not Accepted

Contractor

Date

Owner

Date

END OF SECTION

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SECTION 01 26 57 – CHANGE ORDER REQUEST NO.: ___

Owner:	*South Fork Water Board*	**Owner's Project No.:**	
Engineer:	Consor	**Engineer's Project No.:**	W253326OR.00
Contractor:		**Contractor's Project No.:**	
Project:	Water Quality Systems Building		
Date Issued:		**Effective Date:**	

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

Description:

Description of the change

Attachments:

List documents related to the change

Change in Contract Price	Change in Contract Times (days)
Original Contract Price: $ _____	Original Contract Times: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] from previously approved Change Orders No. 1 to No. __: $ _____	*[Increase] [Decrease]* from previously approved Change Orders No.1 to No. __: Substantial Completion: _____ Ready for final payment: _____
Contract Price prior to this Change Order: $ _____	Contract Times prior to this Change Order: Substantial Completion: _____ Ready for final payment: _____
[Increase] [Decrease] this Change Order: $ _____	*[Increase] [Decrease]* this Change Order: Substantial Completion: _____ Ready for final payment: _____
Contract Price incorporating this Change Order: $ _____	Contract Times with all approved Change Orders: Substantial Completion: _____ Ready for final payment: _____

	Recommended by Engineer *(if required)*	Authorized by Owner
By:		
Title:		
Date:		

	Authorized by Contractor	Approved by _____ *(if applicable)*
By:		
Title:		
Date:		

END OF SECTION

SECTION 01 26 70 - TIME & MATERIALS WORK LOG

Project:	Water Quality Systems Building		**Date of Work:** _____
Owner:	South Fork Water Board	**Engineer:**	*Consor*
Contractor:		**Project No.:**	

Work Item Description: _____

LABOR

Name & Description of work:	Hours:
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

MATERIALS

Description:	Quantity:
_____	_____
_____	_____
_____	_____
_____	_____

EQUIPMENT

Type & Use:	Hours:
_____	_____
_____	_____
_____	_____
_____	_____

ENGINEER	CONTRACTOR
By: _____	**By:** _____
Title: _____	**Title:** _____
Date:	**Date:**

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SECTION 01 31 19 – PROJECT MEETINGS

PART 1 GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements for project meetings.

1. Pre-construction meeting.
2. Progress meetings.
3. Pre-installation meetings prior to starting certain work.
4. Commissioning meetings.
5. Project closeout meetings.
6. Owner training meetings.

B. Related Sections

1. Section 01 32 16 - Construction Progress Schedule
2. Section 01 70 00 – Execution and Closeout Requirements
3. Section 01 75 00 – Testing, Training, and Commissioning

1.2 BASIC MEETING REQUIREMENTS

A. Attendees

1. Attendance is required of parties directly affecting, or affected by, Work being discussed at the meeting.

B. Location

1. ADA accessible Contractor's project field office or Owner provided meeting room, unless otherwise agreed.

C. Notification

1. Meeting leader notifies attendees of meeting, including an agenda, a minimum of 7 days prior to meeting.

D. Agenda

1. Meeting leader prepares copies of the agenda for participants and distributes at the meeting.

2. Minimum requirements

a. Meeting purpose.
b. Review minutes of previous meeting.
c. Safety and security.
d. Discuss issues.
e. Action items.
f. Next meeting.

E. Meeting Minutes

1. Meeting leader prepares draft minutes and send to attendees for comment within 7 days.

2. Meeting leader incorporates comments from attendees and submits final meeting minutes to attendees within 7 days of receipt of comments.

1.3 PRECONSTRUCTION MEETING

A. Owner or Engineer will lead the meeting.

B. Timing

1. The Owner will schedule a preconstruction meeting before starting construction, at a time convenient to the Contractor and the Owner, but no later than fifteen (15) days after the Notice to Proceed and before construction activities begin. The meeting will be held at the Project Site or another convenient location as selected by Owner.

C. Required attendees

1. Owner and Engineer.

2. Owner Representative(s).

3. Contractor's Superintendent and Project Manager.

4. Contractor's Quality Control Representative, if different individual than the Project Manager.

5. All subcontractors or as agreed upon by Owner.

6. Others, as required.

D. Agenda minimum requirements

1. Meeting purpose

a. To establish working understanding between parties and to discuss Construction Schedule. Drawings and other Submittals, cost breakdown of major lump sum items, processing of Submittals and applications for payment, and other subjects pertinent to execution of the Work.

2. Adequacy of distribution of Contract Documents.

3. Distribution and discussion of list of major subcontractors and suppliers.

4. Proposed progress schedules and critical construction sequencing.

a. Sequence, phasing, and occupancy.
b. Equipment deliveries and priorities.

5. Major equipment deliveries and priorities.

6. Project coordination.

    a. Special project procedures.
    b. Project Management Software access, use, and permissions.

7. Designation of responsible personnel.

    a. Communication chain and persons authorized to direct changes.
    b. Site Representative roles

8. Procedures and processing of:

    a. Field decisions.
    b. Proposal requests.
    c. Submittals
    d. Change Orders.
    e. Request for Information/interpretations.
    f. Applications for Payment.
    g. Record documents.
    h. Hazardous material abatement procedures, if any.

9. Use of premises:

    a. Office, construction, and storage areas.
    b. Owner's requirements.
    c. Work hours.
    d. Parking.
    e. Site Access

10. Construction facilities, controls, and construction aids.

11. Utilities.

    a. Coordination with existing utilities.
    b. Temporary utilities.

12. Contractor's Quality Control (CQC) System:

    a. CQC Representative.
    b. CQC daily report.

13. Housekeeping procedures.

14. Safety and security.

15. Submittals.

    a. Review the entire Project, equipment list, control philosophy, schedules, and Submittal requirements.

    b. Awareness of requirements by major subcontractors, major suppliers, and major equipment manufacturers.

c. Discuss specific electrical and instrumentation and controls Submittal requirements.

d. Format and procedures for Submittals.

e. Review of the master Submittal schedule.

f. Review Submittal schedule.

g. Turn-around time.

16. Action items.

17. Next meeting.

1.4 PROGRESS MEETINGS

A. Owner or Engineer leads the meeting.

B. Timing:

1. Hold meetings throughout progress of the Work once each week.

C. Required attendees:

1. Owner's consultants, as appropriate.

2. Owner Representatives.

3. Contractor's Superintendent, Project Manager, and QC Representative, and project scheduler.

4. Subcontractors, as appropriate.

5. Suppliers, as appropriate.

6. Others, as appropriate.

7. Additional invitees:

a. Owner utility companies when the Work affects their interests, and others necessary to the agenda

D. Agenda minimum requirements:

1. Meeting purpose:

a. Provide the status of the Work.

2. Review and approve minutes of previous meeting; written corrections, additions and/or deletions to previous minutes acknowledged.

3. Safety and security.

4. Construction schedule summary.

5. Review of 6 weeks schedule.
    a. Provide printed hard copies for each attendee.
6. Review of off-site fabrication and delivery schedules.
7. Review of Submittals schedule and status of Submittals.
8. Request for information (RFI's) status.
9. MOP's/shutdown coordination.
10. Change order management status.
11. Maintenance of quality standards (QA/QC).
12. Field observations, problems, and conflicts.
13. Commissioning.
14. General items.
15. Action items.
16. Next meeting.

1.5 PRE-INSTALLATION MEETINGS

A. Work requiring pre-installation meetings as found in the various technical specification sections require, but not limited to, the following:

1. Cast-in-place concrete.
2. Exterior masonry.
3. Structural steel
4. Under slab utilities
5. Roofing
6. Hollow metal doors and frames
7. Paint and coatings
8. HVAC sheet metal and equipment
9. On-site hypochlorite generators
10. Chemical storage tanks
11. Process mechanical piping
12. Plumbing piping, specialties, meters, and gauges
13. Lighting systems and controls
14. Landscaping and Irrigation
15. I&C Equipment

B. Contractor leads the meeting.

C. Timing:

1. When specified in Technical Sections or requested by Engineer, before commencing Work of specific section.

D. Required attendees:

1. Owner.

2. Engineer.

3. Contractor.

4. Contractor's project manager.

5. General superintendent.

6. Project scheduler.

7. Major subcontractors and suppliers as appropriate to the agenda topics for each meeting.

8. Additional invitees:

   a. Owner utility companies when the Work affects their interests and others necessary to the agenda.

E. Agenda

1. Review technical contract requirements with any options.

   a. Contractor to submit any options and resolve with Owner any conflicts, interference, or compatibility problems.

2. Work Plan:

   a. Review Contractor provided Develop a written work plan for each definable segment of work. Complete the work plan prior to the pre-installation meeting and serve as the basis for discussion and contract compliance. Include a review of contract requirements to assure that materials and equipment delivered and assembled for construction conform to contract requirements and that control testing, including procedures, are finalized. Examine work areas, upon which new work is to be placed, to verify the substrate for the new phase of work.

3. Schedule. Include the work on the three (3) week schedule.

4. Review requirements related to:

   a. Schedule.

   b. Submittals and mock-ups - status of approval; review contract requirements. Review and approval of submittals pertaining to a pre-installation meeting by Owner and returned to Contractor is required.

c. Tolerances.

d. Manufacturer's requirements.

e. Weather limitations.

5. Materials – available and ready for use.

6. Persons responsible for the Work.

7. Pre-installation Work Plan.

8. Quality control methods.

a. Testing/Inspection requirements

1) Required inspections and tests, who samples and how often.

a) Criteria for performance of work.

b. Acceptability of substrates

1) Criteria for approving substrate.

c. Required performance results.

d. Recording requirements.

9. Applicable governing rules and regulations.

10. Temporary facilities and controls.

a. Safety, environmental controls, security, noise.
b. Space and access limitations.

11. Protection of work, curing periods and related subjects.

12. Other business.

13. Agenda minimum requirements:

a. Meeting purpose:

1) Review conditions of installation, preparation, and installation procedures.
2) Review coordination with related work.

b. Review minutes of previous meeting.

c. Safety and security.

d. Action items.

e. Next meeting.

1.6 PRE-SHUTDOWN MEETINGS

A. Contractor leads the meeting.

B. Timing:

1. All shutdowns and tie-ins of any type that have the potential to impact or interrupt operations of the existing system that require a pre-shutdown meeting at Project site at least 5 working days prior to commencing shutdown for tie-in or modification of specific plant systems.

C. Required attendees:

1. Require attendance of parties directly affecting, or affected by shutdown, including Engineer, specific work crews, Owner's construction, operations and maintenance staff, and affected utilities.

D. Agenda minimum requirements:

1. Meeting purpose:
2. Review conditions of installation, preparation, and installation procedures.
3. Review coordination with related work.
4. Review timelines and sequences.
5. Review responsibilities.
6. Review coordination with related work.
7. Safety and security.
8. Action items.
9. Next meeting if needed.

1.7 TRAINING MEETINGS FOR OPERATING INSTRUCTIONS OF OWNER'S PERSONNEL

1. Refer to Section 01 75 00, Testing, Training and Commissioning for training requirements related to operating instructions of Owner's personnel.

1.8 ADDITIONAL MEETINGS

A. As the construction progresses, additional meetings may be required. These may be called at the direction of or by the Owner.

END OF SECTION

SECTION 01 32 21 - SCHEDULES AND REPORTS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Schedules and reports.

1.2 TERMINOLOGY

A. The words and terms listed below are not defined terms that require initial capital letters, but, when used in this Section, have the indicated meaning.

1. Baseline schedule: A planned and approved timetable projection that illustrates the project execution strategy, key deliverables, planned activity dates and milestones.

2. Critical path method (CPM): A method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

B. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.

2. Predecessor Activity: An activity that precedes another activity in the network.

3. Successor Activity: An activity that follows another activity in the network.

C. Critical path: The longest sequence of dependent tasks in a project.

D. Near critical path: The longest path after the critical path.

E. Weather day: The Contractor being prevented or inhibited from performing at least 4 hours of work on the critical path due to weather conditions.

1.3 SCHEDULING FORMAT

A. Utilize critical path method (CPM) format.

B. Provide Schedule based on time anticipated for each activity.

C. Submit schedule format for Engineer and Owner approval. Contractor and Engineer must agree on the format.

1.4 SCHEDULING HARDWARE AND SOFTWARE

A. Maintain access to scheduling software on-site
B. Prepare computerized schedule utilizing the most current version of Oracle Primavera P6.

1.5 SCHEDULE PREPARATION

A. Preparation and submittal of Progress Schedule represents Contractor's intention to execute the Work within specified time and constraints.

B. Costs associated with Schedule requirements are included in the Contract Price.

C. During preparation of the preliminary Progress Schedule, the Engineer will facilitate Contractor's efforts by answering questions regarding sequencing issues, scheduling constraints, interface points, and dependency relationships.

D. Prepare Schedule utilizing discrete activity durations in terms of working days.

1. Do not exceed a 15 working day duration on activities except concrete curing, submittal review, and equipment fabrication and deliveries.

2. Where duration of continuous work exceeds 15 working days, subdivide activities by location, stationing, or other sub-element of the Work.

3. Coordinate holidays to be observed with the Owner and incorporate them into the Schedule as non-working days.

E. Failure to include an activity required for execution of the Work does not excuse Contractor from completing the Work and portions thereof within specified times and at price specified in Contract.

1. Contract requirements are not waived by failure of Contractor to include required Schedule constraints, sequences, or milestones in Schedule.

2. Contract requirements are not waived by Owner's acceptance of the Schedule. In the event of conflict between accepted Schedule and Contract requirements, terms of Contract govern at all times, unless requirements are waived in writing by the Owner.

F. Reference Schedule to working days beginning with Notice to Proceed as Contract Time as Day "1".

G. Baseline Schedule and project completion:

1. Should Contractor submit a Baseline Schedule showing project completion more than 20 working days prior to Contract completion date, Owner may issue Change Order, at no cost to Owner, revising time of performance of Work and Contract completion date to match Contractor's Schedule completion date.

2. Adjust accordingly any Contract milestone dates.

H. Interim milestone dates, operational constraints:

1. In event there are interim milestone dates and/or operational constraints set forth in Contract, show them on Schedule.

I. Contract float is for the mutual benefit of both Owner and Contractor.

1. Changes to the Project that can be accomplished within this available period of float may be made by Owner without extending the Contract Time by utilizing float.

2. Time extensions will not be granted nor delay damages owed until Work extends beyond currently accepted Contract completion date.

3. Likewise, Contractor may utilize float to offset delays other than delays caused by the Owner.

4. Mutual use of float can continue until all available float shown by Schedule has been utilized by either Owner or Contractor, or both. At that time, extensions of the Contract Time will be granted by Owner for valid Owner-caused or third party-caused delays which affect the planned completion date and which have been properly documented and demonstrated by Contractor.

5. Non-sequestering of float: Pursuant to float sharing requirements of Contract, Schedule submittals can be rejected for use of float suppression techniques such as preferential sequencing or logic, special lead or lag logic restraints, extended activity durations, or imposed dates.

J. Resource (labor) loading and leveling:

1. Input labor data on each schedule activity.

2. Manpower data consists of the man-hours estimated to perform each task, categorized by trade.

3. Provide leveled manpower requirements.

a. Availability of the resources drive activity duration.

1.6 SCHEDULER

A. Designate, in writing within 5 calendar days after Notice of Award, the person responsible for preparation, maintenance, updating, and revision of all schedules.

B. Scheduler has the authority to update Schedule on behalf of the Contractor.

C. Qualifications:

1. A minimum of 5 years verifiable experience in preparation of construction schedules for projects of similar value, size, and complexity.

2. Knowledge of critical path method (CPM) scheduling utilizing the specified software.

D. References:

1. Submit written reference of 3 project Owners who have personal experience with this scheduler on previous projects.

2. Identify name, address, telephone number, project name, and cost.

E. Meeting Attendance

1. Scheduler will attend all project meetings called for as specified in Section 01 31 19, Project Meetings.

1.7 SUBMITTAL REQUIREMENTS

A. Preliminary and Baseline Progress Schedule.

B. Updated Progress Schedules monthly.

C. Weekly Schedule Update.

D. Submit Schedules in the media and number of copies as follows:

1. PDF format and other formats specified in this Section.
2. CPM Schedule data electronic files in a native file format, if requested

1.8 SCHEDULE FORMAT

A. Produce a clear, legible, and accurate calendar based, time scaled, and graphical network diagram.

1. Group activities related to the same physical areas of the Work. Produce the network diagram based upon the early start of all activities.

B. Include for each activity, the description, activity number, estimated duration in working days, total float, and all activity relationship lines.

C. Illustrate order and interdependence of activities and sequence in which Work is planned to be accomplished.

1. Incorporate the basic concept of the precedence diagram network method to show how the start of 1 activity is dependent upon the start or completion of preceding activities and its completion restricts the start of following activities.

D. Provide Progress Schedule showing the critical path for the Project.

E. Delineate the specified Contract Times and identify the planned completion of the Work as a milestone.

1. Show the time period between the planned and Contract completion dates, if any, as an activity identified as Project float.

F. Identify system shutdown dates, system tie-in dates, specified interim completion or milestone dates and contract completion dates as milestones.

G. Include, in addition to construction activities:

1. Any activity by the Owner or the Engineer that may affect progress or required completion dates.

2. Equipment and long-lead material deliveries over 8 weeks.

3. Approvals required by regulatory agencies or other third parties.

H. At a minimum, the schedule shall include the following activities:

1. Mobilization.

2. Equipment and materials procurement/fabrication/delivery.
3. Special Inspections
4. Engineer of Record observations
5. Excavation.
6. Backfill and compaction.
7. Dewatering, if needed.
8. Grading, subbase, base, paving, sidewalks, and curb and gutters.
9. Fencing and landscaping.
10. Concrete, including installation of forms and reinforcement, placement of concrete, curing, stripping, finishing, and patching.
11. Tests for leakage of concrete structures intended to hold water.
12. Masonry.
13. Metal fastenings, framing, structures, and fabrications.
14. Wood structures, finish carpentry, architectural woodwork, and plastic fabrications.
15. Waterproofing and dampproofing, insulation, roofing and flashing, and sealants.
16. Doors and windows, including hardware and glazing.
17. Finishes including coating and painting, flooring, ceiling, and wall covering.
18. Building specialties including furnishings, laboratory equipment, and toilet and bath accessories.
19. Process equipment, including identification of ordering lead-time, factory testing, and installation.
20. Pumps and drives, including identification of ordering lead time, factory testing, and installation.
21. Conveying equipment including hoists and cranes, conveyor systems, and materials handling equipment, including identification of ordering lead-time and installation.
22. Other mechanical equipment including fans and heating, ventilating, and air conditioning equipment.
23. Trenching, pipe laying, and trench backfill and compaction.
24. Piping, fittings, and appurtenances, including identification of ordering and fabrication lead time, layout, installation and testing.
25. Valves, gates, and operators, including identification of order lead-time, installation, and testing.

26. Plumbing specialties.

27. Electric transmission, service, and distribution equipment, including identification of ordering lead-time, and factory testing.

28. Other electrical work including lighting, heating and cooling, and special systems, including identification of ordering lead-time.

29. Instrumentation and controls, including identification of ordering lead-time.

30. Preliminary testing of equipment, instrumentation, and controls.

31. Commissioning phase:

    a. Source Testing.
    b. Owner Training.
    c. Installation Verification.
    d. Functional Testing.
    e. Start-up Phase.
    f. Start-up Period.

32. Instrumentation and Controls Performance Testing.

33. Substantial completion.

34. Punch list work.

35. Demobilization.

1.9 PRELIMINARY SCHEDULE

A. Procedure:

1. Submit proposed Preliminary Schedule within 10 calendar days after Notice to Proceed.

2. Meet with Engineer within 7 calendar days after receipt of Preliminary Schedule to review and make necessary adjustments.

3. Submit revised Preliminary Schedule within 5 calendar days after meeting.

4. Update Preliminary Schedule monthly until the Baseline Schedule is accepted.

B. Activities:

1. Define activities to be completed in the first 90 calendar days of Work.

2. Actualize activities performed during the first 90 days into the first monthly Schedule update.

1.10 WORK WITHIN THE FIRST 90 DAYS

A. Proceed with Work after Preliminary Schedule and Preliminary Schedule of Values have been accepted by Owner. See Section 01 33 00 Submittal Procedures.

B. Submittal and acceptance of Preliminary Schedule and Preliminary Schedule of Values is condition precedent to making of progress payments for mobilization costs otherwise provided for in the Contract.

1.11 BASELINE PROGRESS SCHEDULE

A. Due date: No more than 45 calendar days after Notice to Proceed.

B. Format:

1. Progress Schedule: Show sequence and interdependence of all activities required for complete performance of all Work, beginning with date of Notice to Proceed and concluding with date of final completion of Contract.

1.12 SUMMARY SCHEDULE

A. Due date: At weekly progress meetings and after each Schedule update or Schedule revision.

B. Format:

1. Consolidate groups of activities associated with Major Items of Work shown on Baseline Schedule.

2. Intended to give an overall indication of the Project Schedule without a large amount of detail.

1.13 WEEKLY SCHEDULE

A. Due date: At every weekly progress meeting.

B. Format:

1. Contractor and Engineer must agree on the format.

2. 4-week Schedule showing the activities completed during the previous week and the Contractor's schedule of activities for following 3 weeks.

3. Use the logic and conform to the status of the current Progress Schedule when producing a weekly Schedule in CPM schedule or a bar chart format.

a. In the event that the weekly Schedule no longer conforms to the current Schedule, Contractor may be required to revise the Schedule as specified in this Section.

4. Activity designations used in the weekly Schedule must be consistent with those used in the Baseline Schedule and the monthly Schedule updates.

C. Engineer's Submittal review response:

1. When Schedules reflects the Owner's and Contractor's agreement of project approach and sequence, Schedules will be accepted by the Owner.

2. Engineer's Submittal review response for Schedule Submittals will be "Receipt Acknowledged - Filed for Record".

3. Acceptance of the Schedules by the Owner is for general conformance with the Contract Documents and for the Owner's planning information and does not relieve the Contractor of sole responsibility for planning, coordinating, and executing the Work within the Contract completion dates.

    a. Omissions and errors in the accepted Schedules do not excuse performance less than that required by the Contract Documents.

    b. Acceptance by the Owner in no way constitutes an evaluation or validation of the Contractor's plan, sequence or means, methods, and techniques of construction.

1.14 SCHEDULE UPDATES

A. Any update:

1. Prepare update using most recent accepted version of Schedule including:

    a. Actual start dates of activities that have been started.

    b. Actual finish dates of activities that have been completed.

    c. Percentage of completion of activities that have been started but not finished.

    d. Actual dates on which milestones were achieved.

    e. Update activities by inputting percent complete figures with actual dates.

    f. Use retained logic in preparing Schedule updates.

    g. When necessary, input remaining durations for activities whose finish dates cannot be calculated accurately with a percent complete figure only.

    h. Revisions to the Schedule may be included that have been previously approved as specified.

B. Monthly updates:

1. Submit written narrative report in conjunction with each Schedule update, including descriptions of the following:

    a. Activities added to or deleted from the Schedule are to adhere to cost and other resource loading requirements.

        1) Identify added activities in manner distinctly different from original activity designations.

    b. Changes in sequence or estimated duration of activities.

    c. Current or anticipated problems and delays affecting progress, impact of these problems and delays and measures taken to mitigate impact.

    d. Assumptions made and activities affected by incorporating change order work into the Schedule.

e. Include a response in writing to each of the Engineer's comments or questions from the previous month's schedule review and number responses consistent with the Engineer's numbering.

2. Submit updated Schedule and materials specified under Submittal of Progress Schedules 5 calendar days before the monthly schedule update meeting.

3. Since monthly Schedule update is the application for progress payment required, submittal and acceptance of the monthly Schedule update is a condition precedent to the making of any progress payments.

C. Weekly progress meeting:

1. Update the Schedule prior to weekly progress meeting.

a. Identify overall progress of each major item of work in the summary schedule.

b. If there are significant changes to the Schedule, submit a written report at the weekly progress meeting.

2. Should monthly Schedule update show project completion earlier than current Contract completion date, show early completion time as schedule activity, identified as "Project Float".

3. Should monthly Schedule update show Project completion later than current Contract completion date, prepare and submit a Schedule revision.

1.15 REVISIONS TO SCHEDULES

A. Submit revised Schedules within 5 days:

1. When delay in completion of any activity or group of activities indicates an overrun of the Contract Time or milestone dates by 20 working days or 5 percent of the remaining duration, whichever is less.

2. When delays in Submittals, deliveries, or work stoppages are encountered, making necessary the replanning or rescheduling of activities.

3. When the Schedule does not represent the actual progress of activities.

4. When any change to the sequence of activities, the completion date for major portions of the Work, or when changes occur which affect the critical path.

5. When Contract modification necessitates Schedule revision, submit schedule analysis of Change Order work with cost proposal.

B. Create a separate Submittal for Schedule revisions.

1. Comply with Schedule updates as specified in this Section.
2. Do not submit with Schedule updates.

C. Schedule revisions will not be reflected in the Schedule until after the revision is accepted by the Owner.

1. This includes Schedule revisions submitted for the purpose of mitigating a Contractor-caused project delay.

1.16 ADJUSTMENT OF CONTRACT TIME OR PRICE

A. Contract Time will be adjusted only for causes specified in Contract Documents.

B. If the Contractor believes that the Owner has impacted its work such that the Project completion date will be delayed, the Contractor must submit proof, in the form of a time impact analysis demonstrating the delay to the critical path.

C. Time impact analysis:

1. Use the accepted Schedule update that is current relative to the time frame of the delay event (change order, third party delay, or other Owner-caused delay). Represent the delay event in the Schedule by:

a. Inserting new activities associated with the delay event into the Schedule.
b. Revising activity logic.
c. Revising activity durations.

2. If the Progress Schedule's critical path and completion date are impacted as a result of adding this delay event to the Progress Schedule, a time extension equal to the magnitude of the impact may be warranted.

3. The time impact analysis Submittal must include the following information:

a. A fragment of the portion of the Schedule affected by the delay event.
b. A narrative explanation of the delay issue and how it impacted the Schedule.
c. A schedule file used to perform the time impact analysis.

D. When a delay to the Project as a whole can be avoided by revising preferential sequencing or logic and the Contractor chooses not to implement the revisions, the Contractor will be entitled to a time extension and no compensation for extended overhead.

E. Indicate clearly that the Contractor has used, in full, project float available for the Work involved in the request, including any float that may exist between the Contractor's planned completion date and the Contract completion date.

1. Utilize the latest version of the Schedule update accepted at the time of the alleged delay, and other relevant information, to determine the adjustment of the Contract Time.

F. Adjustment of the Contract Times will be granted only when the Contract float has been fully utilized and only when the revised date of completion of the Work has been pushed beyond the Contract completion date.

1. Adjustment of the Contract Times will be made only for the number of days that the planned completion of the work has been extended.

G. Actual delays in activities which do not affect the Critical Path Work or which do not move the Contractor's planned completion date beyond the Contract completion date will not be the basis for an adjustment to the Contract Time.

H. If completion of the project occurs within the specified Contract Time, the Contractor is not entitled to job-site or home office overhead beyond the Contractor's originally planned occupancy of the site.

I. Notify Engineer of a request for Contract Time adjustment.

1. Submit request as specified in the Contract Documents.

2. In cases where the Contractor does not submit a request for Contract Time adjustment for a specific change order, delay, or Contractor request within the specified period of time, then it is mutually agreed that the particular change order, delay, or Contractor request has no time impact on the Contract completion date and no time extension is required.

J. Engineer will, within 30 calendar days after receipt of a Contract Time adjustment, request any supporting evidence, review the facts, and advise the Contractor in writing.

1. Include the new Progress Schedule data, if accepted by the Owner, in the next monthly Schedule update.

2. When the Owner has not yet made a final determination as to the adjustment of the Contract Time, and the parties are unable to agree as to the amount of the adjustment to be reflected in the Progress Schedule, reflect that amount of time adjustment in the Progress Schedule as the Engineer may accept as appropriate for such interim purpose.

3. It is understood and agreed that any such interim acceptance by the Engineer is not binding and made only for the purpose of continuing to schedule the Work, until such time as a final determination as to any adjustment of the Contract Time acceptable to the Engineer has been made.

4. Revise the Progress Schedule prepared thereafter in accordance with the final decision.

1.17 WEATHER DAY ALLOWANCE

A. Allowance:

1. Include as a separate identifiable activity on the critical path, an activity labeled "Weather Day Allowance".

B. Actual Weather Day:

1. Insert a weather delay activity in the critical path to reflect actual weather day occurrences when weather days are experienced and accepted by the Engineer.

2. Reduce duration of Weather Day Allowance activity as weather delays are experienced and inserted into the Schedule. Remaining weather days in the Weather Day Allowance at completion of the Project is considered float.

3. Provide a written notice to the Engineer of the occurrence of a weather day within 2 days after the onset of such weather and describe in reasonable detail the type of weather encountered and the Work interfered with or interrupted.

    a. A Schedule update will not suffice as a written notice.

    b. Engineer will determine if the Weather Day constitutes a use of a portion of the Weather Day Allowance.

    c. After use of all the Weather Day Allowance, the Engineer will determine if the Contractor is entitled to an extension of the Contract Time due to weather conditions.

1.18 ALLOWANCE FOR OWNER-CAUSED DELAY

A. Allowance:

1. Include as a separate identifiable activity on the critical path, an activity labeled "Allowance for Owner-Caused Delay."

2. Insert this activity at the end of the Schedule, following the Project Completion Milestone.

3. Duration of this activity is specified in the Bid Form.

    a. The duration of this Owner-Caused Delay Allowance is in addition to the contractual time frame.

B. Actual delay:

1. Insert an activity in critical path to reflect actual Owner-caused delay occurrences when Owner-Caused delay days are experienced and accepted by Engineer.

    a. Identify this activity as an Owner-Caused delay.

2. Reduce duration of Owner-Caused Delay Allowance activity as Owner-caused delays are experienced and inserted into the Schedule. Remaining days in Owner-Caused Delay Allowance at completion of project is considered float.

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. This Section contains administrative and procedural requirements for submittals review and information.

B. The Contractor shall provide submittals including shop drawings, schedules, drawings, and other information as may be necessary for the prosecution of the work in the shop and in the field as required by the contract documents or the Owner 's instruction.

1.2 DEFINITIONS

A. Action Submittals

1. Written and graphic information and physical samples that require Engineer's responsive action.

B. Informational Submittals

1. Written and graphic information and physical Samples that do not require Engineer's responsive action. Submittals may be rejected for not complying with requirements.

1.3 SCHEDULE OF SUBMITTALS

A. Schedule of Submittals include Submittals required in the Contract Documents but not limited to test plans, training plans, test procedures, operation and maintenance manuals, Drawings, samples, record documents, and specifically required certificates, warranties, and service agreements.

B. Contractor shall provide the following Schedules of Submittals:

1. Preliminary Schedule of Submittals

a. Due 15 days after NTP.

b. Include Submittals anticipated in the first 90 calendar days after award of Contract using early start dates.

c. Indicate week and month anticipated for submittal to Engineer.

d. Indicate “Priority” Submittals where review time can impact Contractor’s schedule.

1) “Priority” indication will not alter review times.

2) Engineer will endeavor to provide early review of “Priority” Submittals where possible.

e. Submittal of Preliminary Schedule of Submittals is a condition precedent to Owner making progress payments during the first 90 calendar days after award of Contract.

C. Final Schedule of Submittals:

1. Due 30 days after Preliminary Schedule of Submittals has been submitted and accepted by Owner.

2. Format:

a. Include Submittals using early start dates.

b. Include all Submittals, including those required in the Preliminary Schedule of Submittals.

c. Indicate week and month anticipated for submittal to Engineer.

d. Indicate "Priority" submittals where review time can impact Contractor's schedule.

1) "Priority" indication will not alter review times.

2) Engineer will endeavor to provide early review of "Priority" Submittals where possible.

3. Submittal of final Schedule of Submittals is a condition precedent to Owner making progress payments after the first 90 calendar days after Notice to Proceed.

D. Provide updated Schedule of Submittals with updated schedules if Schedule revisions change listing and timing of Submittals.

1.4 SUBMITTAL PROCEDURES

A. American Iron and Steel (AIS) Compliance: Materials provided under work of this Section shall comply with the AIS requirements of the Water Infrastructure Finance and Innovation Act (WIFIA). All materials provided and incorporated into this Project shall meet the AIS requirements of P.L. 113-76, Consolidated Appropriations Act, 2014.

A. For all Materials and Products that are required to comply with AIS requirements, submit AIS certification from the manufacturer that documents the material or product meets AIS requirements.

B. Submit Shop Drawings, Manufacturer information, and cut sheets, and Samples to Engineer for review in accordance with the accepted Schedule of Submittals.

C. All submittal shall be electronic submittal as defined in the Section, except material samples, which must be delivered to a designated location at the project site as determined by the Owner.

D. Transmit each submittal with Engineer-accepted transmittal form certifying compliance with requirements of Contract Documents.

E. Sequentially number transmittal forms. Mark transmittal forms for resubmittals with original number and sequential alphabetic suffix.

F. Show the following information on each Submittal:

1. Number submittals sequentially according to Section. For example, the first product submittal for Section 05 50 00 would be “05 50 00-1”. Resubmittals of that submittal would be “05 50 00-1.1”, followed by “05 50 00-1.2”, and so on. The second product submittal for that Section would be “05 50 00-2”.

2. Submittals containing product information from multiple Section may not be reviewed. Divide submittals in a manner that meets the numbering and tracking system requirements stated herein.

3. Alternative method of numbering may be used, if acceptable to Owner.

G. Identify: Project, Contractor, subcontractor and supplier, pertinent drawing and detail number, and Section and/or Drawing number as appropriate to submittal.

H. Apply Contractor's stamp, signed or initialed, certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is according to requirements of the Work and Contract Documents.

I. Coordinate submission of related items.

1. Schedule drawings for interrelated items for submission at the same time.

2. The Engineer may wait to respond in cases where partial submission cannot be reviewed until the complete submission has been received or where drawings cannot be reviewed until correlated items affected by them have been received. Engineer will advise the Contractor in writing that the shop drawing submitted will not be reviewed until drawings for related items have been received.

J. Electronic transmittals of submittals shall be provided by the Contractor. Provide electronic submittals in portable document format (PDF) in addition to the source document format (Word, Excel, AutoCAD, etc.). Reviewed submittals will be returned to the Contractor as PDF electronic files.

K. For each submittal for review, allow not less than 14 days for Engineer review, excluding delivery time to and from Contractor.

L. Identify variations in Contract Documents and product or system limitations that may be detrimental to successful performance of completed Work.

M. Allow space on submittals for Contractor and Engineer review stamps or comments.

N. When revised for resubmission, identify changes made since previous submission. Provide a narrative of changes. Indicate that revisions were made on drawings or calculations.

O. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with review comments.

P. Submittals not requested will not be recognized nor processed.

Q. Incomplete Submittals

1. Engineer will not review. Complete submittals for each item are required. Delays resulting from incomplete submittals are not the responsibility of Engineer.

1.5 ENGINEER REVIEW

A. Informational submittals and other similar data are for Engineer's information, do not require Engineer's responsive action, and will not be reviewed or returned with comment.

B. Submittals made by Contractor that are not required by Contract Documents may be returned without action.

C. The Engineer will review the submitted data and drawings and return to the Contractor with notations thereon indicating "No Exception Taken", "Make Corrections Noted", "Rejected", "Revise and Resubmit", or "Submit Specified Item".

D. If more than two submissions of an item are required to meet the Project specifications, it is the responsibility of the Contractor for Engineer’s charges to Owner for its review time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

E. Engineer’s review of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.

F. Engineer’s review of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Contract.

G. Engineer’s review of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents.

H. Engineer’s review will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

1.6 RESUBMITTAL PROCEDURES

A. Make corrections required by Engineer and return the required number of corrected copies of Drawings and submit, as required, new Samples for review. Direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

B. Furnish required submittals with sufficient information and accuracy to obtain required review of an item with no more than two submittals. Engineer will record Engineer’s time for reviewing a third or subsequent submittal of a Drawings, sample, or other item requiring review, and the Contractor is 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.

C. If Contractor requests a change of a previously reviewed submittal item, the Contractor is responsible for Engineer’s charges to Owner for its review time, and Owner may impose a set-

off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

1.7 PRODUCT DATA

A. Submit to Engineer for review for assessing conformance with information given and design concept expressed in Contract Documents. Provide sufficient data for determination of compliance with the Contract Documents.

B. Mark each copy to identify applicable products, models, options, and other data. Supplement Manufacturers' standard data to provide information specific to this Project.

1. Note submittal will be returned to Contractor without review of submittal if products, models, options, and other data are not clearly marked or identified.

C. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

D. After review, produce copies and distribute according to specified herein and for record documents.

1.8 SHOP DRAWINGS

A. Submit to Engineer for assessing conformance with information given and design concept expressed in Contract Documents.

B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. When required by individual Sections, provide Drawings signed and sealed by a professional Engineer licensed in the state of Project, responsible for designing components shown on Drawings.

1. Include signed and sealed calculations to support design.

2. Submit Drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.

3. Make revisions and provide additional information when required by authorities having jurisdiction.

D. Provide scalable, dimensioned drawings as full-sized (22-inch x 34-inch) sheets and be able to print as scalable full-sized sheets.

E. After review, produce copies and distribute according to specified herein and for record documents.

1.9 SAMPLES

A. Submit to Engineer for assessing conformance with information given and design concept expressed in Contract Documents.

B. Samples for Selection as Specified in Product Sections:

1. Submit to Engineer for aesthetic, color, and finish selection.
2. Submit Samples of finishes, textures, and patterns for Owner selection.

C. Submit Samples to illustrate functional and aesthetic characteristics of products, with integral parts and attachment devices. Coordinate Sample submittals for interfacing work.

D. Include identification on each Sample, with full Project information.

E. Submit number of Samples specified in individual Sections; Engineer will retain one Sample.

F. Reviewed Samples that may be used in the Work are indicated in individual Sections.

G. After review, produce copies and distribute according to specified herein and for record documents.

1.10 DESIGN DATA

A. Submit data for Engineer's knowledge as Contract administrator or for Owner.

B. Submit information for assessing conformance with information given and design concept expressed in Contract Documents.

1.11 TEST REPORTS

A. Submit reports for Engineer's knowledge and records as Contract administrator or for Owner.

B. Submit test reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

1.12 CERTIFICATES

A. Submit certification by Manufacturer, installation/application Subcontractor, or Contractor to Engineer, in quantities specified for Product Data.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or product but must be acceptable to Engineer.

1.13 MANUFACTURER’S INSTRUCTIONS

A. Submit Manufacturer's installation instructions for Engineer's knowledge as Contract administrator or for Owner.

B. Submit printed instructions for delivery, storage, assembly, installation, startup, adjusting, and finishing, to Engineer in quantities specified for Product Data.

C. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.14 MANUFACTURER'S FIELD REPORTS

A. Submit reports for Engineer's knowledge and records as Contract administrator or for Owner.

B. Submit report within 48 hours of observation to Engineer for information.

C. Submit reports for information for assessing conformance with information given and design concept expressed in Contract Documents.

1.15 [ERECTION DRAWINGS

A. Informational Submittal: Submit Drawings for Engineer's knowledge and records as Contract administrator or for Owner.

B. Submit Drawings for information assessing conformance with information given and design concept expressed in Contract Documents.

C. Data indicating inappropriate or unacceptable Work may be subject to action by Engineer or Owner.]

1.16 OPERATION AND MAINTENANCE (O&M) INSTRUCTIONS

A. Provide O&M manuals for all equipment and products as specified in Section 01 78 23 Operation and Maintenance Data.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 33 17 – STRUCTURAL DESIGN, SUPPORT AND ANCHORAGE

PART 1 GENERAL

1.1 THE REQUIREMENT

A. The Contractor shall provide calculations and details for structural and non-structural components, supports, and anchorages as required by the Contract Documents and the 2022 OSSC. The contractor shall furnish and install all such structural and non-structural components, supports, and anchorages in accordance with the calculations and details.

B. The Contractor shall provide calculations and details for structures and non-building structures, supports, and anchorages as required by the Contract Documents and the 2022 OSSC. The contractor shall furnish and install all such structures and non-building structures, supports, and anchorages in accordance with the calculations and details.

C. Where a conflict exists between the requirements of the Contract Documents and the 2022 OSSC, the more stringent requirement shall apply.

D. Design parameters used to determine Seismic and Wind design forces shall be as listed herein.

1.2 REFERENCES

A. OSSC 2022 Oregon Structural Specialty Code

B. ASCE 7 American Society of Civil Engineers Standard 7-16 – Minimum Design Loads for Buildings and Other Structures.

C. ACI 318 Building Code Requirements for Structural Concrete (2019 edition)

D. TMS 402/602 Building Code Requirements and Specification for Masonry Structures (2016 edition)

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01 33 00, Contractor Submittals.

B. Calculations and Details

1. Calculatons and details are considered a Deferred Submittal as defined in the OSSC.

2. Calculations and details shall be complete, accurate, and in accordance with the requirements of the OSSC and ASCE 7, and shall be signed and sealed by a Professional Engineer registered in the State of Oregon.

3. Calculations shall be clear and concise and show equipment and other non-structural component anchorage forces and the capacities of the anchorage elements proposed by the Contractor. The calculations shall substantiate a complete load path from the component or equipment being anchored into the supporting structure or foundation.

4. The calculations and details shall demonstrate a complete lateral and vertical load path and shall clearly indicate all forces imposed on the supporting structure.

5. Calculations and details are required for all Non-Structural components, supports, anchorages, and attachments.

    a. Non-Structural components shall include all architectural, mechanical, and electrical components, equipment, piping, ductwork, and all other similar or related appurtenances necessary to produce the complete architectural, mechanical, and electrical systems.

6. When the Contract Documents require the CONTRACTOR to design structures or structural components, calculations and details for those structures and structural components, and their supports, anchorages, and attachments, are required.

7. When computer generated calculations and analyses are included as part (or as the whole) of the calculations, the calculations shall include, but not be limited to, the following: derivations of all input parameters; clear indication of the applicable load combinations and building code equations; diagrams of all members, geometry, loads, forces, reactions and deflections, for all components and connections; and output results demonstrating all stress, force, deflection and other Contract Document and building code requirements have been satisfied.

8. All calculations associated with anchorage into concrete or masonry shall be done using Strength Level forces, and shall be in accordance with the applicable provisions of ACI 318 and TMS 402/602, respectively.

9. Refer to Part 2 below for additional requirements.

1.4 SEISMIC DESIGN CRITERIA

A. Design Requirements

1. Design Parameters:

    a. Risk Category: III.

    b. Seismic Design Category: D.

    c. Mapped MCE spectral acceleration at short period: $S_S = 0.831$.

    d. Mapped MCE spectral acceleration at 1-second period: $S_1 = 0.370$.

    e. Site Class: D

    f. Design spectral acceleration at short period: $S_{DS} = 0.647$.

    g. Design spectral acceleration at 1-second period: $S_{D1} = 0.478$.

    h. Long period transition period: $T_L = 16$ seconds

    i. Response modification coefficient, R: In accordance with ASCE 7, Tables 12.2-1, 12.14-1, 15.4-1 and 15.4-2.

    j. Seismic Importance Factor, I: 1.25.

k. Component amplification factor, a_p: In accordance with ASCE 7, Tables 13.5-1 and 13.6-1.

l. Component response modification factor, R_p: In accordance with ASCE 7, Tables 13.5-1 and 13.6-1.

m. Component importance factor, I_p:

1) I_p = 1.00, unless noted otherwise herein.

2) I_p = 1.50 if any of the following conditions apply:

a) The component is required to function for life-safety purposes after an earthquake, including fire sprinkler systems.

b) The component contains hazardous materials.

2. The following components are exempted from the seismic design requirements:

a. Exemptions shall be as indicated in ASCE 7 Chapter 13.

1.5 WIND DESIGN CRITERIA

A. Design Requirements

1. Design Parameters:

a. Risk Category: III.
b. Basic 3-second Wind Gust Speed: 105 miles per hour.
c. Exposure Category: B.
d. Topographic Factor, K_{zt}: 1.0.

PART 2 PRODUCTS

2.1 GENERAL

A. Non-Structural Component Supports and Anchors

1. Unless otherwise indicated, non-structural component supports, anchors, and restrainers shall be adequately designed for all applicable static, dynamic, operational, seismic and wind loads.

a. Wall-mounted equipment weighing more than 250 pounds or which is within 18-inches of the floor shall be provided with fabricated steel supports. Pedestals shall be of welded steel or engineered framing support systems. If the supported equipment is a panel or cabinet or is enclosed with removable sides, the pedestal shall match the supported equipment in appearance and dimensions.

b. All equipment and all other non-structural components shall be supported and anchored in place by methods that satisfy the building code and the Contract Documents.

c. All equipment and all other non-structural components shall be supported and anchored in place by methods that satisfy the manufacturer's applicable seismic certification requirements.

2. Component attachments shall be bolted, welded, or otherwise positively fastened without consideration of frictional resistance produced by the effects of gravity.

B. Non-Building Structures

1. Non-Building Structures shall be designed in accordance with ASCE 7 Chapter 15.

2. Non-Building Structures, foundations, supports, anchors, and restrainers shall be adequately designed for all applicable static, dynamic, operational, seismic and wind loads.

C. Anchors – General

1. Anchor bolts shall be in accordance with Section 05 50 00.

2. Grouts for anchor bolts shall be in accordance with Section 03 60 00.

3. The Contractor shall determine the size, type, capacity, location, and other placement requirements of anchorage elements. Anchoring methods and leveling criteria in the manufacturer's literature shall be followed. Submit methods and criteria with the calculations and details.

4. Anchor bolt calculations shall clearly show that the capacity of the anchor and the capacity of the concrete that the anchor is embedded in are adequate to resist all applicable load combinations, including seismic and wind loads.

   a. The design of anchors resisting seismic forces shall satisfy the ductility requirements stated in the OSSC, ASCE 7, ACI 318, and TMS 402/602.

5. Reduction factors associated with edge distance, embed length, grout and base plate thickness, and bolt spacing shall all be considered and based on the actual dimensions of the concrete or masonry that resists the anchorage forces.

6. Where anchorage is required into or through equipment pads, the following requirements shall apply unless otherwise approved by the Engineer:

   a. For tensile forces, the embed length and associated concrete failure zone shall be provided entirely within the structural slab. No portion of the equipment pad may be considered as effective in resisting tensile forces.

   b. For shear forces, the edge distance and associated concrete failure zone shall be provided entirely within the equipment pad. No portion of the structural slab may be considered as effective in resisting shear forces.

7. Anchor bolt details shall include required bolt diameter, embed, spacing, and edge distances.

8. Where additional reinforcement is required to satisfy anchorage requirements, such reinforcement shall be included in the anchorage details, and shall be furnished and installed by the Contractor.

D. Mechanical and Electrical Equipment Foundations

1. Equipment foundations are indicated on Drawings. The Contractor, through the equipment manufacturer, shall verify the size and weight of the equipment foundation to ensure compatibility with equipment.

2. Equipment foundation dimensions shall be coordinated with the equipment base geometry and the edge distance and embed requirements of the equipment anchorage calculations.

E. Mechanical and Electrical Equipment Equipment (Housekeeping) Pads

1. General

a. Equipment, tanks, control cabinets, enclosures, and related equipment shall be mounted on concrete equipment pads, unless otherwise indicated. The top surface of the equipment pads shall be level, unless otherwise indicated, or otherwise required by the equipment manufacturer.

b. Equipment pads shall be sized to accommodate the bearing and anchorage requirements of the equipment, subject to the constraints listed below.

c. Final geometry of the equipment pads shall not result in a condition that violates applicable building code provisions, including but not limited to the provisions of the National Electric Code.

2. Mechanical Equipment Pads

a. Mechanical equipment pad heights shall be coordinated with process equipment and piping elevation requirements. Where no such elevation constraints exist, the equipment pad height shall be as shown on the drawings, or as indicated below when no specific height is provided.

b. Equipment pads for mechanical equipment shall be 3.5 inches tall (maximum) at the front of the equipment.

c. Mechanical equipment pads shall extend not more than 2 inches beyond the front, back, and sides of the equipment, except as indicated below, unless otherwise shown on the drawings.

1) Where necessary to meet seismic or wind anchorage requirements, the pads may be extended beyond the 2 inch limit indicated above. The pads shall extend not more than 6 inches beyond the front, back, and sides of the equipment.

3. Electrical Equipment Pads

a. Electrical equipment pads shall be 3.5 inches tall (maximum) at the front of the equipment.

b. Electrical equipment pads shall extend not more than 2 inches beyond the front, back, and sides of the equipment, except as indicated below, unless otherwise shown on the drawings.

   1) Where necessary to meet seismic anchorage requirements, the pads may be extended beyond the 2 inch limit indicated above. The pads shall extend not more than 6 inches beyond the front, back, and sides of the equipment.

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 43 33 - MANUFACTURERS' FIELD SERVICES

PART 1 GENERAL

1.1 DEFINITIONS

A. Person-Day: One person for 8 hours within regular Contractor working hours.

1.2 SUBMITTALS

A. Informational Submittals:

1. Training Schedule: Submit, in accordance with requirements of this Specification, not less than 21 days prior to start of equipment installation and revise as necessary for acceptance.

2. Lesson Plan: Submit, in accordance with requirements of this Specification, proposed lesson plan not less than 21 days prior to scheduled training and revise as necessary for acceptance.

3. Training Session Recordings: Furnish Owner with two complete sets of recordings fully indexed and cataloged with printed label stating session and date recorded.

1.3 QUALIFICATION OF MANUFACTURER'S REPRESENTATIVE

A. Authorized representative of the manufacturer, factory trained, and experienced in the technical applications, installation, operation, and maintenance of respective equipment, subsystem, or system, with full authority by the equipment manufacturer to issue the certifications required of the manufacturer. Additional qualifications may be specified in the individual specification section.

B. Representative subject to acceptance by Owner and Engineer. No substitute representatives will be allowed unless prior written approval by such has been given.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 FULFILLMENT OF SPECIFIED MINIMUM SERVICES

A. Furnish manufacturers' services, when required by an individual specification section, to meet the requirements of this section.

B. Where time is necessary in excess of that stated in the Specifications for manufacturers' services, or when a minimum time is not specified, time required to perform specified services shall be considered incidental.

C. Schedule manufacturer' services to avoid conflict with other onsite testing or other manufacturers' onsite services.

D. Determine, before scheduling services, that conditions necessary to allow successful testing have been met.

E. Only those days of service approved by Engineer will be credited to fulfill specified minimum services.

F. When specified in individual specification sections, manufacturer's onsite services shall include:

1. Assistance during product (system, subsystem, or component) installation to include observation, guidance, instruction of Contractor's assembly, erection, installation or application procedures.

2. Inspection, checking, and adjustment as required for product (system, subsystem, or component) to function as warranted by manufacturer and necessary to furnish Manufacturer's Certificate of Proper Installation.

3. Providing, on a daily basis, copies of manufacturers' representatives field notes and data to Owner.

4. Revisiting the Site as required to correct problems and until installation and operation are acceptable to Engineer.

5. Resolution of assembly or installation problems attributable to or associated with respective manufacturer's products and systems.

6. Assistance during functional and performance testing, and facility startup and evaluation.

7. Training of Owner's personnel in the operation and maintenance of respective product as required.

3.2 MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

A. When so specified, a Manufacturer's Certificate of Proper Installation form, a copy of which is attached to this section, shall be completed and signed by equipment or material manufacturer's representative.

B. Such form shall certify signing party is a duly authorized representative of manufacturer, is empowered by manufacturer to inspect, approve, and operate their equipment and/or material and is authorized to make recommendations required to ensure equipment and/or material is complete and operational.

3.3 TRAINING

A. General:

1. Furnish manufacturers' representatives for detailed classroom and hands-on training to Owner's personnel on operation and maintenance of specified product (system, subsystem, component) and as may be required in applicable Specifications.

2. Furnish trained, articulate personnel to coordinate and expedite training, to be present during training coordination meetings with Owner, and familiar with operation and

maintenance manual information specified in Section 01 78 23, Operation and Maintenance Data.

3. Manufacturer's representative shall be familiar with facility operation and maintenance requirements as well as with specified equipment.

4. Furnish complete training materials, to include operation and maintenance data, to be retained by each trainee.

5. Instructions of Owner's Operation and Maintenance Staff

   a. The manufacturer shall furnish a minimum of two training sessions.

   b. Manufacturer is responsible for travel time and expenses and are excluded from training time indicated in Section 3.03.A.5.a.

   c. Presentation, handouts, and other training material used during training shall be provided on a USB thumb drive along with Recorded Training Session. Files shall be bookmarked, organized and fully searchable.

B. Training Schedule:

1. List specified equipment and systems that require training services and show:

   a. Respective manufacturer.
   b. Estimated dates for installation completion.
   c. Estimated training dates.

2. Allow for multiple sessions when several shifts are involved.

3. Adjust schedule to ensure training of appropriate personnel as deemed necessary by Owner, and to allow full participation by manufacturers' representatives. Adjust schedule for interruptions in operability of equipment.

4. Coordinate with Section 01 32 00, Construction Progress Documentation, and Section 01 75 76, Testing, Training and Startup.

C. Lesson Plan: When manufacturer or vendor training of Owner personnel is specified, prepare a lesson plan for each required course containing the following minimum information:

1. Title and objectives.
2. Recommended attendees (such as, managers, engineers, operators, maintenance).
3. Course description, outline of course content, and estimated class duration.
4. Format (such as, lecture, self-study, demonstration, hands-on).
5. Instruction materials and equipment requirements.
6. Resumes of instructors providing training.
7. Lesson Plan shall be submitted prior for review and approval.

D. Prestartup Training:

1. Coordinate training sessions with Owner's operating personnel and manufacturers' representatives and with submission of operation and maintenance manuals in accordance with Section 01 78 23, Operation and Maintenance Data.

2. Complete at least 14 days prior to beginning of facility startup.

E. Post-startup Training: If required in Specifications, furnish and coordinate training of Owner's operating personnel by respective manufacturer's representatives.

F. Recording of Training Sessions:

1. Furnish audio recording of post-startup instruction sessions, including manufacturers' representatives' hands-on equipment instruction and classroom sessions.

2. Use DVD format suitable for playback on standard equipment available commercially in the United States. Blu-ray® DVD format is not acceptable without Engineer's prior approval.

3. DVD may contain multiple training sessions. If multiple training sessions included on a DVD, provide with on-screen menu for playback selection.

3.4 SUPPLEMENTS

A. The supplement listed below, following "End of Section," is part of this specification.

1. Manufacturer's Certificate of Proper Installation.

END OF SECTION

MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

OWNER _____ EQPT SERIAL NO: _____

EQPT TAG NO: _____ EQPT/SYSTEM: _____

PROJECT NO: _____ SPEC. SECTION: _____

I hereby certify that the above-referenced equipment/system has been:

(Check Applicable)

- ☐ Installed in accordance with Manufacturer's recommendations.
- ☐ Inspected, checked, and adjusted.
- ☐ Serviced with proper initial lubricants.
- ☐ Electrical and mechanical connections meet quality and safety standards.
- ☐ All applicable safety equipment has been properly installed.
- ☐ Functional tests.
- ☐ System has been performance tested, and meets or exceeds specified performance requirements. (When complete system of one manufacturer)

Note: Attach any performance test documentation from manufacturer.

Comments: _____

_____

_____

_____

I, the undersigned Manufacturer's Representative, hereby certify that I am (i) a duly authorized representative of the manufacturer, (ii) empowered by the manufacturer to inspect, approve, and operate their equipment and (iii) authorized to make recommendations required to ensure equipment furnished by the manufacturer is complete and operational, except as may be otherwise indicated herein. I further certify that all information contained herein is true and accurate.

Date: _____, 20___

Manufacturer:_____

By Manufacturer's Authorized Representative: _____

(Authorized Signature)

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SECTION 01 45 00 - QUALITY CONTROL

PART 1 GENERAL

1.1 DESCRIPTION

A. This Section includes general quality control requirements and supplements those in the General Conditions and Technical Specifications.

1.2 PROVISIONS

A. Contractor's Responsibility for Testing

1. The Contractor is responsible for the cost of all testing as specified in this section.

2. The presence or absence of a quality assurance inspector does not relieve Contractor from any Contract requirement.

3. Owner may charge Contractor for any additional cost of inspection or test when Work is not ready at the time specified by Contractor for inspection or test, or when prior rejection makes re-inspection or retest necessary. Quality assurance inspections and tests will be performed in a manner that will not unnecessarily delay the Work.

B. Owner's Right to Perform Additional Tests

1. The Owner or Engineer reserves the right to complete additional testing. In such cases, the Provide safe access for the Owner or Engineer and their inspectors to adequately inspect the quality of work and the conformance with Project specifications.

2. All work is subject to Owner's quality assurance inspection and testing at all locations and at all reasonable times before acceptance to ensure strict compliance with the terms of the Contract Documents.

a. Owner's quality assurance inspections and tests are for the sole benefit of Owner and do not:

1) Relieve Contractor of responsibility for providing adequate quality control measures;

2) Relieve Contractor of responsibility for damage to or loss of the material before acceptance;

3) Constitute or imply acceptance; or

4) Affect the continuing rights of Owner after acceptance of the completed Work.

1.3 QUALITY ASSURANCE

A. Testing Requirements

1. An independently owned and operated laboratory approved by the Owner shall perform testing as specified herein.

B. Testing

1. General

a. Conduct required testing of work and/or materials in the presence of the Engineer. Provide 48-hour notification to the Owner and Owner's representative prior to conducting any and all quality assurance testing. Where applicable, installation of buried work and materials be only completed with the consent of the Engineer.

b. Where such inspection and testing are to be conducted by an independent laboratory or agency, the sample, or samples of material to be tested and selected by such laboratory or agency or by the Engineer. Furnish such samples of materials without charge to Owner.

c. The results from any and all tests are made for the information of the Owner. Regardless of any test results, the Contractor is solely responsible for the quality of workmanship and materials and for compliance with the requirements of the Drawings and Specifications.

2. Costs of Testing

a. The Contractor and Owner shall be responsible for and shall pay for tests in accordance with the schedule in Part 3 of this Section.

b. Where test results demonstrate that the material or workmanship does not meet the minimum requirements of the Contract Documents, additional testing shall be completed and shall be paid for by the Contractor with no reimbursement by the Owner.

c. Special Inspections

Owner-retained Special Inspectors and Testing Agencies conduct Special inspections and testing as required by Chapter 17 of the IBC and as indicated in the Contract Documents.

C. Special Inspectors and Testing Agencies Responsibilities

1. Verify that manufacturers maintain detailed fabrication and quality control procedures and review the completeness and adequacy of those procedures to perform the Work.

2. Promptly notify Owner and Contractor of irregularities and deficiencies observed in the Work during performance of their services.

3. Submit certified written report of each test, inspection and similar quality control service to Owner, Contractor, and jurisdictional authorities. Interpret test results and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

4. Submit final report of special inspections at Substantial Completion, including a list of unresolved deficiencies.

5. Re-test and re-inspect corrected work.

D. Contractor's Responsibilities

1. Provide quality requirements to all subcontractors and enforce all requirements.

2. Notify Owner, Engineer, Special Inspectors and Testing Agencies at least 48 hours in advance of time when Work that requires testing or special inspecting will be performed, unless otherwise indicated in the Contract Documents.

3. Pay for any Contractor requested testing and inspecting not required by the Contract Documents.

4. Pay for all re-testing or re-inspections by Special Inspectors and Testing Agencies for replacement work resulting from work that failed to comply with the Contract Documents. Owner will deduct such costs from the Contract Price.

5. Submit copies of licenses, certifications, correspondence, records, and similar documents used to establish compliance with standards and regulations that pertain to performance of the Work to the Owner, Engineer, and Special Inspectors.

6. Where Special Inspection requires pre-construction testing for compliance with specified requirements for performance and test methods, comply with the following:

    a. Provide test specimens representative of proposed products and construction in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.

    b. Provide information on configurations of test assemblies, testing procedures and laboratory test records to adequately demonstrate capability of products to comply with performance requirements.

7. Cooperate with Agencies performing required tests, special inspections, and similar quality control services. Notify Agencies in advance of operations to permit assignment of personnel. Provide the following:

    a. Access to the Work.

    b. Incidental labor, equipment, and materials necessary to facilitate tests and special inspections.

    c. Adequate quantities of representative samples of materials that require and inspecting. Assist Agencies in obtaining samples.

    d. Provide facilities for storage and field curing of test samples.

    e. Deliver samples to Testing Agencies.

8. Coordinate sequence of activities to accommodate required quality-assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and special inspecting.

9. Schedule times for tests, special inspections, obtaining samples, and similar activities. Distribute schedule to Owner, Engineer, Special Inspectors, Testing Agencies, and each party involved in portions of the work where tests and special inspections are required.]

1.4 LABORATORY TEST OR INSPECTION REPORTS

A. Independently owned and operated testing laboratory is required to sign and certify each report. Unless otherwise specified, submit three copies of each report to the Owner or Owner's Representative.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 GENERAL

A. Maintain an adequate inspection system and perform such inspections as will ensure that the Work conforms to the Contract Documents.

B. Maintain complete inspection records and make them available at all times to Owner and Engineer.

C. The quality control system shall consist of plans, procedures, and organization necessary to produce an end product that complies with the Contract Documents. The system shall cover all construction and demolition operations, both onsite and offsite, including Work by subcontractors, fabricators, suppliers and purchasing agents, and shall be keyed to the proposed construction sequence.

3.2 FIELD TESTING SCHEDULE

A. The Contractor shall complete field testing in accordance with the following schedule. Additional source material testing shall be completed as necessary to establish the basis of field tests. The frequency of testing listed in this schedule lists the minimum number of tests per quantity of work completed by the Contractor. Testing locations will be determined by the Owner and/or the Engineer.

Material to be Tested	Payment Responsibility for Initial Testing	Minimum Testing Frequency
Compacted Rock Backfill For Structures	Owner	In-place compaction testing (w/ nuclear compaction gage) performed at 2-foot elevation increments, at a minimum one test per 2,500 sf of material placed. See Technical Specifications for further details on payment responsibilities.
Trench Backfill	Contractor	In-place compaction testing (w/ nuclear compaction gage) performed at 2-foot elevation increments, at a minimum one test per 100 lineal feet of pipeline trench as measured along pipe centerline. See Technical Specifications for further details.

Material to be Tested	Payment Responsibility for Initial Testing	Minimum Testing Frequency
Subgrade Backfill	Contractor	
Asphalt Concrete	Contractor	As required when placed. See Technical Specifications for further details.
Concrete	Owner	As required when placed. See Technical Specifications for further details.
Steel	Owner	See Technical Specifications for further details.
Grout	Owner	Compression test specimens will be taken during construction from the first placement of each type of grout and at intervals thereafter as selected by the ENGINEER to ensure continued compliance with Specifications.
Masonry Mortar and Grout	Owner	As required when placed. See Technical Specifications for further details.
Water pipe, Hydrostatic testing and disinfection	Contractor	Contractor shall hydrostatically test and disinfect all waterlines prior to placing them in service following successful construction. See Technical Specifications for further details..

END OF SECTION

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SECTION 01 56 39 - TEMPORARY TREE AND PLANT PROTECTION

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes provisions for temporary protection of trees and other plant life in preparation for site or building excavation Work.

B. This Section shall be applied concurrently and in conjunction with other plant material protection measures herein described and specified.

1.2 REFERENCE STANDARDS

A. ANSI A300 – Tree Care Operations Standards

B. Pruning practices shall conform with recommendations "Structural Pruning: A Guide For The Green Industry"; Published by Urban Tree Foundation, Visalia, California; most current edition.

1.3 DEFINITIONS

A. Designated Trees: Existing Trees to Remain as indicated on Drawings.

B. Critical Root Zone (CRZ): The CRZ for trees 4 inches in caliper or smaller shall be an area with a radius at least 5 feet from the trunk. The CRZ for trees over 4 inches in caliper shall be an area with a radius of at least 1 foot 6 inches from the trunk for every 1 inch of caliper size.

C. Zone of Protection: As indicated in Drawings.

D. Weed: A plant that is undesirable where it is growing.

1.4 PROHIBITED ACTIVITIES

A. Cutting of roots 2 inches in diameter or larger without approval. Damaging tree bark, branches.

B. Removal of protective fencing or notice posted on trees prior to approval of Substantial Completion.

C. Activities prohibited within the Zone of Protection (without prior approval) are, but not limited to: construction, operation of machinery, storage of materials, paving, grading, cutting, filling, travel within, dumping, disposal of liquids, and parking of vehicles or equipment.

1.5 SUBMITTALS

A. Contractor shall provide a Certified Arborist who is currently certified by the International Society of Arboriculture (ISA), approved by the Engineer, to perform all tree root and canopy pruning and other necessary preservation measures outlined in this specification as needed during the course of the construction work at existing trees to remain. Submit Certified Arborist credentials to Engineer for approval.

B. Submit product literature for temporary protection fencing for approval.

PART 2 MATERIALS

2.1 TEMPORARY PROTECTION FENCING

A. Provide 42-inch-high orange mesh construction fencing with agricultural metal stakes to be set at 10 feet on center minimum.

2.2 TREE PROTECTION SIGN

A. Heavy-duty, waterproof signs, 8.5 inches by 11 inches, colored background with black 2-inch high or larger letters. The signs shall be attached to the tree protection fence every 50 feet on center. The tree protection sign shall read “Tree, Plant, and Root Protection Area – Keep Out”.

PART 3 EXECUTION

3.1 INSPECTION

A. Inspect all trees specified in the Drawings for protection prior to construction.

1. Document with written memorandum and photographs any unusual conditions.
2. Submit copies of documentation to Engineer prior to beginning work.

B. Verify all conditions in the Drawings with actual conditions at Site regarding tree protection prior to any site disturbance.

C. The Engineer must be present during demolition of existing conditions occurring within the drip line of trees designated to remain.

D. Notify Engineer 24 hours prior to inspections and/or tagging of protected trees.

3.2 PROTECTION

A. Install barricades specified in the Drawings at drip lines of trees designated to remain prior to the commencement of construction.

B. Clearly designate protected trees and clear of any material storage, personnel, or vehicular movement.

C. Provide temporary fencing, barricades, and guards as necessary or required to protect trees designated on the Drawings to remain, from damage above and below grade.

D. Protect root systems of trees and plant life to remain.

1. Protect from damage due to noxious materials in solution caused by runoff or spillage during mixing and placement of construction materials.

2. Protect from flooding, erosion, or excessive wetting resulting from dewatering operations and compaction.

3. Protect against unauthorized cutting, breaking, skinning roots and branches, or bruising bark.

4. Protect from smothering and compaction.

    a. Do not store construction materials or permit vehicles to drive or park within the drip line area of any tree to remain.

5. Protect from dumping of refuse in close proximity.

E. Where cutting is necessary, review conditions with the Engineer before proceeding, and comply with directives of Engineer.

3.3 EXCAVATION AROUND TREES

A. Excavate within drip lines of trees only where indicated on the Drawings or as directed by Engineer.

B. Where trenching for utilities is required within drip lines, tunnel under or around roots by hand excavating.

1. Where possible trench toward trunk of tree and tunnel under central root mass to avoid severing all lateral roots on side of trench.

2. Do not cut main lateral roots or tap roots over two inches in diameter unless authorized by the Certified Arborist.

3. Temporarily support and protect trees from damage until permanently covered with approved backfill.

C. Do not allow exposed roots to dry out before backfill is placed.

1. Provide temporary earth or burlap cover.
2. Water roots daily when exposed and maintain in a moist condition.

D. Backfill roots only upon inspection approval from the Engineer.

1. Backfill around root excavations only with clean imported topsoil free from materials deleterious to root growth.

2. Backfill to eliminate voids and compact only by means of manual tamping at root areas.

3. Water sufficiently to settle topsoil and eliminate voids or air pockets around roots.

4. Allow for natural settlement of soil surface, and furnish and apply topsoil sufficient to bring to original finish grade after backfill settlement.

E. If during excavation, any condition arises that threatens the survivability of the protected tree, or an unknown condition arises that affects the stability or integrity of the root system, notify the Engineer immediately.

3.4 REPAIR AND REPLACEMENT OF DAMAGED TREES

A. In the event of damage to existing trees:

1. Immediately prune limbs smaller than 3-inch caliper or roots smaller than 2-inch caliper to repair trees damaged by construction operations.

2. Make repairs promptly after damage occurs to prevent progressive deterioration of damaged trees.

3. Any such pruning and/or repairs shall be approved in advance and at completion by Engineer.

4. The Engineer shall reserve the right, at cost to the Contractor, to obtain the services of a Certified Consulting Arborist with current membership in the American Society of Consulting Arborists to determine the severity of damage.

5. The Contractor is responsible for the cost of repairs caused by their actions or by the actions of subcontractors engaged by the Contractor.

B. Remove and replace dead or damaged trees which are determined by the Engineer to be incapable of restoration to normal growth patterns at no additional cost to Owner.

1. Provide new trees of the same species as those removed or damaged, with size and/or quantity to be determined by Engineer.

2. Furnish replacement trees and plant life to the Site and plant, maintain, and warranty as directed by the Engineer.

3. If trees are not replaceable with the same species, and size, compensate the Owner for the replacement cost of the trees based on the evaluation of a Certified Consulting Arborist.

4. The Contractor is responsible for additional costs of removing damaged trees and labor for planting new specimens.

3.5 DESIGNATED TREE REMOVAL PROCEDURES

A. If designated tree removal is specified by Engineer, furnish labor, material, and equipment necessary for removing and/or salvaging existing trees, if necessary, as designated on the Drawings for removal.

1. Verify location and species with Engineer prior to removal.

B. Salable logs or timber may be sold to Contractor's benefit upon notification and prior approval of Owner. Upon approval, remove salable logs or timber promptly from site.

3.6 DESIGNATED TREE TRANSPLANTING PROCEDURES

A. If designated tree transplanting is specified by ENGINEER, verify and identify existing trees to be transplanted.

B. All work shall be in accordance with the standards and practices outlined in the following: Tree and Shrub Transplanting Manual, E.B. Himelick, 1981 Ed., International Society of Arboriculture.

C. Prior to commencement of Work, submit a coordination schedule, method of transplanting, traffic control, routing, etc., to Engineer, for review and approval.

D. Warranty for transplanted trees shall be determined and directed on a case by case basis by the Engineer, upon contracting of specified transplanting work.

E. Review and verify location of utilities in area of operation. Obtain location and jurisdictional approval from utilities prior to transplanting activities. Protect utilities and the public at all times.

F. Prior to transplanting, spray trees with an anti-desiccant emulsion-type film forming agent, "Dowax" by Dow Chemical Company, "Wilt-Pruf" by Nursery Specialty Products Inc., "D-Wax", by Plant Products Inc., or approved equal, prior to digging with two separate applications allowing 48 hours apart. Use a power sprayer to provide an adequate film over trunks, branches, stems, twigs, and foliage. Anti-desiccant must be dry prior to relocation.

G. Dig, ball and burlap, and move designated trees for relocation to the new planting location shown on the Drawings. In the event the new planting area is not prepared, place tree in a storage area approved by the Engineer solely designated for healing-in of plant materials until final planting may occur. Brace in a vertical position, provide shade, wind protection, and irrigation at plant storage area. Utilize all horticulturally proper methods for plant storage. Plants shall be maintained by Contractor while in storage.

3.7 GRADING AND FILLING AROUND TREES

A. Maintain existing grade within drip line of trees unless otherwise indicated on the Drawings or directed by the Engineer.

3.8 MAINTENANCE OF PROTECTIVE MEASURES

A. Maintain protective measures throughout the construction process. Immediately repair any alteration to protection measures throughout construction process. Repair or reinstall protective measures immediately upon alteration. Monitor protective measures daily.

B. Remove and clear area of debris and fencing, barricades, etc., upon final written approval of Engineer.

3.9 DAMAGE OR LOSS TO EXISTING PLANTS TO REMAIN

A. Actual tree damage such as trunk scoring and broken limbs or damaged roots inside the Zone of Protection will be assessed according to the percentage of loss of tree value. The percentage of tree value will be determined by the Owner's Representative. Tree value will be determined from “Evaluation of Landscape Trees, Shrubs, and Other Landscape Plants” by International Society of Arboriculture.

B. Any remedial work on damaged existing trees recommended by the consulting arborist shall be completed by the Contractor at no cost to the Owner. Remedial work shall include but is

not limited to soil compaction remediation and vertical mulching, pruning and or cabling, insect and disease control including injections, compensatory watering, additional mulching, and could include application tree growth regulators.

C. Remedial work may extend up to two years following the completion of construction to allow for any requirements of multiple applications or the need to undertake applications at required seasons of the year.

END OF SECTION

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Descriptions of requirements for products, product delivery, product storage and handling and product substitutions.

1.2 PRODUCTS

A. At minimum, comply with specified requirements and reference standards.

B. Specified products define standard of quality, type, function, dimension, appearance, and performance required.

C. Furnish products of qualified manufacturers that are suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise. Confirm that Manufacturer's production capacity can provide sufficient product, on time, to meet Project requirements.

1.3 PRODUCT DELIVERY REQUIREMENTS

A. Transport and handle products according to Manufacturer's instructions.

B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.

C. Provide equipment and personnel to handle products; use methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Store and protect products according to Manufacturer's instructions.

B. Store products with seals and labels intact and legible.

C. Store sensitive products in weathertight, climate-controlled enclosures in an environment suitable to product.

D. For exterior storage of fabricated products, place products on sloped supports above ground.

E. Provide off-Site storage and protection when Site does not permit on-Site storage or protection.

F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.

H. Provide equipment and personnel to store products; use methods to prevent soiling, disfigurement, or damage.

I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.5 PRODUCT SUBSITUTIONS

A. Products complying with specified reference standards or description are acceptable.

1. Substitution requests that impact scope, schedule and budget are unacceptable.

B. In Sections were an “or equal” is not mentioned, no options or substitutions allowed.

C. In Sections were an “or equal” is mentioned, submit a request for substitution for any manufacturer not named, adhering to the following conditions:

1. Include Section annotated with either a green ✓ or red ✗ next to all paragraphs and subparagraphs.

a. A green ✓ signifies that the proposed substitution specifically adheres to the paragraphs and subparagraphs in each Section.

b. A red ✗ signifies that the proposed substitution deviates from the paragraphs and subparagraphs in each Section. For paragraphs in which a red ✗ is utilized, provide a detailed description of the deviation.

2. Accurately and fully document any deviations within substitution request. Any undocumented deviations will be cause for rejection at the sole liability of the Contractor.

3. Include sufficient manufacturer provided literature, data sheets and drawings such that allows the Engineer to confirm that all requirements of Section are met.

PART 2 PRODUCTS - NOT USED

PART 2 EXECUTION - NOT USED

END OF SECTION

SECTION 01 75 00 - TESTING, TRAINING, AND COMMISSIONING

PART 1 GENERAL

1.1 SCOPE

This section specifies equipment and system testing and start-up, services of Manufacturer's representatives, training of Owner's personnel, and final testing requirements for the complete facility.

1.2 CONTRACT REQUIREMENTS

A. Testing, training, and start-up are requisite to the satisfactory completion of the Contract.

B. Complete all testing, training, and start-up within the Contract Time(s).

C. Furnish all necessary labor, power, chemicals, tools, equipment, instruments, and services required for and incidental to completing functional testing, performance testing, and operational testing.

D. Provide competent, experienced technical representatives of Equipment Manufacturers for assembly, installation, testing, and operator training.

1.3 START-UP PLAN

A. Submit start-up plan for each piece of equipment and each system not less than 2 weeks prior to planned initial equipment or system start-up.

B. Provide detailed Start-up Progress Schedule with the following activities identified:

1. Manufacturer’s services
2. Installation certifications
3. Operator training
4. Submission of operation and maintenance manual
5. Functional testing
6. Performance testing
7. Operational testing

C. Provide testing plan with test logs for each item of equipment and/or system. Include testing of alarms, control circuits, capacities, speeds, flows, pressures, vibrations, sound levels, and other parameters.

D. Provide summary of shutdown requirements for existing systems if required, which are necessary to complete start-up of new equipment and systems.

E. Revise and update start-up plan based upon review comments, actual progress, or to accommodate changes in the sequence of activities.

1.4 GENERAL START-UP AND TESTING PROCEDURES

A. Mechanical Systems:

1. Remove rust preventatives and oils applied to protect equipment during construction.
2. Flush lubrication systems and dispose of flushing oils. Recharge lubrication system with lubricant recommended by Manufacturer.
3. Flush fuel system and provide fuel for testing and start-up.
4. Install and adjust packing, mechanical seals, O-rings, and other seals. Replace defective seals.
5. Remove temporary supports, bracing, or other foreign objects installed to prevent damage during shipment, storage, and erection.
6. Check rotating machinery for correct direction of rotation and for freedom of moving parts before connecting driver.
7. Perform cold alignment and hot alignment to Manufacturer's tolerances.
8. Adjust V-belt tension and variable pitch sheaves.
9. Inspect hand and motorized valves for proper adjustment. Tighten packing glands to ensure no leakage but permit valve stems to rotate without galling. Verify valve seats are positioned for proper flow direction.
10. Tighten leaking flanges or replace flange gasket. Inspect screwed joints for leakage.
11. Install gratings, safety chains, handrails, shaft guards, and sidewalks prior to operational testing.

B. Electrical Systems

1. Perform insulation resistance tests on wiring except 120-volt lighting, wiring, and control wiring inside electrical panels.
2. Perform continuity tests on grounding systems.
3. Test and set switchgear and circuit breaker relays for proper operation.
4. Perform direct current high potential tests on all cables that will operate at more than 2,000 volts. Obtain services of independent testing lab to perform tests.
5. Check motors for actual full load amperage draw. Compare to nameplate value.

C. Instrumentation Systems

1. Bench or field calibrate instruments and make required adjustments and control point settings.
2. Leak test pneumatic controls and instrument air piping.

3. Energize transmitting and control signal systems, verify proper operation, ranges, and settings.

1.5 FUNCTIONAL TESTING

A. Functionally test mechanical and electrical equipment for proper operation after general start-up and testing tasks have been completed.

B. Demonstrate proper rotation, alignment, speed, flow, pressure, vibration, sound level, adjustments, and calibration. Perform initial checks in the presence of and with the assistance of the Manufacturer's representative.

C. Demonstrate proper operation of each instrument loop function including alarms, local and remote controls, instrumentation, and other equipment functions. Generate signals with test equipment to simulate operating conditions in each control mode.

D. Conduct continuous 8-hour test under full load conditions. Replace parts which operate improperly.

1.6 CERTIFICATE OF PROPER INSTALLATION

A. At completion of functional testing, furnish written report prepared and signed by Manufacturer's authorized representative, certifying equipment:

1. Has been properly installed, aligned, adjusted, and lubricated.

2. Is free of any stresses imposed by connecting piping or anchor bolts.

3. Is suitable for satisfactory full-time operation under full load conditions.

4. Operates within the allowable limits for vibration.

5. Controls, protective devices, instrumentation, and control panels furnished as part of the equipment package are properly installed, calibrated, and functioning.

6. Control logic for start-up, shutdown, sequencing, interlocks, and emergency shutdown has been tested and is properly functioning.

B. Furnish written report prepared and signed by the electrical and/or instrumentation subcontractor certifying:

1. Motor control logic that resides in motor control centers, control panels, and circuit boards furnished by the electrical and/or instrumentation subcontractor has been calibrated and tested and is properly operating.

2. Control logic for equipment start-up, shutdown, sequencing, interlocks, and emergency shutdown has been tested and is properly operating.

C. Co-sign the reports along with the Manufacturer's representative and subcontractors.

1.7 TRAINING OF OWNER'S PERSONNEL

A. Provide operations and maintenance training for items of mechanical, electrical, and instrumentation equipment. Utilize Manufacturer's representatives to conduct training sessions.

B. Coordinate training schedule with City staff. Coordinate training sessions to prevent overlapping sessions. Arrange sessions so that individual operators and maintenance technicians do not attend more than two sessions per week.

C. Provide Operation and Maintenance Manual for specific pieces of equipment or systems 2 weeks prior to training session for that piece of equipment or system.

D. Satisfactorily complete functional testing before beginning operator training.

E. The Owner may videotape the training for later use with the Owner's personnel.

1.8 MINIMUM SERVICE SCHEDULE

Minimum services as specified shall be provided in accordance with the manufacturer's recommendations.

1.9 OPERATIONAL TESTING

A. Conduct operational test of the entire facility after completion of operator training. Demonstrate satisfactory operation of equipment and systems in actual operation.

B. Conduct operational test for continuous 7-day period.

C. Owner will provide operations personnel, power, fuel, and other consumables for duration of test.

D. Immediately correct defects in material, workmanship, or equipment which became evident during operational test.

E. Repeat operational test when malfunctions or deficiencies cause shutdown or partial operation of the facility or results in performance that is less than specified.

1.10 RECORD KEEPING

A. Maintain and submit to Engineer the following records generated during start-up and testing phase of Project:

1. Daily logs of equipment testing identifying all tests conducted and outcome.
2. Logs of time spent by Manufacturer's representatives performing services on the job site.
3. Equipment lubrication records.
4. Electrical phase, voltage, and amperage measurements.
5. Insulation resistance measurements.

END OF SECTION

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.1 DESCRIPTION

A. This section includes procedural requirements for providing, compiling, and submitting operation and maintenance data required for this Project.

1.2 SUMMARY

A. This section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. General contents of data.
2. Specific data for each equipment and system.
3. Manual for materials and finishes.
4. Assembly.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

A. O&M Manual Content: Operations and maintenance manual submittal requirements are specified in individual Specification Sections for the Products for which they must be supplied. Submit reviewed manual content formatted and organized by this Section and as defined in Section 01 33 00.

1. Engineer will comment on whether content of operations and maintenance submittals are acceptable.

2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Manual Submittal: Submit an electronic copy of each manual in final form prior to requesting inspection for Substantial Completion and as defined in Section 01 33 00. Engineer will return an electronic copy with comments.

1. The Contractor to correct or revise each manual to comply with Engineer’s comments.

C. Submit one electronic and 3 hard copies of each corrected manual as a final manual within 15 days of receipt of Engineer's comments and prior to commencing startup, commissioning, and/or training.

D. After acceptance, deliver one electronic copy to the Engineer.

1.5 FORMAT (HARDCOPY)

A. Prepare data in the form of an O&M instructional manual.

B. Binders: Commercial quality, 8-1/2 x 11-inch three-hole post type binders with hardback, 3-inch maximum binder size. When multiple binders are used, correlate data into related consistent groupings. Three ring binders are not acceptable.

C. Arrange contents by Specification Section numbers and sequence of Table of Contents of this Project Manual.

D. Provide tabbed fly leaf for each separate product and system, with printed description of product and major component parts of equipment. Insert type tab labels must be secured or bonded to prevent the labels from falling out.

E. Text: Manufacturer's printed data, or typewritten data on 20-pound paper.

F. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages and insert into clear plastic envelopes that can be secured into the three-hole post binders.

1.6 FORMAT (ELECTRONIC DOCUMENTATION)

A. The Contractor must provide Operation and Maintenance Manual information specific to the configuration of the Project in electronic form that is substantively the same as that hard copy materials. Documents should be formatted like a web site complete with index page and Table of Contents. The electronic format must be such that the Owner is able to load the files onto a server to provide online access via any standard web browser. The Contractor shall make use of HTML (for text-based documents) and PDF (for CAD type drawings) file formats. The complete document shall be provided on a flash drive.

B. The electronic O&M data must be organized in a logical manner to aid operation in troubleshooting and information retrieval.

1.7 QUALITY ASSURANCE

A. Preparation of data shall be performed by personnel:

1. Trained and experienced in O&M of described equipment.
2. Familiar with requirements of this section.
3. Skilled as technical writers to the extent required to communicate the essential data to the Reader.
4. Skilled as drafters competent to prepare any required drawings.

1.8 SUPPLEMENTS

A. The supplements listed below, following "END OF SECTION" are part of this Specification.

1. 01 78 23A, Contractor Submittal Form
2. 01 78 23B, Equipment Data Form

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 GENERAL CONTENTS OF DATA

A. Each individual manual shall contain equipment data pertaining to not more than one Specification section number as indicated in the Contract Documents.

1. Completed Contractor Submittal Form (01 78 23A). An electronic copy of the form can be provided to the Contractor upon request

B. Title Sheet: First page in data listing following:

1. Title: “OPERATION AND MAINTENANCE INSTRUCTIONS”.

2. Title of Project: As shown in Contract Documents.

3. Name(s) of applicable building(s) or structure(s) in which equipment is located.

4. Name of equipment as described in Contract Documents.

5. Contractor’s name, address, and telephone number.

6. Subcontractor’s name, address, and telephone number if equipment is provided by Subcontractor.

7. Contractor’s or Subcontractor’s purchase order number, Manufacturer’s shop order number or other such numbers required for parts and service ordering.

8. Manufacturer’s name, address, and telephone number.

9. Name, address, and telephone number for local source of supply for parts and service.

C. Equipment List: Immediately following title sheet containing the following:

1. Table of Contents: Immediately following equipment list. Arrange in logical, systematic order and shall include as minimum each tabbed divider. Each page shall be numbered.

2. Tabbed Dividers: Insert tabbed section dividers between each major section

a. Provide title of section on each tab.
b. Provide table of contents for each tabbed section, arranged in systematic order.

3. Equipment Data Sheets: Provide catalog sheets showing configuration, Manufacturer’s specifications, models, options, and styles of equipment and major components being provided. Product data sheets will show project specific information with inapplicable information deleted by crossing out or removal. Include in tabbed section(s).

4. Text:

a. Include only those sheets applicable to Project.

b. Each sheet shall:

1) Identify specific equipment or part installed.
2) Identify text applicable to equipment or part installed.
3) Do not include inapplicable information or neatly strike it out.

5. Drawings:

a. Supplement text with drawings to clearly illustrate following:

1) Equipment and components.
2) Relations of component parts of equipment and systems.
3) Control and flow diagrams.

b. Actual drawings of equipment from Manufacturer. "Typical" drawings are not acceptable unless they accurately illustrate actual installation for this contract.

6. Specially written information, as required to supplement text for particular installation.

a. Provide explanation of interrelationships of equipment and components, and effects one component has on another or entire system.

b. Provide overall instructions and procedures for equipment tying in instructions and procedures for separate components into unified instructional package.

c. Provide glossary of any special terms used by the Manufacturer if applicable.

d. Organize in consistent format under separate headings for different O&M procedures.

e. Provide logical sequence of instructions in order of O&M action required for each procedure.

3.2 SPECIFIC DATA FOR EACH ITEM AND/OR SYSTEM

A. For each item of equipment and system include:

1. Completed Equipment Data Form (01 78 23B). An electronic copy of the form can be provided to the Contractor upon request.

2. Description of equipment and component parts:

a. Function

b. Normal operating characteristics

c. Limiting conditions.

d. Performance curves

e. Engineering data

f. Test as applicable.

g. Complete nomenclature and model number of replaceable parts including keyed labeled exploded diagram.

h. Complete nameplate data.

i. Owner's tag (or asset) numbers for equipment as indicated on the Contract Drawings.

3. Operating Procedures:

   a. Startup and break-in.
   b. Normal operating instructions.
   c. Regulation and control
   d. Stopping and shutdown,
   e. Emergency instructions.
   f. Summer and winter operating instructions, as applicable.
   g. Special operating instructions.

4. Maintenance Procedures:

   a. Routine maintenance operations.
   b. Guide to troubleshooting.
   c. Disassembly, repair, and reassembly instructions.
   d. Alignment, adjusting, and checking instructions.

5. Servicing and Lubrication Schedule:

   a. List of lubricants required and quantity to be applied.
   b. Schedule of lubrication.
   c. Schedule for other routine maintenance.

6. Manufacturer's printed instructions regarding safety precautions for both (a) protection of personnel operating equipment and systems and (b) prevention of damage to equipment and systems.

7. Description of sequence of operation of controls.

8. Assembly drawings and diagrams required for maintenance.

9. Manufacturer's parts list and illustrations

   a. Predicted life of parts subject to wear.
   b. Items recommended to be stocked by the Owner as spare parts and quantities of same.

10. Accepted control diagrams such as ladder diagrams, instrumentation loop diagrams, and electrical schematics.

11. Bill of material.

12. Other data as required under applicable Specification sections.

B. Each electric and electronic system, as applicable to equipment such as switchgear, motor control centers, panel boards, switchboards, starters, breakers, and relays shall include:

1. Description of System and Component Parts:

    a. Function
    b. Normal operating characteristics
    c. Limiting conditions.
    d. Performance curves
    e. Engineering data
    f. Rating tables
    g. Tests, as applicable.
    h. Complete nomenclature and model number of replaceable parts.
    i. Complete nameplate data.
    j. Owner's Tag (asset) numbers for equipment as indicated on the Contract Drawings.

2. Circuit Directories of Panel Boards:

    a. Electrical service.
    b. Controls.
    c. Communications.

3. Complete instrumentation

    a. Loop diagrams
    b. Tabulated listing of components in each control circuit or loop.

4. Operating Procedures:

    a. Routine and normal operating instructions.
    b. Sequences required.
    c. Special operating instructions.

5. Maintenance Procedures:

    a. Routine maintenance operations.
    b. Guide to troubleshooting.
    c. Disassembly, repair, and reassembly instructions.
    d. Adjustment and checking instructions.

6. Manufacturer's printed instructions regarding safety precautions for both:

    a. Protection of personnel operating equipment and systems.
    b. Prevention of damage to equipment and systems.

7. List of all of original Manufacturer's components, spare parts with diagram, and recommended quantities to be maintained in storage by the Owner.

8. Other data as required under pertinent sections of Specifications.

C. Prepare and include additional data when need for such data becomes apparent during instruction of Owner's personnel. Differences between the equipment O&M manual and the

Manufacturer's training session shall result in the training and/or O&M Manual being corrected.

3.3 MANUAL FOR MATERIAL AND FINISHES

A. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Provide information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Include Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Additional Requirements: As specified in individual product specification sections.

E. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

3.4 ASSEMBLY

A. Assemble in 3 sets.

B. Remove bindings of individual manuals.

C. Insert index tabs labeled with the respective piece of equipment to separate individual manuals.

D. Provide a Table of Contents at the front of each volume showing the equipment items in the order in which they appear in the volume. Each equipment items shall include the functional name, applicable specifications section, and the plan listing, if any.

E. The preventive maintenance schedule shall be bound in the front of each section immediately following the index tab sheet. The schedule shall be identified with respect to the piece of equipment it is referring to.

F. Sheet Size: 8-1/2 x 11 sheets.

G. Drawings may be on 11 x 17-inch sheets folded to 8-1/2 x 11 inches.

H. Engrave on covers and end of binder, title OPERATIONS AND MAINTENANCE INSTRUCTIONS, name of Project, Owner's project number, date of Contract, and volume number with subject matter of contents, and Engineer's name.

END OF SECTION

01 78 23A	CONTRACTOR SUBMITTAL FORM		
TO: (Engineer) (Address) (City, State, Zip) (Attn:)		DATE:	
		SPECIFICATION SECTION TITLE:	
		SECTION NO.:	
		MANUFACTURER/ VENDOR:	
FROM: (Contractor) (Address) (City, State, Zip)		NO. OF COPIES SUBMITTED TO ENGINEEER:	
		SIGNATURE OF CONTRACTOR:	

GENTLEMEN:
We have checked the O&M manual submittal dated _____, 20__, and have found it to be in accordance with the requirements of Specification Section 01 78 23 as noted below.

FORMAT
Size: 8-1/2 x 11 or 11 x 17
Paper: 20-lb minimum
Text: Printed data/neatly typed
Drawings: Standard size bound in text; in text-size labeled envelopes
Tabbed Section Dividers
Cover Label: Title
Project name
Building/structure ID
Equipment name
Specification section
Binders: 3-ring

CONTRACTOR SUBMITTAL FORM			Page 2 of 5
Provided	Not Applicable	Page No.	
3.01 GENERAL CONTENTS			
			A. Section number - one specification only
			B. Title Page
			1. Title
			2. Project title
			3. Building/structure ID
			4. Equipment name
			5. Contractor ID
			6. Subcontractor ID
			7. Purchase order data
			8. Manufacturer ID
			9. Service/parts supplier ID
			C. Product List
			D. Table of Contents
			E. Tabbed Sections
			F. Pertinent data sheets
			1. Annotated as needed
			G. Text
			1. Pertinent to project
			2. Annotated
			H. Drawings
			1. Supplement text
			a. Illustrate product and components
			b. Relations of equipment systems
			c. Control and flow diagrams
			2. Actual drawing of project equipment

CONTRACTOR SUBMITTAL FORM			Page 3 of 5
Provided	Not Applicable	Page No.	
3.01 GENERAL CONTENTS			
			I. Special Information
			1. Interrelationships of equipment and components
			2. Instructions and procedures provided
			3. Instructions organized in consistent format
			4. Instructions in logical sequence
			5. Glossary
			J. Warranty, Bond, Service Contract
3.02 SPECIFIC CONTENTS (EQUIPMENT/SYSTEMS ONLY)			
			A. For each item of equipment
			1. Complete Form 2 to Section 01 78 23
			2. Description of Unit and Components
			a. Equipment functions
			b. Normal operating characteristics
			c. Limiting conditions
			d. Performance curves
			e. Engineering data
			f. Test data
			g. Replaceable parts list (with numbers)
			h. Nameplate data
			i. P&ID numbers
			3. Operating Procedures
			a. Startup, break-in
			b. Routine/normal operation
			c. Regulation and control
			d. Stopping and shutdown
			e. Emergency

CONTRACTOR SUBMITTAL FORM			Page 4 of 5
Provided	Not Applicable	Page No.	
3.02 SPECIFIC CONTENTS (EQUIPMENT/SYSTEMS ONLY)			
			3. Operating Procedures (continued)
			f. Seasonal operation
			g. Special instructions
			4. Maintenance Procedures
			a. Routine/normal instructions
			b. Troubleshooting guide
			c. Disassembly/repair/assembly
			d. Alignment, adjusting and checking instructions
			5. Servicing and Lubrication
			a. List of lubricants
			b. Lubrication schedule
			c. Maintenance schedule
			6. Safety Precautions/Features
			7. Sequence of Operation of Controls
			8. Assembly Drawings
			9. Parts List and Illustrations
			a. Predicted life
			b. Spare parts list
			10. Control Diagrams/Schematics
			11. Bill of Materials
			12. Other Data as Required

CONTRACTOR SUBMITTAL FORM			Page 5 of 5
Provided	Not Applicable	Page No.	
3.02 SPECIFIC CONTENTS (EQUIPMENT/SYSTEMS ONLY)			
			B. Each electrical and electronic system
			1. Description
			a. Equipment functions
			b. Normal operating characteristics
			c. Performance curves
			d. Engineering data
			e. Test data
			f. Replaceable parts list (with numbers)
			g. Nameplate data
			h. P&ID numbers
			2.Circuit and Panel Board Directories
			a. Electrical
			b. Controls
			c. Communications
			3. Instrumentation
			a. Loop Diagrams
			b. Components list each circuit/loop
			4. Operation Procedures
			a. Routine/normal operating instructions
			b. Sequences required
			c. Special operating instruction
			5. Maintenance Procedures
			a. Routine/normal instructions
			b. Troubleshooting guide
			c. Disassembly/reassembly
			d. Adjusting and checking
			6. Safety Precautions/Features
			7. Spare Parts List
			8. Additional Data

01 78 23B	EQUIPMENT DATA FORM		
PROJECT NAME			
CONTRACT NO.			
CONTRACTOR			
EQUIPMENT NO.		ASSET NO.*	
DESCRIPTION		MAINT. NO.*	
LOCATION			
MANUFACTURER			
PURCHASED FROM			
VENDOR ORDER NO.		PURCHASE $	
DATE OF PURCHASE			
LOCAL SUPPLIER			
ADDRESS			
PHONE NO.			
MODEL NO.			
NO. OF UNITS		SERIAL NOS.	
*By Owner			

EQUIPMENT DATA FORM			Page 2 of 4
NAMEPLATE DATA			
ELECTRIC MOTOR		PUMP/HVAC UNIT	
MANUFACTURER		MANUFACTURER	
TYPE	[ ] AC [ ] DC	TYPE	
HORSEPOWER		SIZE	
RPM		CAPACITY	
VOLTAGE		PRESSURE	
AMPERAGE		ROTATION	
PHASE		IMPELLER SIZE	
FRAME		IMPELLER MATERIAL	
DRIVE/REDUCER		OTHER (I&C)	
MANUFACTURER		MANUFACTURER	
TYPE	[ ] GEAR [ ] V-BELT [ ] CHAIN [ ] VARIDRIVE	TYPE	
		SIZE	
SERVICE FACTOR		CAPACITY	
RATIO		RANGE	

EQUIPMENT DATA FORM			Page 3 of 4
MAINTENANCE SUMMARY			
EQUIPMENT NO.		ASSET NO.*	
DESCRIPTION		MAINT. NO.*	

MAINTENANCE OPERATION:	FREQUENCY:
List briefly each Maintenance Operation required and refer to specific information in Manufacturer's Manual, if applicable. Refer by symbol to "Lubricant List" for Lubrication Operation.	List required frequency of each maintenance operation.
*By Owner	

EQUIPMENT DATA FORM				Page 4 of 4
LUBRICANT/RECOMMENDED SPARE PARTS LIST				
EQUIPMENT NO.		ASSET NO.*		
DESCRIPTION		MAINT. NO.*		
LUBRICANT LIST				
REFERENCE SYMBOL	LUBRICANT TYPE (MILITARY STANDARD)	RECOMMENDED LUBRICANT AND MANUFACTURER		
List symbols in "Maintenance Operation" (Page 3).	List general lubricant type.	List specific lubricant name, viscosity, and Manufacturer.		
RECOMMENDED SPARE PARTS LIST				
PART NO. **	DESCRIPTION	UNIT	QUANTITY	UNIT COST
ADDITIONAL DATA AND REMARKS				
* By Owner ** Identify parts provided by this contract with two asterisks. Note: Attach additional sheets if necessary; identify each sheet at top with equipment number and description.				

SECTION 02 30 00 - SUBSURFACE INVESTIGATION

PART 1 GENERAL

1.1 SUMMARY

A. Subsurface investigations and reporting have been performed for the purpose of obtaining data for the planning and design of this project. Copies of such reporting are attached to the Contract Documents as Supplementary Information.

1.2 LIMITATIONS

A. The subsurface investigations and reporting are being made available solely for the convenience of the Bidder and shall not relieve the Bidder or the Contractor of any risk, duty to make examinations and investigations as required by Section 4.02 of the Contract General Conditions, or any other responsibility under the Contract Documents.

B. It is mutually agreed to by all parties:

1. Written reports are reference documents and are not part of the Contract Documents.

2. Subsurface investigations are for the purpose of obtaining data for planning and design of the project.

3. Data concerning borings and test pits is intended to represent with reasonable accuracy conditions and material found in specific borings and test pits at the time the borings and test pits were made.

C. It is expressly understood and agreed the Owner and Engineer assume no responsibility whatsoever in respect to the sufficiency or accuracy of the investigation thus made, the records thereof, or of the interpretations set forth therein, or made by the Owner in his use thereof; and there is no warranty or guarantee, either expressed or implied, that the conditions indicated by such investigations, or records thereof, are representative of those existing throughout such areas, or any part, or that unforeseen developments may not occur.

D. The Owner's subsurface investigations and reporting are made available to Bidder or Contractor only on the basis of the understandings and agreement herein stated.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 02 41 00 - DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of existing facilities.
2. Abandoning and removing utilities.

B. Related Sections:

1. Section 31 05 16 - Aggregates for Earthwork
2. Section 31 10 00 - Site Clearing
3. Section 31 22 13 - Rough Grading
4. Section 31 23 16 - Excavation
5. Section 33 05 50 - Existing Pipe Abandonment
6. Pre-Demolition Hazardous Building Materials Survey Report – Supplemental Materials, PBS, September 2021

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Submit to Engineer a copy of written permission of private property owners, with copy of fill permit for said private property, as may be required for disposal of materials.

1.3 QUALITY ASSURANCE

A. Existing Conditions: Determine the extent of work required and limitations before proceeding with Work.

B. Conform to applicable local, state, and federal codes for environmental requirements in relation to disposal of debris.

1. Burning at the Site for the disposal of refuse, debris, and waste materials resulting from demolition and site clearing operations shall not be permitted.

C. Permits: The Contractor is responsible for obtaining all necessary permits required for completion of the Work described in this Section.

D. Protection of Persons and Property: Meet all federal, state, and local safety requirements for the protection of workmen, other persons, and property in the vicinity of the Work and requirements of the General Provisions.

E. If the existing material to be demolished and removed contains any hazardous materials which will require special handling upon removal, such as asbestos or lead, it is the responsibility of the Contractor to remove and dispose of the material in accordance with all applicable federal, state, and local regulations.

1. See the Pre-Demolition Hazardous Building Materials Report included in the supplementary materials of the Contract Documents.

PART 2 PRODUCTS

2.1 MATERIALS

A. Existing Materials: All materials, equipment, miscellaneous items, and debris involved, occurring, or resulting from demolition, clearing, and grubbing work shall become the property of the Contractor at the place of origin, except as otherwise indicated in the Drawings or Specifications.

B. Crushed Rock: As specified in Section 31 05 16-2.1, Aggregates for Earthwork. Of the size shown in the Drawings or specified herein.

C. Sand: As specified in Section 31 05 16-2.2, Aggregates for Earthwork.

PART 3 EXECUTION

3.1 EXAMINATION

A. The Owner assumes no responsibility for the actual condition of the facilities to be demolished. The Contractor shall visit the site, inspect all facilities and be familiar with all existing conditions and utilities.

B. Demolition drawings identify major equipment and structures to be demolished only. Auxiliary utilities such as water, air, chemicals, drainage, lubrication oil, hydraulic power fluid, electrical wiring, controls, and instrumentation are not necessarily shown shall be considered incidental to all demolition work.

C. Identify waste and salvage areas for placing removed materials.

3.2 PREPARATION

A. Carefully coordinate the work of this Section with all other work and construction.

B. Call Local Utility Line Information service at 1-800-332-2344, not less than three working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

2. Disconnect or arrange for disconnection of utilities (if any) affected by required work.

3. Keep all active utilities intact and in continuous operations.

3.3 PROTECTION

A. Utilities: Locate, identify, and protect utilities located by utilities and indicated in the Drawings to remain from damage.

B. Survey control: Protect benchmarks, survey control points, and existing structures from damage or displacement.

C. Preservation and Trimming of Trees, Shrubs and Other Vegetation: As specified in Section 31 10 00-3.4.C, Site Clearing.

D. Landscaped Areas: Protect existing landscaped areas as specified in Section 31 10 00-3.4.D, Site Clearing.

E. Miscellaneous Site Features: Protect all existing miscellaneous site features from damage by excavating equipment and vehicular traffic, including but not limited to existing structures, fences, mailboxes, sidewalks, paving, guy wires, utility poles, and curbs.

F. Repair and Replacement:

1. Damaged items, including but not restricted to those noted above, shall be repaired, or replaced with new materials as required to restore damaged items or surfaces to a condition equal to and matching that existing prior to damage or start of Work of this contract.

2. Any damage to existing facilities or utilities to remain as caused by the Contractor's operations shall be repaired at the Contractor's expense.

3.4 DEMOLITIONS

A. Areas which are to be excavated for the purpose of demolition shall be cleared and stripped in accordance with Section 31 10 00-3.6, Site Clearing.

B. Carefully consider all bearing loads and capacities for placement of equipment and material on site. In the event of any questions as to whether an area to be loaded has adequate bearing capacity, consult with Engineer prior to the placement of such equipment or material.

3.5 EXISTING WATER UTILITY PIPING ABANDONMENT

A. As specified in Section 33 05 50, Existing Pipe Abandonment.

3.6 ELECTRICAL AND CONTROL SYSTEM DEMOLITION

A. All electrical and control system demolition work shall at all times be conducted in a safe and proper manner to avoid injury from electrical shock to all personnel.

1. Electrical equipment to be shut off for a period of time shall be tagged, locked out, and sealed with a crimped wire and lead seal and made inoperable.

2. At no time shall live electrical wiring or connections or those which can become energized be accessible to any persons without suitable protection or warning signs.

3.7 ASPHALTIC CONCRETE DEMOLITION

A. Asphalt pavement shall be removed to the limits shown in the Drawings.
B. The limits of the removal shall be saw cut.
C. Asphalt pavement may not be used as rubble fill.

3.8 REMOVAL

A. Remove debris, rock, excavated materials, rubble, abandoned piping, and extracted plant life resulting from abandonment and/or demolition activities from site.

B. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site.

C. Removal: All material resulting from demolition, clearing, and grubbing, and trimming operations shall be removed from the Project Site and disposed of in a lawful manner. Materials placed on property of private property owners shall be by written permission only.

3.9 GRADING

A. All grading work shall be completed in accordance with Section 31 22 13, Rough Grading.

3.10 CLEANUP

A. During and upon completion of work, promptly remove all unused tools and equipment, surplus materials, debris, and dust and shall leave all areas affected by the work in a clean, condition, as may be subject to Engineer approval.

B. Adjacent structures shall be cleaned of dust, dirt, and debris resulting from demolition.

C. Adjacent areas shall be returned to their existing condition prior to the start of work.

END OF SECTION

SECTION 03 01 30 - CONCRETE REPAIR AND REHABILITATION

PART 1 GENERAL

1.1 THE SUMMARY

A. Remove, repair, or rehabilitate new and existing concrete members and surfaces as indicated.

B. Provide all materials and equipment necessary to accomplish the WORK.

C. Repair damage to concrete and concrete surfaces which results from the removal of embedded items, from construction activities, or which existed previously in structures indicated to be repaired.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. ACI 201.1R Guide for Making a Condition Survey of Concrete in Service

B. ACI 546R Concrete Repair Guide

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 01 33 00 – Contractor Submittals.

B. Shop Drawings

1. Submit Shop Drawings for strengthening required around new openings.

2. Submit detailed drawings showing proposed methods for supporting existing structures, equipment, and piping during demolition and repair activities.

C. Concrete Repair Products and Procedures

1. Submit a comprehensive plan for each repair method indicated within this Section, the plan shall including the following:

a. Manufacturer's literature containing instructions and recommendations on the mixing, handling, placement, curing, and appropriate uses for each product.

b. Curing products and procedures for each repair method for which curing is recommended by the manufacturer.

1.4 QUALIFICATIONS OF CONCRETE RESTORATION FIRMS

A. The concrete restoration WORK shall be performed by an experienced firm customarily engaged in performing similar repair work on cast-in-place concrete structures.

B. The restoration firm shall have completed at least 5 similar projects in the last 5 years.

C. The restoration firm shall be certified by the manufacturer of the repair materials.

1.5 QUALITY ASSURANCE

A. Field Tests of Cement Based Mortars and Grouts

1. The ENGINEER may take compression test specimens during construction from the first placement of each type of mortar or grout, and at intervals thereafter as selected by the ENGINEER in order to ensure continued compliance with the indicated requirements.

2. The CONTRACTOR shall assist the ENGINEER in obtaining specimens for testing.

3. The compression tests and fabrication of specimens for repair mortar and non-shrink grout will be performed as specified in ASTM C 109.

4. A set of 5 specimens will be made for testing at 7 days, 28 days, and additional time periods as appropriate.

5. Any material, already placed, which fails to meet the indicated performance requirements is subject to removal and replacement as part of the WORK.

6. The cost of laboratory tests on mortar and grout will be paid by the OWNER, but the CONTRACTOR shall be responsible for the cost of any additional tests and investigation on the WORK that does not meet the indicated requirements.

7. The CONTRACTOR shall supply all necessary materials for fabricating the test specimens.

B. Repair Concrete: Repair concrete shall be tested as required in Section 03 31 00 – Cast-in-Place Concrete.

C. Epoxy Grout: Epoxy grout shall be tested as required in Section 03 60 00 – Grouting.

D. Construction Tolerances: Construction tolerances shall comply with the requirements of Section 03 31 00 – Cast-in-Place Concrete, except as otherwise indicated.

PART 2 PRODUCTS

2.1 GENERAL

A. All products and materials in contact with potable water shall be certified as being in conformance with ANSI/NSF Standard 61 – Drinking Water System Components – Health Effects.

2.2 REPAIR MORTAR

A. Provide repair mortar as a pre-packaged, 2-component, polymer-modified, cementious, non-sag mortar, specifically formulated for the repair of surface defects.

B. Provide the mortar with a penetrating corrosion inhibitor.

C. Repair mortar shall have the following properties:

Physical Property	Value	ASTM Standard
Compressive Strength (min.)		C-109

at 7 days 7000 psig at 28 days 2200 psig	6000 psig 7000 psig	
Bond Strength (min.) 98% C-666 at 28 days	2200 psig	C-882 (modified)
Freeze/Thaw resistance (min.) 300 cycles	98 percent	C-666

D. Provide a minimum repair thickness of 1/4 inch, unless otherwise indicated.

E. Repair Mortar shall be **SikaTop 123 Plus**, by **Sika Corporation**, or equal.

2.3 NON-SHRINK GROUT

A. Provide non-shrink grout conforming to the requirements of Section 03 60 00 – Grouting.

2.4 CONCRETE MATERIALS

A. Cement

1. Use Type II Portland cement unless otherwise indicated.

2. Where repairs are to be made on wall surfaces open to view and above normal water surface elevations, blend white Portland cement with the Type II cement as needed in order to match the color of the adjacent existing concrete surface.

B. Structural Repair Grout

1. Where required, provide structural repair grout meeting the requirements of Section 03 60 00 – Grouting.

2. Provide a minimum repair thickness of 3 inches.

C. Cement Grout

1. Provide cement grout that meets the requirements of Section 03 60 00 – Grouting.

2. Provide a minimum repair thickness of one inch.

D. Miscellaneous Materials**:** For concrete construction materials not covered specifically in this Section, conform to the requirements of Section 03 31 00 – Cast-in-Place Concrete.

2.5 AGGREGATE

A. Obtain the written permission of the manufacturer and ENGINEER before using aggregate to extend repair mortar and grout products.

B. If allowed and unless otherwise indicated, provide aggregate consisting of 3/8-inch clean, washed gravel or crushed stone as required in Section 03 31 00 – Cast-in-Place Concrete.

2.6 BONDING AGENT AND ANTI-CORROSION COATING

A. Provide a bonding agent that is a solvent-free, moisture-tolerant, epoxy-modified, cementitious product, specifically formulated as a bonding agent and anti-corrosion coating.

B. Bonding Agent shall be **Armatec 110 EpoCem**, by **Sika Corporation**, or equal.

2.7 EPOXY GROUT

A. Provide an epoxy grout conforming to the requirements of Section 03 60 00 – Grouting.

2.8 EPOXY RESIN

A. Use epoxy resin for structural crack repair.

B. For crack injection, provide a 2-component, moisture-tolerant, low-viscosity, high-strength epoxy resin adhesive that is specially formulated for that usage.

C. Provide a minimum bond strength of 2900 psi when tested per ASTM C 882 at 14 days, moist cured.

D. Epoxy Resin shall be Sikadur 35, Hi-Mod LV, by Sika Corporation, KEMKO 068 LoVis IR, by ChemCo Systems, Inc., or equal.

2.9 PROTECTIVE COATING

A. Waterproofing

1. Provide a 2-component, polymer-modified, cementitious waterproofing and protective slurry mortar for concrete.

2. Apply the material in 2 coats, with a coverage of 40 sq ft/gal/coat.

3. Waterproofing shall be **Sika Top Seal 107**, by **Sika Corporation**, or equal.

2.10 FORMWORK

A. Where needed, provide formwork that meets the requirements of Section 03 11 00 – Concrete Formwork.

2.11 REINFORCEMENT STEEL

A. Where required, provide reinforcing steel that meets the requirements of Section 03 21 00 – Reinforcement Steel.

2.12 POLYURETHANE SEALANT

A. Provide a 2-part polyurethane, gun-grade sealant.
B. Polyurethane Sealant shall be **Sikaflex – 2C**, by **Sika Corporation**, or equal.

2.13 POLYURETHANE CHEMICAL GROUT

A. Use polyurethane chemical grout for non-structural crack repair.

B. Polyurethane Chemical Grout shall be SikaFix HH, by Sika Corporation, Flex LV PURe, by WR Grace/De Neef, Flex SLV PURe, by WR Grace/De Neef, or equal.

2.14 EXPANSION JOINTS

A. Provide an expansion joint system for repair of the existing expansion joints, consisting of a Hypalon sealing strip and an epoxy adhesive in order to provide a watertight seal.

B. Expansion Joint System shall be **Sikadur Combiflex**, by **Sika Corporation**, or equal.

2.15 HYDROPHILIC WATERSTOP

A. Provide hydrophilic waterstop of the type which expands in the presence of water to form a watertight joint seal without damaging the concrete in which it is cast.

B. Provide hydrophilic waterstop that is bentonite-free, and manufactured from chloroprene rubber and modified chloroprene rubber with hydrophilic properties.

C. Hydrophilic Waterstop shall be Hydrotite RSS-040 P, by Greenstreak Group, Inc., KM 4mm String, by Adeka Ultra Seal, or equal.

2.16 HIGH STRENGTH EPOXY GEL

A. High-Strength Epoxy Gel for crack surface sealing shall be **Denepox Rapidgel**, by **WR Grace/De Neef**, or equal.

PART 3 EXECUTION

3.1 GENERAL

A. Repairs

1. Repair techniques will be reviewed during the pre-construction meeting between the CONTRACTOR, ENGINEER, and OWNER.

2. The CONTRACTOR shall be familiar with the cause of deteriorated concrete and shall choose the right equipment, repair materials and techniques to be used for each particular repair.

3. Choose repair materials to match the adjacent concrete surface in color and texture.

4. Apply repair materials in strict accordance with the manufacturer's printed instructions, including temperature and moisture requirements throughout application and curing.

5. Protect adjacent portions of the structure, including all valves, pipes, mechanical equipment, and filter media from debris generated by repair activities.

6. For portions of the structure that are not identified to be repaired, maintain in their original condition.

B. Structural Stability

1. Use caution not to weaken the structural capacity of a beam, column, wall, slab, walkway, or other concrete member during concrete removal.

2. For severely deteriorated concrete members, consult with the ENGINEER before removing a major portion of any structural member.

3. Shoring may be required in order to support the structure and to protect workers.

3.2 REPAIR SEQUENCING

A. Unless otherwise indicated, perform concrete repairs in the following sequence, with no activity in an area being started until previous activities in that area have been completed, including curing, cleanup, and the like:

1. removal of equipment, miscellaneous metals, and other surface features that would interfere with the repair;

2. removal of concrete sections which require complete replacement;

3. surface preparation hydroblasting over the entire area to be repaired;

4. embedded metal repair;

5. crack repair;

6. filter trough to wall connection repair;

7. spalled and delaminated concrete repair;

8. scaled concrete;

9. pop-out repair, and repair of other surface damage, deterioration, or defects;

10. patching of holes in concrete;

11. replacement of concrete sections which require complete replacement;

12. new construction;

13. application of protective coatings;

14. expansion joint repair; and,

15. installation of traffic topping.

B. For areas which require combinations of spalled and delaminated concrete repair, scaled concrete, and pop-out repair, perform these repairs at the same time.

C. Limit the size of the repair area in order to permit the repairs to be performed together, without sacrificing the quality of the individual repairs.

3.3 EMBEDDED METAL REPAIR

A. Unless otherwise indicated, repair anchor bolts and other embedded metal, except rebar, that are exposed at the concrete surface and are showing signs of corrosion, as follows:

1. Cut off or otherwise remove corroded metal fastened at the surface;

2. Burn back embedded metals to a depth of at least 1.5 inches beyond the surface of sound concrete;

3. Chip away unsound concrete around the embedded metal.

4. Apply epoxy grout to the repair area until level with the surface of the surrounding sound concrete.

B. Unless otherwise indicated, repair embedded rebar that is exposed at the concrete surface following the procedures outlined in the appropriate concrete repair subsection, below.

3.4 CRACK REPAIR

A. Structural Cracks - Structural Cracks are defined as follows:

1. All cracks where reinforcing steel is passing across the crack, including erratic cracks, and cracks at construction joints.

2. Repair structural cracks with epoxy resin.

B. Non Structural Cracks - Non Structural Cracks are defined as follows:

1. Cracks occurring at flexible joints, contraction joints or expansion joints.
2. Repair non-structural cracks with polyurethane chemical grout.

C. Efflorescence

1. Prior to the crack repair, clean efflorescence from the cracks and the surrounding area.
2. Clean the efflorescence by light hydro-blasting or scrubbing.

D. Pressure Injection: Pressure Injection to be performed prior to leak testing and roof membrane installation.

1. General

a. The indicated repair materials have been selected to minimize the loss of material during the injection process. The areas selected for crack repair are to be identified by the Contractor, Engineer or Construction Manager and be determined prior to leak tests and roof membrane installation. The injection of cracks may also be required as a result of the leak test.

b. In order to avoid excessive loss of injected material at the lower exposed portions of the cracks, space the injection ports a distance no greater than the thickness of the wall being repaired.

2. Open through thickness structural cracks are to be repaired to deliver a water tight hydraulic structure passing the specified leakage test. All 3 foot long minimum or greater through thickness cracks greater than a minimum 15 mil thickness in the walls are to be injected unless they do not accept grout. All 2 foot long minimum through thickness cracks greater than 10 mil thickness in the foundation, water conduits, floor slabs and roof are to be injected unless they do not accept grout. Perform structural crack repairs by pressure injection in accordance with the manufacturer's directions, and in accordance with the following basic procedure:

    a. Remove unsound and foreign materials from the crack in a manner that does not trap debris in the crack and prevent the flow of repair materials.

    b. Remove any contamination by flushing with water or solvent, allowing adequate time for air-drying or blow out the solvent with compressed air. For potable water applications, any solvents must be fully flushed from the joint unless NSF/ANSI Standard 61 approved.

    c. Install the injection ports in accordance with the manufacturer's directions.

    d. Sealing

        1) Seal the surface in order to keep the pressure injecting materials from leaking out before it has set or gelled.

        2) Seal a surface by brushing an epoxy over the surface of the crack and allowing it to harden, or use high injection pressures to cut-out the cracks in a 'V' shape, fill with an epoxy, and strike off flush with the surface.

        3) Surface patching or sealant shall be performed where needed to provide for complete penetration of the injected polyurethane grout and to prevent wastage. Seal surface of crack with fast setting hydraulic cement or high strength epoxy gel. The floor surface along the cracks shall be cleaned and all wasted grout and surface seal material shall be completely removed from the concrete surface following completion of the repair work

    e. Inject the repair materials, with consideration of the following items:

        1) Carefully select the pressure of the hydraulic pump or other device, because too much pressure can extend the existing cracks and cause more damage.

        2) For vertical cracks, start by pumping material into the entry port at the lowest elevation until the material level reaches the entry port above, then cap the lower injection port and repeat the process at successively higher ports until the crack has been completely filled.

        3) For horizontal cracks, start at one end of the crack and work to the other end, filling the crack until the pressure can be maintained.

        4) For very fine cracks, start the injection of repair material at the widest end and proceed toward the thinner end, using low-viscosity repair material.

f. Cleanup

1) Remove the surface seal by grinding or other appropriate means.

2) Coat fittings and holes at injection ports with an epoxy patching compound.

3) If crack repairs are part of repair for surface defects, painting with epoxy is not necessary and surface preparation may be started after crack repairs have been completed.

3. Open through thickness non-structural cracks are to be repaired to deliver a water tight hydraulic structure passing the specified leakage test. Open through thickness cracks with lengths of at least 3 feet on each side of the wall and roof, at least 2 feet of length on the foundation or floor slab are to be injected unless they do not accept grout. All 3 foot long minimum or greater through thickness cracks greater than a minimum 15 mil thickness in the walls are to be injected unless they do not accept grout. All 2 foot long through thickness cracks greater than 10 mil thickness in the floors and roof are to be injected unless they do not accept grout. Perform non-structural crack repairs in accordance with the manufacturer's directions, and in accordance with the following basic procedure:

a. Remove unsound and foreign materials from the crack in a manner that does not trap debris in the crack and prevent the flow of repair materials.

b. Remove contamination by flushing with water or solvent, allowing adequate time for air-drying or blow out the solvent with compressed air. Any solvents must be fully flushed from the joint unless NSF/ANSI Standard 61 approved.

c. Install the injection ports in accordance with the manufacturer's directions.

d. Moisture

1) For non-structural cracks, moisture must be present for the chemical grout to react.

2) Prior to injecting the repair materials, inject the crack with a small amount of water in order to completely moisten the crack.

e. Inject the repair materials, with consideration of the following items:

1) Carefully select the pressure of the hydraulic pump or other device, because too much pressure can extend the existing cracks and cause more damage.

2) For vertical cracks, start by pumping material into the entry port at the lowest elevation until the material level reaches the entry port above, cap the lower injection port and repeat the process at successively higher ports until the crack has been completely filled, and then, starting again at the lowest port, re-inject into all ports in order to ensure that all voids are properly sealed off.

3) For horizontal cracks, start at one end of the crack and work to the other end, filling the crack until the pressure can be maintained.

4) For very fine cracks, start the injection of repair material at the widest end and proceed toward the thinner end.

f. Cleanup

1) Remove excess surface material by grinding or other appropriate means.

2) Coat fittings and holes at injection ports with an epoxy patching compound.

3) If crack repairs are part of repair for surface defects, painting with epoxy is not necessary and surface preparation may be started after crack repairs have been completed.

3.5 SPALLED AND DELAMINATED CONCRETE REPAIR

A. Repair spalls and delaminated concrete using repair mortar.

B. Surface Preparation

1. Remove all delaminated concrete and all unsound concrete beyond the spalled or delaminated area.

2. Boundaries

a. Determine the boundaries of the patch by sawcuts to a depth of at least 1/4 inch up to one inch deep.

b. Refer to the Structural Drawings for sawcut locations.

c. Where the sawcut locations are not shown on the Drawings, the boundaries shall be layouts designed to reduce boundary edge length.

d. Avoid excessive or complex edge conditions.

3. Sawcuts

a. Perform sawcuts perpendicular to the surface or slightly undercut.

b. Construct sawcuts in maximum 1/4-inch increments.

c. After each incremental cut, inspect the cut surface in order to ensure that the existing reinforcement has not been cut.

d. If at any depth the reinforcement becomes exposed, terminate the sawcut and notify the ENGINEER.

4. Chip away concrete within the repair area to a depth sufficient to expose sound concrete over the entire repair area, or to a minimum depth required by repair mortar, whichever is greater.

5. Base the selection of partial depth concrete removal equipment on the size of repair area, depth of concrete to be removed, and the location of the deteriorated concrete such as wall, slab-on-grade, underside or top of elevated slab.

6. Removal

    a. The maximum allowable pneumatic chipping hammer shall be a 30-lb class hammer.

    b. Hydroblast removal shall use a maximum pressure of 40,000 psig.

    c. Sand blasting is not permitted.

    d. Hydroblast concrete removal is recommended for large area of surface defects.

    e. Remove water blasting debris daily in order to prevent it from setting up.

    f. If a chipping hammer is used, ensure that the existing reinforcement is not damaged during the concrete removal operations.

    g. Remove protrusions, such as mortar spatter or fins, by grinding or by striking with a hammer or other tool.

7. Reinforcement

    a. Remove concrete from around reinforcement when the rebar is rusted, more than half the rebar perimeter is already exposed, the concrete bond around the rebar is broken, or if the concrete is unsound or honey-combed.

    b. Remove concrete in order to provide a clear space of minimum one inch on all sides of the reinforcement, such that the rebar can be cleaned and the repair material will completely surround the rebar.

    c. Clean exposed reinforcement by water blasting or wire brushing.

    d. After fully exposing and cleaning the reinforcement, check for steel deterioration, and if the cross-sectional area of the steel has been reduced by more than 10 percent, whether by deterioration, surface preparation, or a combination of both, provide additional reinforcement.

    e. Consult with the ENGINEER before adding or replacing rebar.

C. Repairing Surface Defects

1. Clean the concrete surface after removing unsound concrete, repairing cracks, and cleaning the reinforcement.

2. Ensure that the concrete surface and reinforcement are free of form-release agents, curing compounds, surface hardeners, oils, grease, food, chemicals, and other contaminants.

3. Remove dust, including new dust generated by surface preparation or scarifying.

4. Prior to application of the bonding agent, apply anti-corrosion coating to exposed rebar in accordance with the manufacturer's recommendations, allow the coating to dry, reapply the coating, and allow to dry again.

5. Prior to applying the repair mortar, apply bonding agent in accordance with the manufacturer's recommendations.

6. Repair Mortar

    a. Apply repair mortar in accordance with the manufacturer's recommendations.

    b. The thickness of each lift of repair mortar shall be in accordance with the manufacturer's recommendations, with the minimum thickness being not less than 1/4 inch.

7. Fully consolidate the repair mortar, working the material into the substrate to completely fill all pores and voids in the area to be filled.

8. Bring the repair surface into alignment with the adjacent existing surfaces in order to provide a uniform, even surface.

9. Match the repair surface to adjacent existing surfaces in texture by applying necessary coatings and surface treatments.

10. Float-finish the repaired surface using wood or sponge floats.

11. For repaired surfaces to receive a protective coating, brush-finish the surface in order to produce a roughened substrate for the coating.

12. Minimum and maximum ambient and surface temperatures shall be as recommended by repair material manufacturer.

D. Curing

1. Curing of repair mortar to receive waterproofing shall be as follows:

    a. Keep the mortar continuously wet by the application of water for a minimum period of at least 7 consecutive days, beginning immediately after the mortar has reached final set;

    b. Weight the curing blankets or otherwise held them in place in order to prevent being dislodged by wind or other causes, and to be substantially in contact with the concrete surface;

    c. Ensure that edges are continuously held in place; and,

    d. Keep the curing blankets and concrete continuously wet by the use of sprinklers or other means, both during and after normal working hours.

2. If the repair mortar is not to receive waterproofing, provide curing in accordance with the manufacturer's recommendations except that the minimum cure period shall be 7 days.

3. During cold weather, maintain the repair material temperature above 50 degrees F for at least 3 days after placement.

3.6 SCALED CONCRETE REPAIR

A. Repair scaling and pop-outs using repair mortar.

B. Surface Preparation

1. Prior to repair, prepare the surface in accordance with the repair mortar manufacturer's recommendations with the following minimum requirement.

2. Remove unsound concrete from surfaces by high-pressure water blasting, using a minimum pressure of 10,000 psigg and maximum pressure of 40,000 psigg.

3. Clean exposed reinforcement by water blasting or wire brushing.

C. Repairing Surface Defects

1. Clean the concrete surface after removing unsound concrete, repairing cracks, and cleaning reinforcement.

2. Ensure that the concrete surface and reinforcement are free of form-release agents, curing compounds, surface hardeners, oils, grease, food, chemicals, and other contaminants.

3. Remove dust, including new dust generated by surface preparation or scarifying.

4. Prior to application of the bonding agent, apply anti-corrosion coating to exposed rebar in accordance with the manufacturer's recommendations, allow the coating to dry, reapply the coating, and allow to dry again.

5. Prior to applying the repair mortar, apply bonding agent in accordance with the manufacturer's recommendations.

6. Apply repair mortar in accordance with the manufacturer's recommendations, using a minimum repair material thickness of 1/4 inch.

7. Fully consolidate the repair material, working the material into the substrate to completely fill all pores and voids in the area to be filled.

8. Bring the repair surface into alignment with the adjacent existing surfaces in order to provide a uniform, even surface.

9. Match the repair surface to adjacent existing surfaces in texture by applying necessary coatings and surface treatments.

10. Float-finish the repaired surface using wood or sponge floats.

D. Provide strip joint in newly placed mortar at the location of repaired cracks.

E. Curing

1. Curing of repair mortar to receive waterproofing shall be as follows:

   a. Keep the mortar continuously wet by the application of water for a minimum period of at least 7 consecutive days, beginning immediately after the mortar has reached final set;

b. Weight the curing blankets or otherwise held them in place in order to prevent being dislodged by wind or other causes, and to be substantially in contact with the concrete surface;

c. Ensure that edges are continuously held in place; and,

d. Keep the curing blankets and concrete continuously wet by the use of sprinklers or other means, both during and after normal working hours.

2. If the repair mortar is not to receive waterproofing, provide curing in accordance with the manufacturer's recommendations except that the minimum cure period shall be 7 days.

3. During cold weather, maintain the repair material temperature above 50 degrees F for at least 3 days after placement.

3.7 POP-OUT REPAIR, AND REPAIR OF OTHER SURFACE DAMAGE, DETERIORATION, OR DEFECTS

A. Repair pop-outs and other surface damage, deterioration, and defects which are 1/4 inch deep or shallower, using the procedures described under "SCALED CONCRETE REPAIR," above.

B. Repair other pop-outs and surface damage, deterioration, and defects using the procedures described under "SPALLED AND DELAMINATED CONCRETE REPAIR," above.

3.8 REPLACEMENT OF CONCRETE SECTIONS WHICH REQUIRE COMPLETE REPLACEMENT

A. Refer to the Structural Drawings for locations where the level of concrete deterioration is such that complete removal and replacement of the deteriorated section is required.

B. At these locations, remove the deteriorated concrete in accordance with the details on the Structural Drawings and the requirements of this Section.

C. Limits

1. The limits of concrete removal shall be as indicated on the Structural Drawings.

2. If no limits of removal are indicated, determine the limits in accordance with the procedures described under "Boundaries – Spalled and Delaminated Concrete Repair."

D. Provide sawcuts in accordance with the procedures described under "Sawcuts – Spalled and Deliminated Concrete Repair."

E. After removal of the concrete, prepare the area and provide repair concrete in accordance with the details on the Structural Drawings and the requirements of this Section.

F. Unless otherwise indicated, match the finished cross-section of the repaired concrete to the cross-section of the adjacent undamaged concrete.

3.9 PATCHING OF HOLES IN CONCRETE

A. General

1. For the purposes of this Section, holes are defined as penetrations completely through the concrete member and with interior surfaces approximately perpendicular to the surface of the existing member.

2. Interior surface areas which are inclined and do not meet this criteria shall be chipped as needed to meet this requirement.

3. The perimeter of holes at the surface shall form a regular shape composed of curved or straight line segments.

4. Provide the minimum depth of placement for the material used; score the existing concrete by sawcutting, and chip as needed to meet this requirement.

5. Roughen the interior surface of holes less than 12 inches in diameter to a minimum of 0.125-inch amplitude, and roughen larger holes to a minimum of 0.25-inch amplitude.

6. At holes, coat the existing surface to be repaired with a bonding agent.

B. Patching Small Holes: For holes which are less than 12 inches in their least dimension and extend completely through concrete members, fill with non-shrink grout.

C. Patching Large Holes

1. Fill holes which are larger than 12 inches in their least dimension with structural repair grout.

2. Provide large holes which are normally in contact with water or soil with hydrophilic waterstop placed in a groove.

3. Alternatively, bond the hydrophilic waterstop to the surface using an epoxy grout which completely fills all voids and irregularities beneath the waterstop material.

4. Install the waterstop in accordance with the requirements of Section 03 32 00 – Joints in Concrete.

5. Provide reinforcing steel in layers matching existing reinforcement location, size, spacing and cover requirements unless directed otherwise by the ENGINEER.

6. In locations where NSF/ANSI Standard 61 approval is required by the authority having jurisdiction, use one of the following procedures:

7. Provide Product Data showing the proposed structural repair grout is NSF/ANSI Standard 61 approved.

8. Complete the repair with structural repair grout. Coat all surfaces required to have NSF/ANSI Standard 61 approval completely with Sikadur 31, Tyfo S, or equal.

9. Place the structural repair grout to within 1 ½" of the finished surface of the repair. Complete the remainder of the repair with SikaTop123 Plus, or equal.

3.10 PATCHING OF LINED HOLES

A. General

1. This WORK applies to those openings which have embedded material over all or a portion of their inside edge.

2. The requirements for repairing holes in concrete, as indicated above, apply as modified herein.

3. The ENGINEER will determine whether the embedded material is allowed to remain.

B. Where embedded material is allowed to remain, trim it back a minimum of 2 inches from the concrete surface.

C. Roughen or abrade the embedded material in order to promote good bonding to the repair material.

D. Remove substances that interfere with good bonding.

E. Completely remove embedded items that are not securely and permanently anchored into the concrete.

F. Completely remove embedded items which are larger than 12 inches in their least dimension, unless they are composed of a metal to which reinforcing steel can be welded; where reinforcement is required, weld it to the embedded metal.

G. The following requirements shall apply to concrete members which are in contact with water or soil:

1. Using epoxy grout, fill lined openings which are less than 4 inches in their least dimension;

2. Using an epoxy bonding agent, coat lined openings which are greater than 4 inches but less than 12 inches in their least dimension, prior to being filled with non-shrink grout.

3. Using an epoxy bonding agent, coat lined openings which are greater than 12 inches in their least dimension, and provide a hydrophilic waterstop bonded to the interior of the opening with epoxy adhesive, prior to being filled with approved repair material.

3.11 APPLICATION OF PROTECTIVE COATINGS

A. Waterproofing

1. Apply waterproofing in accordance with the manufacturer's printed instructions.

2. Do not begin waterproofing WORK until repairs and new construction in the affected area have been completed and adequately cured.

3.12 EXPANSION JOINT REPAIR

A. Repair deteriorated expansion joints as follows:

1. Completely remove existing sealant;
2. Remove defective backer materials in the joint;
3. Sand-blast the joint and prepare the surface in accordance with the sealant manufacturer's instructions;
4. Prepare the wall surface on each side of the joint in accordance with the expansion joint manufacturer's instructions;
5. Ensure that the prepared surface is clean, sound, and bare concrete;
6. Place backer material in the joint;
7. Apply a primer recommended by the sealant manufacturer;
8. Fill the joint with polyurethane sealant;
9. Allow a minimum of 3 days curing prior to installing the expansion joint; and,
10. Install the expansion joint in accordance with the manufacturer's instructions.

END OF SECTION

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SECTION 03 11 00 - CONCRETE FORMING

PART 1 GENERAL

1.1 THE SUMMARY

A. The CONTRACTOR shall furnish concrete formwork, bracing, shoring, and supports for cast-in-place concrete and shall design and construct falsework, all in accordance with the Contract Documents.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01 33 00 - Contractor Submittals.

B. Manufacturer’s information demonstrating compliance with requirements for the following:

1. Form ties and related accessories, including taper tie plugs, if taper ties are used.
2. Form gaskets.
3. Form release agent, including NSF certification if not using mineral oil.
4. Manufacturer's design information on formwork, form materials, and locations for use.

1.3 QUALITY ASSURANCE

A. Tolerances: The variation from required lines or grade shall not exceed 1/4-inch in 10-feet, non-cumulative, and there shall be no offsets or visible waviness in the finished surface. Other tolerances shall be within the tolerances of ACI 117 - Standard Tolerances for Concrete Construction and Materials

PART 2 PRODUCTS

2.1 GENERAL

A. Except as otherwise expressly accepted by the ENGINEER, lumber brought on the Site for use as forms, shoring, or bracing shall be new material. Forms shall be smooth surface forms and shall be of the following materials:

Walls	Steel, fiberglass, or plywood panel
Columns	Steel, plywood or fiberglass
Roof and floor	Plywood
All other WORK	Steel panels, fiberglass, plywood or tongue and groove lumber

B. Form materials that may remain or leave residues on or in the concrete shall be certified as compliant with NSF Standard 61 – Drinking Water System Components.

C. Water-based form release agent shall be Clean Strip J1EF by Dayton Superior, or equal.

2.2 FORM AND FALSEWORK MATERIALS

A. Materials for concrete forms, formwork, and falsework shall conform to the following requirements:

1. Lumber shall be Douglas Fir or Southern Yellow Pine, construction grade or better, in conformance with U.S. Product Standard PS 20 - American Softwood Lumber Standard

2. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded, exterior type Douglas Fir or Southern Yellow Pine plywood manufactured especially for concrete formwork, shall conform to the requirements of PS 1 – Construction and Industrial Plywood, for Concrete Forms, Class I, and shall be edge sealed.

3. Form materials shall be metal, wood, plywood, or other material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line, and grade indicated. Metal forms shall accomplish such results. Wood forms for surfaces to be painted shall be Medium Density Overlaid plywood, MDO Ext. Grade.

4. Steel leave in place forms shall not be used.

B. Unless otherwise indicated, exterior corners in concrete members shall be provided with 3/4-inch chamfers or be tooled to 1/2-inch radius. Re-entrant corners in concrete members shall not have fillets unless otherwise indicated.

C. Forms and falsework to support the roof and floor slabs shall be designed for the total dead load, plus a live load of 50 psf minimum. The minimum design load for combined dead and live loads shall be 100 psf.

2.3 FORM TIES

A. Form ties shall be provided with a plastic cone or other suitable means for forming a conical hole to insure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties or other removable form tie fasteners having a circular cross-section shall not exceed 1-1/2 inches; and all such fasteners shall be such as to leave holes of regular shape for reaming. Form ties for water-retaining structures shall have integral waterstops that tightly fit the form tie so that they cannot be moved from mid-point of the tie. Form ties shall be ST-4 Hex Head Snaptie by MeadowBurke, Snap-Ties by Dayton/Richmond, or equal.

B. Removable taper ties may be used when approved by the ENGINEER. A preformed neoprene or polyurethane tapered plug sized to seat at the center of the wall shall be inserted in the hole left by the removal of the taper tie. Use HD-9 Taper-Tie by MeadowBurke, Taper-Tie by Dayton/Richmond, or equal.

PART 3 EXECUTION

3.1 GENERAL

A. Forms to confine the concrete and shape it to the required lines shall be used wherever necessary. The CONTRACTOR shall assume full responsibility for the adequate design of forms,

and any forms that are unsafe or inadequate in any respect shall promptly be removed from the WORK and replaced. Provide worker protection from protruding reinforcement bars in accordance with applicable safety codes. A sufficient number of forms of each kind shall be available to permit the required rate of progress to be maintained. The design and inspection of concrete forms, falsework, and shoring shall comply with applicable local, state, and Federal regulations. Plumb and string lines shall be installed before concrete placement and shall be maintained during placement. Such lines shall be used by CONTRACTOR's personnel and by the ENGINEER and shall be in sufficient number and properly installed. During concrete placement, the CONTRACTOR shall continually monitor plumb and string line form positions and immediately correct deficiencies.

B. Concrete forms shall conform to the shape, lines, and dimensions of members required, and shall be substantial, free from surface defects, and sufficiently tight to prevent leakage. Forms shall be properly braced or tied together to maintain their position and shape under a load of freshly-placed concrete. If adequate foundation for shores cannot be secured, trussed supports shall be provided.

C. Forms shall be removed unless approved otherwise by the ENGINEER.

3.2 FORM DESIGN

A. Forms shall be true in every respect to the required shape and size, shall conform to the established alignment and grade, and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete. Suitable and effective means shall be provided on forms for holding adjacent edges and ends of panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets, or similar surface defects in the finished concrete. Plywood, 5/8-inch and greater in thickness, may be fastened directly to studding if the studs are spaced close enough to prevent visible deflection marks in the concrete. The forms shall be tight so as to prevent the loss of water, cement, and fines during placing and vibrating of the concrete. Specifically, the bottom of wall forms that rest on concrete footings or slabs shall be provided with a gasket to prevent loss of fines and paste during placement and vibration of concrete. Such gasket may be a 1- to 1-1/2-inch diameter polyethylene rod held in position to the underside of the wall form. Adequate clean-out holes shall be provided at the bottom of each lift of forms. The size, number, and location of such clean-outs shall be as acceptable to the ENGINEER. Whenever concrete cannot be placed from the top of a wall form in a manner that meets the requirements of the Contract Documents, form windows shall be provided in the size and spacing needed to allow placement of concrete to the requirements of Section 03 31 00 - Cast-in-Place Concrete. The size, number, and location of such form windows shall be as acceptable to the ENGINEER.

3.3 CONSTRUCTION

A. Vertical Surfaces: Vertical surfaces of concrete members shall be formed, except where placement of the concrete against the ground is indicated. Not less than 1-inch of concrete shall be added to the indicated thickness of a concrete member where concrete is permitted to be placed against trimmed ground in lieu of forms. Permission to do this on other concrete members will be granted only for members of comparatively limited height and where the

character of the ground is such that it can be trimmed to the required lines and will stand securely without caving or sloughing until the concrete has been placed.

B. Construction Joints: Concrete construction joints will not be permitted at locations other than those indicated, except as may be acceptable to the ENGINEER. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location, and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete. Pipe stubs and anchor bolts shall be set in the forms where required.

C. Form Ties

1. Embedded Ties: Holes left by the removal of form tie cones shall be reamed with suitable toothed reamers so as to leave the surface of the holes clean and rough before being filled with mortar. Wire ties for holding forms will not be permitted. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete members. The use of snap-ties that cause spalling of the concrete upon form stripping or tie removal will not be permitted. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste. Where metal rods extending through the concrete are used to support or to strengthen forms, the rods shall remain embedded and shall terminate not less than 1-inch back from the formed face or faces of the concrete.

2. Removable Ties: Where taper ties are approved for use, the larger end of the taper tie shall be on the wet side of walls in water retaining structures. After the taper tie is removed, the hole shall be thoroughly cleaned and roughened for bond. A precast neoprene or polyurethane tapered plug shall be located at the wall centerline. The hole shall be completely filled with non-shrink grout for water bearing and below-grade walls. The hole shall be completely filled with non-shrink or regular cement grout for above-grade walls that are dry on both sides. Exposed faces of walls shall have the outer 2-inches of the exposed face filled with a cement grout that shall match the color and texture of the surrounding wall surface.

3.4 REUSE OF FORMS

A. Forms may be reused only if in good condition and only if acceptable to the ENGINEER. Light sanding between uses will be required wherever necessary to obtain uniform surface texture on exposed concrete surfaces. Exposed concrete surfaces are defined as surfaces which are permanently exposed to view. In the case of forms for the inside wall surfaces of hydraulic/water retaining structures, unused tie rod holes in forms shall be covered with metal caps or shall be filled by other methods acceptable to the ENGINEER.

3.5 REMOVAL OF FORMS

A. Careful procedures for the removal of forms shall be strictly followed, and this WORK shall be done with care so as to avoid injury to the concrete. No heavy loading on green concrete will be permitted. In the case of roof slabs and above-ground floor slabs, forms shall remain in place until test cylinders for the roof concrete attain a minimum compressive strength of 75 percent of the 28 Day strength in Section 03 31 00. No forms shall be disturbed or removed

under an individual panel or unit before the concrete in the adjacent panel or unit has attained 75 percent of the 28 Day strength and has been in place for a minimum of 7 Days. The time required to establish said strength shall be as determined by the ENGINEER who will make several test cylinders for this purpose from concrete used in the first group of roof panels placed. If the time so determined is more than the 7 Day minimum, then that time shall be used as the minimum length of time. Forms for vertical walls of waterholding structures shall remain in place at least 36 hours after the concrete has been placed. Forms for parts of the WORK not specifically mentioned herein shall remain in place for periods of time as recommended in ACI 347 - Guide to Formwork for Concrete.

3.6 MAINTENANCE OF FORMS

A. Forms shall be maintained in good condition, particularly as to size, shape, strength, rigidity, tightness, and smoothness of surface. Before concrete is placed, the forms shall be thoroughly cleaned. The form surfaces shall be treated with a nonstaining mineral oil or other lubricant acceptable to the ENGINEER. Any excess lubricant shall be satisfactorily removed before placing the concrete. Where field oiling of forms is required, the CONTRACTOR shall perform the oiling at least 2 weeks in advance of their use. Care shall be exercised to keep oil off the surfaces of steel reinforcement and other metal items to be embedded in concrete.

3.7 FALSEWORK

A. Falsework shall be designed and constructed to provide the necessary rigidity and to support the loads. Falsework for the support of a superstructure shall be designed to support the loads that would be imposed if the entire superstructure were placed at one time.

B. Falsework shall be placed upon a solid footing, safe against undermining, and be protected from softening. When the falsework is supported on timber piles, the maximum calculated pile loading shall not exceed 20 tons. When falsework is supported on any portion of the structure which is already constructed, the load imposed by the falsework shall be spread, distributed, and braced in such a way as to avoid any possibility of damage to the structure.

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SECTION 03 21 00 - REINFORCEMENT STEEL

PART 1 GENERAL

1.1 THE SUMMARY

A. Provide reinforcement steel and appurtenant WORK, complete and in place, in accordance with the Contract Documents.

B. American Iron and Steel (AIS) Compliance: Materials provided under work of this Section shall comply with the AIS requirements of the Water Infrastructure Finance and Innovation Act (WIFIA). All materials provided and incorporated into this Project shall meet the AIS requirements of P.L. 113-76, Consolidated Appropriations Act, 2014.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 01 33 00 – Contractor Submittals.

B. Shop Drawings

1. Furnish shop bending diagrams, placing lists, and drawings of reinforcement steel prior to fabrication.

2. Diagrams

a. The shop bending diagrams shall show the actual lengths of bars to the nearest inch, measured to the intersection of the extensions (tangents for bars of circular cross section) of the outside surface.

b. Include bar placement diagrams that clearly indicate the dimensions of each bar splice.

3. Reinforcement

a. Details of the concrete reinforcement steel and concrete inserts shall be submitted at the earliest possible date after receipt by the CONTRACTOR of the Notice to Proceed.

b. Said details of reinforcement steel for fabrication and erection shall conform to ACI 315 - Details and Detailing of Concrete Reinforcement, and the indicated requirements.

4. Mechanical Couplers

a. Where mechanical couplers are required or permitted to be used to splice reinforcement steel, submit the following items:

1) manufacturer's literature containing instructions and recommendations for installation for each type of coupler used;

2) certified test reports that verify the load capacity of each type and size of coupler used; and

3) Shop Drawings that show the location of each coupler with details of how they are to be installed in the formwork.

5. Welding

a. If reinforcement steel is to be spliced by welding at any location, submit mill test reports containing the information necessary for determination of the carbon equivalent per AWS D1.4 - Structural Steel Welding Code - Reinforcing Steel.

b. Submit a written welding procedure for each type of weld for each size of bar which is to be spliced by welding; merely a statement that AWS procedures will be followed is not acceptable.

c. If reinforcement steel is spliced by welding at any location, submit certifications of procedure qualifications for each welding procedure and certification of welder qualifications, for each welding procedure and for each welder performing on the WORK.

1.3 QUALITY ASSURANCE

A. Materials Testing

1. If requested by the ENGINEER, furnish samples from each heat of reinforcement steel in a quantity adequate for testing.

2. Costs of initial tests will be paid by the OWNER.

3. Costs of additional tests if material fails initial tests shall be the CONTRACTOR's responsibility.

B. Welding

1. Welder qualifications and procedure qualifications shall be as indicated in AWS D1.4.

2. If requested by the ENGINEER, furnish samples of each type of welded splice in a quantity and of dimensions adequate for testing.

3. At the discretion of the ENGINEER, radiographic testing of direct butt-welded splices will be performed.

4. Provide assistance necessary to facilitate testing.

5. Repair welds that fail to meet AWS D1.4.

6. The costs of testing will be paid by the OWNER, but the costs of tests that show failure to meet requirements shall be the CONTRACTOR's responsibility.

PART 2 PRODUCTS

2.1 MATERIAL REQUIREMENTS

A. Materials that may remain or leave residues on or within the concrete shall be certified as compliant with NSF Standard 61- Drinking Water System Components.

2.2 REINFORCEMENT STEEL

A. Reinforcement steel for cast-in-place reinforced concrete construction shall conform to the following requirements:

1. Bar and spiral reinforcement shall conform to ASTM A 615 - Deformed and Plain Billet - Steel Bars, for Grade 60 reinforcement, unless otherwise indicated.

2. Welded Reinforcement

a. Bar and spiral reinforcement that is welded shall conform to ASTM A 706 - Low Alloy Steel Deformed and Plain Bars for Concrete Reinforcement, for Grade 60 reinforcement, unless otherwise indicated.

b. The carbon equivalent in reinforcing that is welded shall not exceed 0.55 percent.

3. Welded Wire Reinforcement

a. Welded wire reinforcement shall conform to ASTM A 185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete Reinforcement, and the indicated Details.

b. Welded wire reinforcement with longitudinal wire of W4 size wire and smaller shall be in flat sheets or in rolls with a core diameter of not less than 10-inches.

c. Welded wire reinforcement with longitudinal wires larger than W4 size shall be in flat sheets only.

B. Accessories

1. Accessories shall include necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers, and other devices to position reinforcement during concrete placement.

2. Bar Supports

a. Bar supports shall meet the requirements of the CRSI Manual of Standard Practice, including special requirements for supporting epoxy-coated reinforcing bars.

b. Wire bar supports shall be CRSI Class 1 for maximum protection with a 1/8-inch minimum thickness of plastic coating that extends at least 1/2 inch from the concrete surface.

c. Plastic shall be gray in color.

3. Concrete Blocks

a. Concrete blocks (dobies) used to support and position reinforcement steel shall have the same or higher compressive strength as required for the concrete in which they are located.

b. Wire ties shall be embedded in concrete block bar supports.

C. Epoxy coating for reinforcing and accessories, where indicated, shall conform to ASTM A 775 - Epoxy - Coated Reinforcing Steel Bars.

2.3 MECHANICAL COUPLERS

A. Mechanical couplers shall be provided where indicated and where approved by the ENGINEER.

B. The couplers shall develop a tensile strength that exceeds 125 percent of the yield strength of the reinforcement bars being spliced at each splice.

C. Multi-Component Couplers

1. Where the type of coupler used is composed of more than one component, components required for a complete splice shall be provided.

2. This shall apply to mechanical splices, including those splices intended for future connections.

D. Connection

1. The reinforcement steel and coupler used shall be compatible for obtaining the required strength of the connection.

2. Straight threaded type couplers shall require the use of the next larger size reinforcing bar or shall be used with reinforcing bars with specially forged ends which provide upset threads which do not decrease the basic cross section of the bar.

E. Couplers shall be Lenton Form Saver by Erico Products, Dowel Bar Splicer System by Dayton/Richmond, or equal.

2.4 WELDED SPLICES

A. Welded splices shall be provided where indicated and where approved by the ENGINEER.

B. Welded splices of reinforcement steel shall develop a tensile strength that exceeds 125 percent of the yield strength of the reinforcement bars that are connected.

C. Materials as required to conform the welded splices to AWS D1.4 shall be provided.

2.5 EPOXY GROUT

A. Epoxy for grouting reinforcing bars shall be specifically formulated for such application, for the moisture condition, application temperature, and orientation of the hole to be filled.

B. Epoxy grout shall be in conformance with the requirements of Section 036000 – Grout.

PART 3 EXECUTION

3.1 GENERAL

A. Reinforcement steel, welded wire fabric, couplers, and other appurtenances shall be fabricated, and placed in accordance with the Building Code and the indicated supplementary requirements.

3.2 FABRICATION

A. General

1. Reinforcement steel shall be accurately formed to the dimensions and shapes indicated, and the fabricating details shall be prepared in accordance with ACI 315 and ACI 318 - Building Code Requirements for Reinforced Concrete, except as modified by the Drawings.

2. Bars shall be bent cold.

3. Bars shall be bent in accordance with the requirements of ACI 318.

4. Fabricate reinforcement bars for structures in accordance with accepted bending diagrams, placing lists, and placing drawings.

B. Fabricating Tolerances

1. Bars used for concrete reinforcement shall conform to the following fabricating tolerances:

a. Sheared Length: plus and minus one inch
b. Depth of Truss Bars: plus zero, minus 1/2 inch
c. Stirrups, Ties and Spirals: plus and minus 1/2 inch
d. Other Bends: plus and minus one inch

3.3 PLACEMENT

A. Reinforcement steel shall be accurately positioned as indicated, and shall be supported and wired together to prevent displacement using annealed iron wire ties or suitable clips at intersections.

B. Reinforcement steel shall be supported by concrete, plastic or metal support spacers, or metal hangers that are sufficiently strong and rigid to prevent any displacement of the reinforcement steel.

C. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used in sufficient numbers to support the bars without settlement, but in no case shall such support be continuous.

D. Concrete blocks used to support reinforcement steel shall be tied to the steel with wire ties that are embedded in the blocks.

E. For concrete over formwork, provide concrete, metal, plastic, or other acceptable bar chairs and spacers.

F. Limitations on the use of bar support materials shall be as follows.

1. Concrete Dobies

   a. permitted at any location except where architectural finish is required

   b. required for slabs on grade and surfaces in contact with or above ozonated process water

2. Wire bar supports will be permitted only at slabs over dry areas, interior dry wall surfaces, and exterior wall surfaces.

3. Plastic bar supports will be permitted at every location except on-grade.

G. Tie wires shall be bent away from the forms in order to provide the required concrete coverage.

H. Bars additional to those indicated that may be found necessary or desirable by the CONTRACTOR for the purpose of securing reinforcement in position shall be provided by the CONTRACTOR at no additional expense to the OWNER.

I. Except where in conflict with the Building Code, unless otherwise indicated reinforcement placing tolerances shall be within the limits in Section 7.5 of ACI 318.

J. Moving Bars

1. Bars may be moved as necessary to avoid interference with other reinforcement steel, conduits, or embedded items.

2. If bars are moved more than one bar diameter or enough to exceed the above tolerances, the resulting arrangement of bars shall be as reviewed and accepted by the ENGINEER.

K. Welded Wire Reinforcement

1. Welded wire reinforcement placed over horizontal forms shall be supported on slab bolsters.

2. Slab bolsters shall be spaced not more than 30-inch on centers, shall extend continuously across the entire width of the reinforcement mat, and shall support the reinforcement mat in the plane indicated.

3. Welded wire reinforcement placed over the ground shall be supported on wired concrete blocks (dobies) spaced not more than 3 feet on centers in any direction.

4. The construction practice of placing welded wire fabric on the ground and hooking into place in the freshly placed concrete shall not be used.

L. Storage and Handling

1. Epoxy-coated reinforcing bars shall be stored, transported, and placed in such a manner as to avoid chipping of the epoxy coating.

2. Non-abrasive slings made of nylon and similar materials shall be used.

3. Specially coated bar supports shall be used.

4. Chips or cracks in the epoxy coating shall be repaired with a compatible epoxy repair material prior to placing concrete.

M. Accessory Spacing

1. Accessories supporting reinforcing bars shall be spaced such that there is no deflection of the accessory from the weight of the supported bars.

2. When used to space the reinforcing bars from wall forms, the forms and bars shall be located such that there is no deflection of the accessory when the forms are tightened into position.

3.4 SPACING OF BARS

A. The clear distance between parallel bars (except in columns and between multiple layers of bars in beams) shall be not less than the nominal diameter of the bars, nor less than 1-1/3 times the maximum size of the coarse aggregate, nor less than one inch.

B. Where reinforcement in beams or girders is placed in 2 or more layers, the clear distance between layers shall be not less than one inch.

C. In columns, the clear distance between longitudinal bars shall be not less than 1-1/2 times the bar diameter, nor less than 1-1/2 times the maximum size of the coarse aggregate, nor less than 1-1/2 inches.

D. The clear distance between bars shall also apply to the distance between a contact splice and adjacent splices or bars.

3.5 SPLICING

A. General

1. Reinforcement bar splices shall only be used at indicated locations.

2. When it is necessary to splice reinforcement at points other than where indicated, the character of the splice shall be as reviewed and accepted by the ENGINEER.

3. Unless otherwise indicated, dowels shall match the size and spacing of the spliced bar.

B. Splices of Reinforcement

1. The length of lap for reinforcement bars, unless otherwise indicated, shall be in accordance with ACI 318 for a Class B splice.

2. Welded Wire Reinforcement

a. Laps of welded wire reinforcement shall be in accordance with ACI 318.

b. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each 2 running feet.

c. Wires shall be staggered and tied in such a manner that they cannot slip.

3. Splices in column spiral reinforcement, when necessary, shall be made by welding or by a lap of 1-1/2 turns.

C. Bending or Straightening

1. Reinforcement shall not be straightened or re-bent in a manner which will injure the material.

2. Bars shall be bent or straight as indicated.

3. Do not use bends different from the bends indicated.

4. Bars shall be bent cold, unless otherwise permitted by the ENGINEER.

5. No bars partially embedded in concrete shall be field-bent except as indicated or specifically permitted by the ENGINEER.

D. Couplers

1. Couplers that are located at a joint face shall be of a type that can be set either flush or recessed from the face as indicated.

2. The couplers shall be sealed during concrete placement to completely eliminate concrete or cement paste from entering.

3. Couplers intended for future connections shall be recessed a minimum of 1/2 inch from the concrete surface.

4. After the concrete is placed, the coupler shall be plugged with plastic plugs which have an O-ring seal and the recess filled with sealant to prevent any contact with water or other corrosive materials.

5. Threaded couplers shall be plugged .

E. Unless indicated otherwise, mechanical coupler spacing and capacity shall match the spacing and capacity of the reinforcing indicated for the adjacent section.

3.6 CLEANING AND PROTECTION

A. Reinforcement steel shall always be protected from conditions conducive to corrosion until concrete has been placed around it.

B. The surfaces of reinforcement steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed.

C. Where there is delay in depositing concrete, the reinforcement shall be re-inspected and, if necessary, re-cleaned.

3.7 EMBEDMENT OF DRILLED REINFORCING STEEL DOWELS

A. Hole Preparation

1. The hole diameter shall be as recommended by the epoxy manufacturer but shall be no larger than 1/4 inch greater than the diameter of the outer surface of the reinforcing bar deformations.

2. The depth of the hole shall be as recommended by the epoxy manufacturer to fully develop the bar but shall not be less than 12 bar diameters, unless indicated otherwise.

3. The hole shall be drilled by methods that do not interfere with the proper bonding of epoxy.

4. Existing reinforcing steel in the vicinity of proposed holes shall be located prior to drilling, and the location of holes shall be adjusted to avoid drilling through or nicking any existing reinforcing bars.

5. The hole shall be blown clean with clean, dry compressed air to remove dust and loose particles.

B. Embedment

1. Epoxy shall be injected into the hole through a tube placed to the bottom of the hole.

2. The tube shall be withdrawn as epoxy is placed but kept immersed to prevent formation of air pockets.

3. The hole shall be filled to a depth that insures excess material will be expelled from the hole during dowel placement.

4. Dowels shall be twisted during insertion into the partially filled hole so as to guarantee full wetting of the bar surface with epoxy.

5. The bar shall be inserted slowly enough to avoid developing air pockets.

END OF SECTION

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SECTION 03 31 00 - CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 THE SUMMARY

A. Provide cast-in-place concrete, as indicated in accordance with the Contract Documents.

B. The following types of concrete are covered in this Section:

1. Structural Concrete

   a. Regular Mix: Roof, floor slabs, columns, walls, pavements, and other concrete items not indicated otherwise in the Contract Documents.

   b. Thick Section Mix: For 12-inch and thicker walls, slabs on grade, pavements, and footings. This type of concrete may be used at the indicated locations at the CONTRACTOR's option if the ENGINEER agrees.

   c. Pea Gravel Mix: At the bottom 6 inches of walls.

2. Other Concretes

   a. Sitework Concrete: Concrete to be used for curbs, gutters, catch basins, sidewalks, fence and guard post embedment, underground duct bank encasement, and other concrete appurtenant to electrical facilities, unless otherwise indicated.

   b. Lean Concrete

      1) Concrete to be used for thrust blocks, pipe trench cut-off blocks, and cradles that are indicated as unreinforced

      2) Lean concrete shall be used as protective cover for dowels intended for future connections.

C. The term "hydraulic structure" shall mean environmental engineering concrete structures for the containment, treatment, or transmission of water, wastewater, other fluids, or gases.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01 33 00 – Contractor Submittals.

B. Mix Designs

1. Prior to beginning the WORK and within 14 Days of the Notice to Proceed, submit preliminary concrete mix designs which shall show the proportions and gradations of materials proposed for each class and type of concrete.

2. Mix designs shall be checked through trial batch and laboratory testing by an independent testing laboratory acceptable to the ENGINEER.

3. Costs related to trial batch and related laboratory testing shall be CONTRACTOR's responsibility as part of the WORK.

4. Since laboratory trial batches require 35 calendar days to complete, the CONTRACTOR shall test a minimum of 2 mix designs for each class of concrete.

C. Delivery Tickets

1. Where ready-mix concrete is used, the CONTRACTOR shall furnish delivery tickets at the time of delivery of each load of concrete.

2. Each ticket shall show the state-certified equipment used for measuring and the total quantities, by weight, of cement, sand, each class of aggregate, admixtures, the amount of water in the aggregate added at the batching plant, and the amount allowed to be added at the Site for the specific design mix.

3. In addition, each ticket shall state the mix number, total yield in cubic yards, and the time of day, to the nearest minute, corresponding to the times when the batch was dispatched, when it left the plant, when it arrived at the Site, when unloading began, and when unloading was finished.

D. Test Data: Test data relating to the cement, aggregate, and admixtures shall be less than 6 months old.

E. Furnish the following submittals in accordance with ACI 301 – Structural Concrete:

1. mill tests for cement
2. admixture certification, including chloride ion content
3. aggregate gradation test results and certification
4. materials and methods for curing

1.3 CONCRETE CONFERENCE

A. The ENGINEER will chair a meeting to review the detailed requirements of the CONTRACTOR's proposed concrete design mixes and to determine the procedures for producing proper concrete construction no later than 14 Days after the Notice to Proceed.

B. Parties involved in the concrete WORK shall attend the conference, including the following at a minimum:

1. CONTRACTOR's representative
2. testing laboratory representative
3. concrete subcontractor
4. reinforcing steel subcontractor and detailer
5. concrete supplier
6. admixture manufacturer's representative

C. The conference shall be held at a time and place proposed by the CONTRACTOR and accepted by the ENGINEER.

D. The conference shall be held at least 5 Days after acceptance.

1.4 QUALITY ASSURANCE

A. General

1. Tests on component materials and for compressive strength and shrinkage of concrete shall be performed as indicated.

2. Tests for determining slump shall be in accordance with ASTM C 143 – Test Method for Slump of Hydraulic Cement Concrete.

3. Testing for aggregate shall include sand equivalence, reactivity, organic impurities, abrasion resistance, and soundness, according to ASTM C 33 – Concrete Aggregates.

4. The cost of trial batch laboratory tests on cement, aggregates, and concrete shall be the CONTRACTOR's responsibility.

5. The cost of laboratory tests on field-placed cement, aggregates, and concrete and the cost of Special Inspections required by Code will be the OWNER'S responsibility.

6. The CONTRACTOR shall be responsible for the cost of any tests and investigations of WORK that is determined to be Defective WORK.

7. The testing laboratory shall meet or exceed ASTM C 1077 – Practice for Laboratories Testing Concrete and Concrete Aggregates for use in Construction and Criteria for Laboratory Evaluation.

8. Concrete for testing shall be furnished by the CONTRACTOR, and the CONTRACTOR shall assist the ENGINEER in obtaining samples and disposal and cleanup of excess material.

B. Inspections

1. Continuous inspection by a special inspector approved by the local building department having jurisdiction and by the ENGINEER will be required where necessary to conform with Code requirements.

2. Costs of the special inspector shall be paid by the OWNER.

3. Inspection reports shall be submitted to the ENGINEER.

4. The special inspector shall observe the following for conformance to the Contract Documents:

   a. the preparation and taking of required test specimens; and,
   b. placement of concrete, except sitework concrete fully supported on earth.

C. Field Compression Tests

1. Compression test specimens shall be taken during construction from the first placement of each type of concrete and at intervals thereafter as selected by the ENGINEER to insure continued compliance with the Specifications.

2. Each set of specimens shall be a minimum of 5 cylinders.

3. Compression test specimens for concrete shall be made in accordance with Section 9.2 of ASTM C 31 – Practices for Making and Curing Concrete Test Specimens in the Field.

4. Specimens shall be 6-inches diameter by 12-inches tall cylinders.

5. Compression tests shall be performed in accordance with ASTM C 39 – Test Method for Compressive Strength of Cylindrical Concrete Specimens.

6. One test cylinder shall be tested at 7 Days, and 2 test cylinders tested at 28 Days.

7. The remaining cylinders shall be held to verify test results, if needed.

D. Evaluation and Acceptance of Concrete

1. Evaluation and acceptance of the compressive strength of concrete shall be in accordance with ACI 318 – Building Code Requirements for Reinforced Concrete, Chapter 5 "Concrete Quality," and as indicated.

2. A statistical analysis of compression test results shall be performed according to ACI 214 – Recommended Practice for Evaluation of Strength Test Methods.

3. The standard deviation of the test results shall not exceed 640 psi, when ordered at equivalent water content as estimated by slump.

4. If any concrete fails to meet these requirements, immediate corrective action shall be taken to increase the compressive strength for subsequent batches of the type of concrete affected.

5. When the standard deviation of the test results exceeds 640 psi, the average strength for which the mix is designed shall be increased by an amount necessary to satisfy the statistical requirement that the probability of any test being more than 500 psi below or the average of any 3 consecutive tests being below the required compressive strength is 1 in 100.

6. The required average strength shall be calculated by Criterion No. 3 of ACI 214 using the actual standard deviation.

7. Concrete that fails to meet the ACI requirements and the indicated requirements is subject to removal and replacement.

E. Shrinkage Tests

1. Drying shrinkage tests shall be performed for the trial batches indicated in the Article below entitled "Trial Batch and Laboratory Tests," for the first placement of each class of structural concrete except pea gravel mix, and during placement to determine continued compliance.

2. Neither structural pea gravel nor structural C-R pea gravel mix need to be tested for shrinkage.

3. Drying shrinkage specimens shall be 4-inch by 4-inch by 11-inch prisms with an effective gauge length of 10-inches, and fabricated, cured, dried, and measured in accordance with

ASTM C 157 – Test Method for Length Change of Hardened Hydraulic Cement Mortar and Concrete, modified as follows:

a. Specimens shall be removed from molds at an age of 23 hours, plus or minus one hour, after trial batching, and shall be placed immediately in water at 70 degrees F, plus or minus 3 degrees F, for at least 30 minutes.

b. Specimens shall be measured within 30 minutes thereafter to determine original length and then shall be submerged in saturated lime water at 73 degrees F, plus or minus 3 degrees F.

c. Measurement to determine expansion expressed as a percentage of original length shall be made at age 7 Days.

d. This length at age 7 Days shall be the base length for drying shrinkage calculations ("0" days drying age).

e. Specimens then shall be stored immediately in a humidity control room maintained at 73 degrees F, plus or minus 3 degrees F, and 50 percent relative humidity, plus or minus 4 percent, for the remainder of the test.

f. Measurements to determine shrinkage, expressed as percentage of base length, shall be performed and reported separately for 7, 14, 21, and 28 Days of drying after 7 Days of moist curing.

4. The drying shrinkage deformation of each specimen shall be computed as the difference between the base length (at "0" days drying age) and the length after drying at each test age.

5. The average drying shrinkage deformation of the specimens shall be computed to the nearest 0.0001 inch at each test age.

6. If the drying shrinkage of any specimen departs from the average of that test age by more than 0.0004 inch, the results obtained from that specimen shall be disregarded.

7. Results of the shrinkage test shall be reported to the nearest 0.001 percent of shrinkage.

8. Compression test specimens shall be taken in each case from the same concrete used for preparing drying shrinkage specimens.

9. These tests shall be considered a part of the normal compression tests for the project.

10. Allowable shrinkage limitations are indicated in PART 2 - PRODUCTS, below.

F. Aggregate Testing: Aggregate testing shall be performed for the trial batch in the Article below entitled “Trial Batch and Laboratory Tests” prior to construction and every 12 months during construction to determine continued compliance.

G. Construction Tolerances

1. The CONTRACTOR shall set and maintain concrete forms and perform finishing operations to ensure that the completed WORK is within tolerances.

2. Surface defects and irregularities are defined as finishes and are different from tolerances.

3. Tolerance is the permissible variation from lines, grades, or dimensions indicated on the Drawings.

4. Where tolerances are not indicated, permissible deviations shall be in accordance with ACI 117 – Standard Tolerance for Concrete Construction and Materials.

5. The following non-cumulative construction tolerances apply to finished walls, columns and slabs unless otherwise indicated:

ITEM	TOLERANCE
Variation of the constructed linear outline from the established position in plan.	in 10 feet: 1/4 inch in 20 feet or more: 1/2 inch
Variation from the level or from the grades indicated.	in 10 feet: 1/4 inch in 20 feet or more: 1/2 inch
Variation from plumb	in 10 feet: 1/4 inch in 20 feet or more: 1/2 inch
Variation in the thickness of slabs and walls.	minus 1/4 inch plus 1/2 inch
Variation in the locations and sizes of slabs and wall openings	plus or minus 1/4 inch

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

A. General

1. Concrete materials in contact with potable water shall be classified as acceptable for potable water use in accordance with NSF/ANSI Standard 61 as required by the authority having jurisdiction. Not all products listed herein are for use in contact with potable water.

2. Cement for concrete that will contact potable water shall not be obtained from kilns that burn metal rich hazardous waste fuel.

3. Materials shall be delivered, stored, and handled so as to prevent damage by water or breakage.

4. Cement reclaimed from cleaning bags or leaking containers shall not be used.

5. Cement shall be used in the sequence of receipt of shipments.

B. Materials and storage of materials shall comply with ACI 301, as applicable.

C. Materials for concrete shall conform to the following requirements:

1. Cement

   a. Cement shall be standard brand Portland cement conforming to ASTM C 150 –Portland Cement, for Type II or Type V.

   b. A minimum of 85 percent of cement by weight shall pass a 325 screen.

   c. A single brand of cement shall be used throughout the WORK, and prior to its use, the brand shall be accepted by the ENGINEER.

   d. The cement shall be suitably protected from exposure to moisture until used.

   e. Cement that has become lumpy shall not be used.

   f. Sacked cement shall be stored in such a manner so as to permit access for inspection and sampling.

   g. Certified mill test reports, including fineness, for each shipment of cement to be used shall be submitted to the ENGINEER, if requested, regarding compliance with the Specifications.

2. Water

   a. Water for mixing and curing shall be potable, clean, and free from objectionable quantities of silty organic matter, alkali, salts, and other impurities.

   b. The water shall be considered potable, for the purposes of this Section only, if it meets the requirements of the local governmental agencies.

   c. Agricultural water with high total dissolved solids (greater than 1000 mg/L TDS) shall not be used.

3. Aggregates

   a. Aggregates shall be obtained from pits acceptable to the ENGINEER, shall be non-reactive, and shall conform to ASTM C 33 – Concrete Aggregates.

   b. The maximum size of coarse aggregate shall be as indicated, and the substitution of lightweight sand for fine aggregate will not be permitted.

   c. Coarse Aggregates

      1) Coarse aggregates shall consist of clean, hard, durable gravel, crushed gravel, crushed rock, or a combination thereof.

      2) The coarse aggregates shall be prepared and handled in 2 or more size groups for combined aggregates, with a maximum size greater than 3/4 inch.

      3) When the aggregates are proportioned for each batch of concrete, the 2 size groups shall be combined (also refer to the Article below entitled "Trial Batch and Laboratory Tests").

d. Fine Aggregates

1) Fine aggregates shall be natural sand or a combination of natural and manufactured sand that is hard and durable.

2) When tested in accordance with ASTM D 2419 – Test Methods for Sand Equivalent Value of Soils and Fine Aggregate, the sand equivalency shall not be less than 75 percent for an average of 3 samples, nor less than 70 percent for an individual test.

3) The gradation of fine aggregate shall conform to ASTM C 33 when tested in accordance with ASTM C 136 for the fineness modulus of the sand used, including the optional grading in Section 6.2.

4) The fineness modulus of sand used shall not be greater than 3.1.

5) When tested in accordance with ASTM C 33, the fine aggregate shall produce a color in the supernatant liquid no darker than the reference standard color solution.

e. Combined Aggregates

1) Combined aggregates shall be well graded from coarse to fine sizes and shall be uniformly graded between screen sizes to produce concrete that has optimum workability and consolidation characteristics.

2) Where a trial batch is required for a mix design, the final combined aggregate gradations will be established during the trial batch process.

3) When tested in accordance with ASTM C 33, the coarse aggregate shall show a loss not exceeding 42 percent after 500 revolutions or 10.5 percent after 100 revolutions.

f. When tested in accordance with ASTM C 33, the ratio of silica released to reduction in alkalinity shall not exceed 1.0.

g. When tested in accordance with ASTM C 33, the loss resulting after 5 cycles of the soundness test shall not exceed 10 percent for fine aggregate and 12 percent for coarse aggregate when using sodium sulfate.

4. Ready-mixed concrete shall conform to the requirements of ASTM C 94 – Ready Mixed Concrete.

5. Admixtures

a. Admixtures shall be compatible and shall be furnished by a single manufacturer capable of providing qualified field service representation.

b. Admixtures shall be used in accordance with manufacturer's recommendations.

c. If the use of an admixture is producing an inferior end result, the CONTRACTOR shall discontinue use of the admixture.

d. Admixtures shall not contain thiocyanates nor more than 0.05 percent chloride ion, and shall be non-toxic after 30 days.

e. Air Content

1) An air-entraining agent meeting the requirements of ASTM C 260 – Air Entraining Admixtures for Concrete shall be used.

2) Concrete floors to receive a dry-shake floor hardener shall have an air content not to exceed 3 percent.

3) The OWNER reserves the right, at any time, to sample and test the air-entraining agent.

4) The air-entraining agent shall be added to the batch in a portion of the mixing water.

5) The solution shall be batched by means of a mechanical batcher capable of accurate measurement.

6) Air content shall be tested at the point of placement.

7) The air entraining agent shall be Micro-Air by Master Builders; Daravair by W.R. Grace; Sika AEA-15 by Sika Corporation; or equal

f. Set-Controlling and Water-Reducing Admixtures

1) Admixtures may be added at the CONTRACTOR's option, subject to the ENGINEER's approval, to control the set, effect water reduction, and increase workability.

2) The cost of adding an admixture shall be the CONTRACTOR's responsibility.

3) Concrete containing an admixture shall be first placed at a location determined by the ENGINEER.

4) Admixtures shall conform to ASTM C 494 – Chemical Admixtures for Concrete.

5) The required quantity of cement shall be used in the mix regardless of whether or not an admixture is used.

6) Concrete shall not contain more than one water-reducing admixture, unless it can be demonstrated that the proposed mix will meet the indicated drying shrinkage requirements.

7) The set-controlling admixture may be either with or without water-reducing properties.

8) Where the air temperature at the time of placement is expected to be consistently greater than 80 degrees F, a set-retarding admixture such as **Plastocrete 161MR by Sika Corporation**, **Pozzolith or Delvo** by **BASF**, **Daratard** by **W.R. Grace**, or equal shall be used.

9) Where the air temperature at the time of placement is expected to be consistently less than 40 degrees F, a non-corrosive set accelerating admixture such as **Plastocrete 161FL** by **Sika Corporation**, **MasterSet FP 20** by **BASF**, **Daraset** by **W.R. Grace**, or equal shall be used.

10) Mid-Range Water Reducers

    a) General use water-reducing admixtures shall be mid-range and shall conform to ASTM C 494, Type A and F.

    b) Use Daracem by **W.R. Grace, Polyheed** by **BASF**, **Sikament** by **Sika Corporation**, or equal.

    c) The quantity of admixture used and the method of mixing shall be in accordance with the manufacturer's instructions and recommendations.

11) High-Range Water Reducers

    a) High-range water reducers shall conform to ASTM C 494, Type F or G.

    b) Use **ADVA** by **W.R. Grace**, **ViscoCrete** by **Sika Corporation**, **Glenium** by **BASF**, or equal.

    c) The high-range water reducer shall be added to the concrete after all other ingredients have been mixed and initial slump has been verified.

    d) No more than 14 ounces of water reducer per sack of cement shall be used.

    e) The water reducer shall be considered as part of the mixing water when calculating the water/cement ratio.

    f) If the high-range water reducer is added to the concrete at the Site, it may be used in conjunction with the same water reducer added at the batch plant.

    g) Concrete shall have a slump of 3 inches, plus or minus 1/2 inch, prior to adding the high-range water reducing admixture at the Site.

    h) The high-range water reducing admixture shall be accurately measured and pressure injected into the mixer as a single dose by an experienced technician.

    i) A standby system shall be provided and tested prior to each day's operation of the primary system.

    j) Concrete shall be mixed at mixing speed for a minimum of 70 mixer revolutions or 5 minutes after the addition of the high-range water reducer, unless recommended otherwise by the manufacturer.

g. Other Admixtures

1) Flyash

a) Flyash shall not be used for concrete sections containing process water in water or wastewater treatment plants or potable water.

b) For other concrete, fly ash may be substituted for not more than 15 percent, by weight, of cement in structural concrete and not more than 30 percent, by weight, for sitework concrete, and not more than 50 percent, by weight, of cement in other concrete.

c) Fly ash shall conform to ASTM C618 and shall not have loss-on-ignition greater than 3 percent.

d) The water/cement ratio shall be calculated based on cement plus fly ash.

2) Ground Blast Furnace Slag Cement

a) Slag cement shall not be used for concrete sections containing process water in water or wastewater treatment plants or potable water.

b) Slag cement shall conform to ASTM C989 – Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars, Grade 100 or 120.

c) Blended cements shall conform to ASTM C595 – Blended Hydraulic Cements, Type 1S, or ASTM C1157 – Performance Specification for Hydraulic Cement.

d) Slag cement substitution, if used, shall be not less than 25, nor more than 50 percent by weight of cement.

e) Slag cement substitution shall not be used with fly ash substitution.

f) The water/cement ratio shall be calculated based on cement plus slag cement.

3) Fiber reinforcing

a) Fiber-reinforced concrete shall be furnished where indicated.

b) Fiber reinforcement shall be synthetic fiber reinforcement.

c) Use **Fibermesh 300**, as manufactured by **Propex**, or equal.

d) Fiber reinforcing shall be batched at the plant at a rate of 1.5 pounds per cubic yard of concrete.

e) Material: 100-percent virgin homopolymer polypropylene-fibrillated fibers; containing no reprocessed olefin materials

f) Conformance: ASTM C 1116, Type III

g) Fire Classifications: UL Report File No. R8534-11; Southwest Certification Services (SWCS), Omega Point Laboratories No. 8662-1

h) Fiber Length: one inch

i) Alkali Resistance: alkali-proof

j) Absorption: nil

k) Specific Gravity: 0.91

l) Melting Point: 324 degrees F (162 degrees C)

h. Corrosion Inhibitor

1) The corrosion inhibitor shall be **DCIS** by **W.R. Grace**, or equal.

2) Mixing water shall be adjusted for the admixture in accordance with the manufacturer's recommendations.

2.2 CURING MATERIALS

A. General: Curing compounds shall be resin-based and shall be compliant with local VOC requirements, unless otherwise indicated herein.

B. Regular Curing Compound

1. Regular curing compound shall be white-pigmented and shall conform to ASTM C 309 - Liquid Membrane-Forming Compounds for Curing Concrete, Type 2, Class B.

2. Sodium silicate compounds will not be accepted.

3. The concrete curing compound shall be:

a. Kurez VOX White Pigmented by Euclid Chemicals Company;
b. L&M Cure R-2 by L&M Construction Chemicals;
c. 1200-White by W.R. Meadows;
d. Kure-N-Seal WB White Pigmented by Sonneborn/Degussa Building Systems;
e. or equal.

C. Dissipating Curing Compound

1. When the curing compound must be removed for finishes or grouting, compounds shall be of a dissipating type, conforming to ASTM C 309, Type 1 or 2, Class B.

2. The dissipating curing compound shall be:

a. Korez DR VOX by Euclid Chemical Company;
b. L&M Cure R-2 by L & M Construction Chemicals;
c. 1100-Clear by W.R. Meadows;
d. or equal.

D. Curing Compound for Applications Requiring NSF/ANSI Standard 61 Compliance

1. When the curing compound is required to conform to NSF/ANSI Standard 61, the curing compound shall be water-based and shall be compliant with all local VOC requirements;

shall conform to ASTM C 309; and shall be certified to conform to the requirements of NSF/ANSI Standard 61.

2. The NSF/ANSI Standard 61 Certified curing compound shall be:

   a. E-Cure by SpecChem, LLC;
   b. Atlas Quantum-Cure NSF by Atlas Tech Products;
   c. or equal.

E. Concrete Curing Blanket

1. Polyethylene Sheets

   a. Polyethylene sheets for use as concrete curing blanket shall be white and shall have a nominal thickness of 6 mils.

   b. The loss of moisture when determined in accordance with ASTM C 156 – Test Method for Water Retention by Concrete Curing Materials, shall not exceed 0.055 grams per square centimeter of surface.

2. Polyethylene-Coated Waterproof Paper

   a. Polyethylene-coated waterproof paper sheeting for use as concrete curing blanket shall consist of white polyethylene sheeting free of visible defects, uniform in appearance, shall have a nominal thickness of 2-mils, and shall be permanently bonded to waterproof paper conforming to the requirements of Federal Specification UU-B-790A – Building Paper, Vegetable Fiber (Kraft, Waterproofed, Water Repellant and Fire Resistant).

   b. The loss of moisture, when determined in accordance with ASTM C 156, shall not exceed 0.055 gram per square centimeter of surface.

3. Polyethylene-Coated Burlap

   a. Polyethylene-coated burlap for use as concrete curing blanket shall be 4 mils thick, with white opaque polyethylene film impregnated or extruded into one side of the burlap.

   b. The burlap shall weigh not less than 9 ounces per square yard.

   c. The loss of moisture, when determined in accordance with ASTM C 156, shall not exceed 0.055 grams per square centimeter of surface.

F. Curing Mats

1. Curing mats for use in Curing Method 6, below, shall be heavy shag rugs or carpets or cotton mats quilted at 4 inches on center.

2. Curing mats shall weigh a minimum of 12 ounces per square yard when dry.

G. Evaporation Retardant

1. An evaporation retardant shall be used.

2. The evaporation retardant shall be:

a. MasterKure ER 50 by BASF/Master Builders;
b. Eucobar by Euclid Chemical Company;
c. E-CON by L & M Construction Chemicals, Inc.;
d. or equal.

2.3 NON-WATERSTOP JOINT MATERIALS

A. Materials for non-waterstop joints in concrete shall conform to the following requirements:

1. The preformed joint filler shall be a non-extruding neoprene sponge or polyurethane type conforming to Section 03 32 00 – Joints in Concrete.

2. The elastomeric joint sealer shall conform to Section 07 92 13 – Sealants and Caulking.

3. Mastic Joint Sealer

a. The mastic joint sealer shall be a material:

1) that does not contain evaporating solvents;

2) that will tenaciously adhere to concrete surfaces;

3) that will remain permanently resilient and pliable;

4) that will not be affected by the continuous presence of water;

5) that will not in any way contaminate potable water;

6) and that will effectively seal the joints against moisture infiltration even when the joints are subject to movement from expansion and contraction.

b. The sealer shall be composed of special asphalts or similar materials blended with lubricating and plasticizing agents to form a tough, durable mastic substance containing no volatile oils or lubricants.

c. The sealer shall be capable of meeting the indicated test requirements, if testing is required by the ENGINEER.

2.4 MISCELLANEOUS MATERIALS

A. Damproofing Agent

1. The damproofing agent shall be an asbestos-free, fibered asphalt emulsion intended for cold application to green concrete, both above- and below-grade.

2. Damproofing shall meet the requirements of ASTM D 1227 – Emulsified Asphalt Used as a Protective Coating for Roofing, Type II, Class I.

3. Dampproofing shall be:

    a. Hydrocide 700 Series by Sonneborn/Degussa Building Systems;
    b. Sealmastic by W. R. Meadows;
    c. HE 789 by Henry Company;
    d. or equal.

B. Bonding Agents

1. Bonding agents shall be epoxy adhesives.

2. Bonding agents for bonding freshly-mixed, plastic concrete to hardened concrete shall be:

    a. Sikadur 32 Hi-Mod Epoxy Adhesive by Sika Corporation;
    b. MasterEmaco ADH 326 by BASF/Master Builders;
    c. BurkEpoxy MV by Edoco;
    d. or equal.

3. Bonding agents for bonding hardened concrete or masonry to steel shall be:

    a. Sikadur 31 Hi-Mod Gel by Sika Corporation;
    b. BurkEpoxy NS by Edoco;
    c. Concresive Paste (LPL) by MBT/Degussa Building Systems;
    d. or equal.

C. Vapor Retarder

1. The vapor retarder shall be a plastic sheet meeting the Class A permeance and strength requirementsof ASTM E 1745 – Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs. The minimum thickness shall be 15 mils.

2. The vapor retarder shall be **Griffolyn Type-85** by **Reef Industries, Inc.**, or equal.

D. Colorant for duct bank concrete shall be an integral red oxide coloring pigment used in the proportion of 8 pounds per cubic yard of concrete.

2.5 CONCRETE DESIGN REQUIREMENTS

A. General

1. Concrete shall be composed of cement, admixtures, aggregates, and water of the qualities indicated.

2. The exact proportions in which these materials are to be used for different parts of the WORK shall be determined during the trial batches.

3. In general, the mix shall be designed to produce a concrete capable of being deposited to obtain maximum density and minimum shrinkage, and, where deposited in forms, to have good consolidation properties and maximum smoothness of surface.

4. The aggregate gradations shall be formulated to provide fresh concrete that will not promote rock pockets around reinforcing steel or embedded items.

5. The proportions shall be changed whenever necessary or desirable to meet the required results, and such changes shall be subject to review by the ENGINEER.

B. Fine Aggregate Composition

1. In mix designs for structural concrete, except for 1/2-inch and 3/8-inch maximum size aggregate, the percentage of fine aggregate in total aggregate by weight shall be as indicated in the following table:

Fine Aggregate	
Fineness Modulus	Percent (maximum)
2.7 or less	41
2.7 to 2.8	42
2.8 to 2.9	43
2.9 to 3.1	44

2. For other concrete, the maximum percentage of fine aggregate of total aggregate by weight shall not exceed 50 percent.

C. Duct Bank Concrete

1. Duct bank concrete shall contain an integral red-oxide coloring pigment.
2. The concrete shall be dyed red throughout.
3. Using a surface treatment to color duct banks will not be accepted.

D. Water/Cement Ratio

1. The indicated water/cement ratio is for a saturated-surface dry condition of aggregate.

2. Throughout every Day, the added batch water shall be adjusted for the total free water in the aggregates, which shall be determined as follows:

   a. The total moisture content of all aggregate shall be calculated by ASTM C 566 – Test Method for Total Moisture Content of Aggregate by Drying.

   b. Subtract the moisture absorbed by the coarse aggregate, calculated by ASTM C 127 – Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.

   c. Subtract the moisture absorbed by the fine aggregate, calculated by ASTM C 128 – Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Fine Aggregate.

E. Concrete Property Tables

1. The maximum cement contents (determined from the maximum W/C Ratios and maximum Water Contents given in the Concrete Property Tables below) are intended to minimize drying shrinkage and heat of hydration of the concrete.

2. It is understood that the indicated maximum cement contents may require additional water reducing agent for the workability required by the CONTRACTOR'S methods, and may not result in the least costly concrete mix for the required concrete strength.

3. If the CONTRACTOR wishes to increase the maximum cement content for any mix, the CONTRACTOR must notify the ENGINEER in writing and submit the request within 30 days of the Notice to Proceed.

4. Increases in cement content shall be at the CONTRACTOR'S expense.

STRUCTURAL CONCRETE				
Type of WORK	Regular Mix (roof, floor slabs, walls, pavements, and other concrete items not categorized elsewhere)	Thick Section Mix (12-inch and thicker walls, slabs on grade, pavements, and footings)	Congested Section Mix (Use where indicated or at the CONTRACTOR's option and approved by the ENGINEER)	Pea Gravel Mix (concrete at the bottom 6 inches of waterstopped walls) At the CONTRACTOR's option, superplastic Regular Mix may be substituted for the first lift
Min 28 Day Compressive Strength, psi	4500	4500	5000	5000
Max Aggregate Size, in	1	1-1/2	1/2	3/8
Cement Content per cubic yard, lb, minimum	564	564	600	752
Water content per cubic yard, lb, maximum	254	254	240	301
Max W/C Ratio by weight	0.42	0.42	0.40	0.40
Total Air Content, percent	3 to 6, all others	3 to 6, all others	3 to 6, all others	4.5 to 7.5, all others
Slump	4 inches +/- 1 in with high-range water reducer: 7 inches +/- 2 in	4 inches +/- 1 in with high-range water reducer: 7 inches +/- 2 in	with high-range water reducer: 7 inches +/- 2 in	with high-range water reducer: 7 inches +/- 2 in

OTHER CONCRETE		
Type of WORK	Sitework Concrete (curbs, gutters, sidewalks, catch basins, fence embedments, encasements, and ductbanks)	Lean Concrete (thrust blocks, pipe trench cut-off blocks, and cradles)
Min 28 Day Compressive Strength, psi	3000	2000
Max Aggregate Size, in	1	1
Cement Content per cubic yard, lb, minimum	470	376
Water content per cubic yard, lb, maximum	254	270
Max W/C Ratio by weight	0.45	0.60
Total Air Content, percent	3 to 6 all others	3 to 6 all others
Slump	4 inches +/- 1 in ductbanks and encasements: 5 inches +/- 1 in	4 inches +/- 1 in

NOTE: The CONTRACTOR is cautioned that the limiting parameters above are not a mix design. Admixtures may be required to achieve workability required by the CONTRACTOR's construction methods and aggregates. The CONTRACTOR shall be responsible for providing concrete with the required workability and strength.

F. Adjustments to Mix Design

1. The CONTRACTOR may elect to decrease the water/cement ratio to achieve the strength and shrinkage requirements and/or add water reducers, as required to achieve workability.

2. The mixes shall be changed whenever such change is necessary or desirable to secure the required strength, density, workability, and surface finish, and the CONTRACTOR shall be entitled to no additional compensation because of such changes.

3. Any changes to the accepted concrete mix design shall be submitted to the ENGINEER for review and shall be tested again in accordance with the indicated requirements.

2.6 CONSISTENCY

A. The quantity of water in a batch of concrete shall be just sufficient, with a normal mixing period, to produce a concrete that can be worked properly into place without segregation and which can be compacted by vibratory methods to give the desired density, impermeability, and smoothness of surface.

B. The quantity of water shall be changed as necessary, with variations in the nature or moisture content of the aggregates, in order to maintain uniform production of a desired consistency.

C. The consistency of the concrete in successive batches shall be determined by slump tests in accordance with ASTM C 143 – Test Method for Slump of Hydraulic Cement Concrete.

D. The slumps shall be as indicated with the concrete properties.

2.7 TRIAL BATCH AND LABORATORY TESTS

A. The CONTRACTOR shall only use a mix design for construction that has first met the trial batch testing requirements.

B. Before placing any concrete, a testing laboratory selected by the ENGINEER shall prepare a trial batch of each class of structural concrete, based on the preliminary concrete mixes submitted by the CONTRACTOR.

C. Aggregate Proportions

1. During the trial batch the aggregate proportions may be adjusted by the testing laboratory using the two coarse aggregate size ranges to obtain the required properties.

2. If one size range produces an acceptable mix, a second size range need not be used.

3. Such adjustments will be considered refinements to the mix design and will not be the basis for extra compensation to the CONTRACTOR.

4. Concrete shall conform to the indicated requirements whether the aggregate proportions are from the CONTRACTOR's preliminary mix design or whether the proportions have been adjusted during the trial batch process.

5. The trial batch shall be prepared using the aggregates, cement, and admixture proposed for the project.

D. The trial batch materials shall be of a quantity such that the testing laboratory can obtain 3 drying shrinkage and 6 compression test specimens from each batch.

E. The determination of compressive strength shall be made by testing 6-inch diameter by 12-inch high cylinders, which have been made, cured, and tested in accordance with ASTM C 192 – Practice for Making and Curing Concrete Test Specimens in the Laboratory, and ASTM C 39.

F. The testing schedule shall be 3 compression test cylinders tested at 7 Days and 3 at 28 Days.

G. The average compressive strength for the 3 cylinders tested at 28 Days for any given trial batch shall be not less than 125 percent of the indicated compressive strength.

H. A sieve analysis of the combined aggregate for each trial batch shall be performed according to the requirements of ASTM C 136 – Method for Sieve Analysis of Fine and Coarse Aggregates, and values shall be provided for percent passing each sieve.

2.8 SHRINKAGE LIMITATION

A. General

1. The CONTRACTOR shall only use a mix design for construction that has first met the trial batch shrinkage requirements.

2. Shrinkage limitations shall apply only to structural concrete.

B. Maximum Shrinkage

1. The maximum concrete shrinkage for specimens cast in the laboratory from the trial batch, as measured at 21-Day drying age or at 28-Day drying age, shall be 0.036 percent or 0.042 percent, respectively.

2. Standard deviation will not be considered.

3. The maximum concrete shrinkage for specimens cast in the field shall not exceed the trial batch maximum shrinkage requirement by more than 25 percent.

C. If the required shrinkage limitation is not met during construction, the CONTRACTOR shall take any or all of the following actions to reestablish compliance:

1. changing the source of aggregates, cement and/or admixtures;

2. reducing water/cement ratio;

3. washing of coarse and/or fine aggregate to reduce fines;

4. increasing the number of construction joints;

5. modifying the curing requirements; or

6. other actions to minimize shrinkage or the effects of shrinkage.

2.9 MEASUREMENT OF CEMENT AND AGGREGATE

A. The amount of cement and of each separate size of aggregate entering into each batch of concrete shall be determined by direct weighing equipment furnished by the CONTRACTOR and acceptable to the ENGINEER.

B. Weighing Tolerances

Material	Percent of Total Weight
Cement	1
Aggregates	3
Admixtures	3

2.10 MEASUREMENT OF WATER

A. The quantity of water entering the mixer shall be measured by a suitable water meter or other measuring device of a type acceptable to the ENGINEER and capable of measuring the water in variable amounts within a tolerance of one percent.

B. The water feed control mechanism shall be capable of being locked in position in order to constantly deliver the required amount of water to each batch of concrete.

C. A positive, quick-acting valve shall be used for a cut-off in the water line to the mixer, and the operating mechanism shall prevent leakage when the valve is closed.

2.11 READY-MIXED CONCRETE

A. General

1. At the CONTRACTOR'S option, ready-mixed concrete may be used if it meets the indicated requirements as to materials, batching, mixing, transporting and placement, and is in accordance with ASTM C 94 and the following supplementary requirements.

2. Ready-mixed concrete shall be delivered to the WORK, and discharge shall be completed within one hour after the addition of the cement to the aggregates or before the drum has been revolved 250 revolutions, whichever occurs first.

3. The use of non-agitating equipment for transporting ready-mixed concrete will not be permitted.

4. Combination truck and trailer equipment for transporting ready-mixed concrete will not be permitted.

5. The quality and quantity of materials used in ready-mixed concrete and in batch aggregates shall be subject to continuous inspection at the batching plant by the ENGINEER.

B. Counters

1. Truck mixers shall be equipped with electrically-actuated counters by which the number of revolutions of the drum or blades may be readily verified.

2. The counter shall be of the resettable, recording type and shall be mounted in the driver's cab.

3. The counters shall be actuated at the time of starting the mixers at mixing speeds.

C. Mixing

1. Each batch of concrete shall be mixed in a truck mixer for not less than 70 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of equipment.

2. Additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as agitating speed.

3. Materials, including the mixing water, shall be in the mixer drum before actuating the revolution counter for determining the number of revolutions of mixing.

D. Uniformity

1. Truck mixers and their operation shall be such that the concrete throughout the mixed batch as discharged is within acceptable limits of uniformity with respect to consistency, mix, and grading.

2. If slump tests taken at approximately the 1/4- and 3/4-point of the load during discharge result in slumps differing by more than one inch when the required slump is 3 inches or less, or if they differ by more than 2 inches when the required slump is more than 3 inches, the mixer shall not be used on the WORK unless the causative condition is corrected and satisfactory performance is verified by additional slump tests.

3. Mechanical details of the mixer, such as water measuring and discharge apparatus, condition of the blades, speed of rotation, general mechanical condition of the unit, and clearance of the drum, shall be checked before a further attempt to use the unit will be permitted.

E. Each batch of ready-mixed concrete delivered to the Site shall be accompanied by a delivery ticket that is furnished to the ENGINEER in accordance with the Paragraph in Part 1 of this Section entitled "Delivery Tickets."

PART 3 EXECUTION

3.1 PROPORTIONING AND MIXING

A. Proportioning of the mix shall conform to ACI 301.
B. Mixing shall conform to ACI 301.
C. Slumps shall be as indicated.
D. Re-tempering of concrete or mortar that has partially hardened will not be permitted.

3.2 PREPARATION OF SURFACES FOR CONCRETING

A. General

1. Earth surfaces shall be thoroughly wetted by sprinkling prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon.

2. The surface shall be free from standing water, mud, and debris at the time of placing concrete.

B. Vapor Retarder

1. The vapor retarder shall be installed under the entire floor slab-on-grade of the Chemical Building. Refer to the Structural drawings for additional information, including regions of the structures listed above where the vapor retarder is not required.

2. Aggregate base on which the vapor retarder is placed shall be at least 6-inches thick within the floor slab-on-grade line after compaction per Section 31 23 23 – Fill and the project Geotechnical Report. Aggregate base surface shall be flat and level with a tolerance of plus zero inches to minus ¾-inch.

3. Place, protect, and repair defects in sheet according to ASTM E 1643 – Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs, and the manufacturer's written instructions.

4. Seams shall be lapped a minimum of 6 inches and sealed in accordance with ASTM E 1643, and as recommended by the vapor retarder manufacturer.

5. Take precautions to avoid damaging the vapor retarder while placing the slab. Keep the vapor retarder dry and place concrete directly on the vapor retarder unless otherwise noted on the Construction Documents.

C. Joints in Concrete

1. Construction joints are defined as concrete surfaces upon which or against which concrete is to be placed, but placement of concrete has been stopped or interrupted and the

ENGINEER has determined that the new concrete cannot be incorporated integrally with the concrete previously placed.

2. The surfaces of horizontal joints shall be given a compacted, roughened surface for good bonding.

3. Except where coated joint surfaces have been indicated, the joint surfaces shall be cleaned of laitance, loose or defective concrete, foreign material, and be roughened to a minimum 1/4-inch amplitude.

4. Cleaning and roughening shall be accomplished by hydroblasting or sandblasting (exposing aggregate) followed by thorough washing.

5. Pools of water shall be removed from the surface of construction joints before the new concrete is placed.

6. Gravel

   a. After the surfaces have been prepared, each approximately horizontal construction joint shall be covered with a 6-inch lift of a pea gravel mix.

   b. The gravel mix shall be placed and spread uniformly.

   c. Wall concrete shall follow immediately and shall be placed upon the fresh pea gravel mix.

D. Placement Interruptions

1. When placing of concrete is to be interrupted long enough for the concrete to take a set, the working face shall be given a shape by the use of forms or other means that will secure proper union with subsequent WORK.

2. Such construction joints shall be made only where acceptable to the ENGINEER.

E. Embedded Items

1. No concrete shall be placed until the formwork, the installation of parts to be embedded, the reinforcement steel, and the preparation of surfaces involved in the placing have been completed and accepted by the ENGINEER at least 4 hours before the placement of concrete.

2. Surfaces of forms and embedded items that have become encrusted with dried grout from previous usage shall be cleaned before the surrounding or adjacent concrete is placed.

3. Inserts or other embedded items shall conform to the indicated requirements.

4. Reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms at locations as indicated or shown by Shop Drawings, and shall be acceptable to the ENGINEER before any concrete is placed.

5. Accuracy of placement shall be the responsibility of the CONTRACTOR.

F. Casting New Concrete Against Old Concrete

1. Where concrete is to be cast against old concrete (defined as any concrete which is greater than 60 Days old), the surface of the old concrete shall be thoroughly cleaned and roughened by hydroblasting or sandblasting to expose aggregate.

2. The joint surface shall be coated with an epoxy bonding agent unless determined otherwise by the ENGINEER.

G. Water

1. No concrete shall be placed in any structure until water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes or other means, and carried out of the forms, clear of the WORK.

2. No concrete shall be deposited underwater nor shall the CONTRACTOR allow still water to rise on any concrete until the concrete has attained its initial set.

3. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete.

4. Pumping or other necessary dewatering operations for removing ground water, if required, shall be subject to review by the ENGINEER.

H. Corrosion Protection

1. Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be positioned and supported prior to placement of concrete such that there will be a minimum of 2 inches clearance between said items and any part of the concrete reinforcement.

2. Securing such items in position by wiring or welding them to the reinforcement will not be permitted.

I. Openings for pipes, inserts for pipe hangers and brackets, and anchors shall be provided, where practicable, during the placement of concrete.

J. Anchor bolts shall be accurately set and shall be maintained in position by templates while embedded in the concrete.

K. Cleaning: The surfaces of metalwork to be in contact with the concrete shall be thoroughly cleaned of dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed.

3.3 HANDLING, TRANSPORTING, AND PLACING

A. General

1. The placement of concrete shall conform to the applicable portions of ACI 301 and the indicated requirements.

2. No aluminum materials shall be used in conveying any concrete.

B. Non-Conforming WORK or Materials

1. Concrete which during or before placing is found not to conform to the indicated requirements will be rejected and shall be immediately removed from the WORK.

2. Concrete that is not placed in accordance with these requirements or which is of inferior quality shall be removed and replaced.

C. Unauthorized Placement

1. No concrete shall be placed except in the presence of an authorized representative of the ENGINEER.

2. The CONTRACTOR shall notify the ENGINEER in writing at least 24 hours in advance of the placement of any concrete.

D. Placement in Wall and Column Forms

1. Concrete shall not be dropped through reinforcement steel or into any deep form, nor shall concrete be placed in any form in such a manner as to leave accumulation of mortar on the form surfaces above the placed concrete.

2. In such cases, means such as hoppers and, if necessary, vertical ducts of canvas, rubber, or metal shall be used for placing concrete in the forms in a manner that it may reach the place of final deposit without separation.

3. In no case shall the free fall of concrete below the ends of ducts, chutes, or buggies exceed 4 feet in walls and 8 feet in columns.

4. Concrete shall be uniformly distributed during the process of deposition, and in no case after deposition shall any portion be displaced in the forms more than 6 feet in the horizontal direction.

5. Concrete in wall forms shall be deposited in uniform horizontal layers not deeper than 2 feet, and care shall be exercised to avoid inclined layers or inclined construction joints except where such are required for sloping members.

6. Each layer shall be placed while the previous layer is still soft.

7. The rate of placing concrete in wall forms shall not exceed 5 feet of vertical rise per hour.

8. Sufficient illumination shall be provided in the interior of forms such that the concrete at the places of deposit is visible from the deck or runway.

E. Casting New Concrete Against Old

1. An epoxy adhesive bonding agent shall be applied to the old surfaces according to the manufacturer's written recommendations.

2. This provision shall not apply to joints where waterstop has been provided.

3. Refer to Section 03 32 00 – Joints in Concrete, for other requirements.

F. Conveyor Belts and Chutes

1. Ends of chutes, hopper gates, and other points of concrete discharge throughout the CONTRACTOR's conveying, hoisting, and placement system shall be designed and arranged such that concrete passing from them will not fall separated into whatever receptacle immediately receives it.

2. Conveyor belts, if used, shall be of a type acceptable to the ENGINEER.

3. Chutes longer than 50 feet will not be permitted.

4. The minimum slopes of chutes shall be such that concrete of the indicated consistency will readily flow in them.

5. If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted.

6. Conveyor belts and chutes shall be covered.

G. Placement in Slabs

1. Concrete placement in sloping slabs shall proceed uniformly from the bottom of the slab to the top for the full width of the placement.

2. As the WORK progresses, the concrete shall be vibrated and carefully worked around the slab reinforcement, and the surface of the slab shall be screeded in an up-slope direction.

H. Temperature of Concrete

1. The temperature of concrete when it is being placed shall be not more than 90 degrees F nor less than 50 degrees F.

2. For sections less than 12 inches thick, the temperature of concrete when placed shall be not less than 55 degrees F.

I. Hot or Cold Weather Procedures

1. If required by the ENGINEER, the CONTRACTOR shall submit detailed procedures for the production, transportation, placement, protection, curing, and temperature monitoring of concrete during hot or cold weather.

2. The submittal shall include procedures to be implemented upon abrupt changes in weather conditions or equipment failures.

3. The CONTRACTOR shall not be entitled to additional compensation for satisfying the hot weather placement or the cold weather placement requirements below.

J. Hot Weather Placement

1. If the temperature of the concrete is 85 degrees F or greater, the time between introducing the cement into the aggregates and discharge shall not exceed 45 minutes.

2. If the concrete is placed when the weather is such that the temperature of the concrete would exceed 90 degrees F, the CONTRACTOR shall employ effective means such as pre-cooling of aggregates, using ice as mixing water, or placing at night as necessary to maintain the temperature of the concrete below 90 degrees F as it is placed.

3. During the curing period, the maximum temperature decrease measured at the surface of the concrete shall not exceed 50 degrees F in 24 hours nor 5 degrees F in one hour.

K. Cold Weather Placement

1. The placement of concrete shall conform to ACI 306.1 – Cold Weather Concreting, and the following requirements:

a. Remove snow, ice, and frost from the surfaces, including reinforcement, against which concrete is to be placed.

b. Before beginning concrete placement, thaw the subgrade to a minimum depth of 6 inches.

c. Reinforcement and embedded items shall be warmed to above 32 degrees F prior to concrete placement.

d. Maintain the concrete temperature above 50 degrees F for at least 72 hours after placement.

e. Concrete ingredients shall not be heated more than necessary to prevent the temperature of the mixed concrete, as placed, from falling below the minimum temperature criterion.

3.4 PUMPING OF CONCRETE

A. General: If the pumped concrete does not produce satisfactory end results, the CONTRACTOR shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.

B. Pumping Equipment

1. The pumping equipment shall have 2 cylinders and shall be designed to operate with one cylinder in case the other one is not functioning.

2. In lieu of this requirement, the CONTRACTOR may have a standby pump on the Site during pumping.

3. The minimum diameter of the hose conduits shall be in accordance with ACI 304.2R – Placing Concrete by Pumping Methods.

4. Pumping equipment and hose conduits that are not functioning properly shall be replaced.

5. Aluminum conduits for conveying the concrete will not be permitted.

C. Field Control: Concrete samples for slump, air content, and test cylinders shall be taken at the placement end of the hose.

3.5 ORDER OF PLACING CONCRETE

A. General

1. The order of placing concrete in the WORK shall be acceptable to the ENGINEER.

2. In order to minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints at the indicated locations.

B. The placing of units shall be done by placing alternate units in a manner such that each unit placed shall have cured at least 5 Days for hydraulic structures and 2 Days for all other structures before the contiguous unit or units are placed, except that the corner sections of vertical walls shall not be placed until the 2 adjacent wall panels have cured at least 10 Days for hydraulic structures and 4 Days for all other structures.

C. Concrete Surfaces

1. The surface of the concrete shall be level whenever a run of concrete is stopped.

2. For a level, straight, intermediate joint on the exposed surface of walls, a wood strip at least 3/4-inch thick shall be tacked to the forms on these surfaces.

3. The concrete shall be carried approximately 1/2 inch above the underside of the strip.

4. The strip shall be removed one hour after the concrete is placed, and any irregularities in the edge formed by the strip shall be leveled with a trowel and laitance shall be removed.

3.6 TAMPING AND VIBRATING

A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted throughout the entire depth of the layer which is being consolidated, into a dense and homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete.

B. Vibrators

1. Vibrators shall be Group 3 in accordance with ACI 309 – Consolidation of Concrete, high speed power vibrators (8000 to 12,000 rpm) of an immersion type in sufficient number and with at least one standby unit as required.

2. Group 2 vibrators may be used only at specific locations when accepted by the ENGINEER.

C. Waterstops

1. Care shall be exercised when placing concrete around waterstops.

2. The concrete shall be carefully worked by rodding and vibrating to make sure that air and rock pockets have been eliminated.

3. Where flat-strip type waterstops have been placed horizontally, the concrete shall be worked under the waterstops by hand, making sure that air and rock pockets have been eliminated.

4. Concrete that is surrounding the waterstops shall be given additional vibration over and above that used for adjacent concrete placement to ensure complete embedment of the waterstops in the concrete.

D. Concrete in Walls

1. Concrete in walls shall be internally vibrated and at the same time rammed, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely fills the forms or excavations and closes snugly against each surface.

2. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly.

3. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the required results within 15 minutes after concrete of the prescribed consistency has been placed in the forms.

4. The vibrating head shall not contact the surfaces of the forms.

5. Care shall be exercised not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

3.7 FINISHING CONCRETE SURFACES

A. General

1. Concrete surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness of any kind, and shall present a finished, smooth, continuous hard surface.

2. Allowable deviations from plumb or level and from the alignment, profiles, and dimensions are defined as tolerances and shall be as indicated.

3. These tolerances are to be distinguished from irregularities in finish as indicated.

4. Aluminum finishing tools shall not be used.

B. Formed Surfaces

1. No treatment shall be required after form removal except for curing, repair of defective concrete, and treatment of surface defects.

2. Where architectural finish is required, treatment(s) shall be as indicated.

3. Surface holes larger than 1/2 inch in diameter or deeper than 1/4 inch are defined as surface defects in basins and exposed walls.

C. Unformed Surfaces

1. General

   a. After proper and adequate vibration and tamping, unformed top surfaces of slabs, floors, walls, and curbs shall be brought to a uniform surface with suitable tools.

   b. Immediately after the concrete has been screeded it shall be treated with a liquid evaporation retardant, and the retardant shall be used again after each operation as necessary to prevent drying shrinkage cracks.

2. The classes of finish for unformed concrete surfaces are defined as follows:

   a. Finish U1

      1) Sufficient leveling and screeding to produce an even, uniform surface with surface irregularities not to exceed 3/8 inch.

      2) No further special finish is required.

   b. Finish U2

      1) After sufficient stiffening of the screeded concrete, surfaces shall be float finished with wood or metal floats or with a finishing machine using float blades.

      2) Excessive floating of surfaces while the concrete is plastic and dusting of dry cement and sand on the concrete surface to absorb excess moisture will not be permitted.

      3) Floating shall be the minimum necessary to produce a surface that is free from screed marks and is uniform in texture.

      4) Surface irregularities shall not exceed 1/4 inch.

      5) Joints and edges shall be tooled where indicated or as determined by the ENGINEER.

   c. Finish U3

      1) After the Finish U2 surface has hardened sufficiently to prevent excess of fine material from being drawn to the surface, steel troweling shall be performed with firm pressure such as will flatten the sandy texture of the floated surface and produce a dense, uniform surface free from blemishes, ripples, and trowel marks.

      2) The finish shall be smooth and free of irregularities.

   d. Finish U4

      1) Trowel the Finish U3 surface to remove local depressions or high points.

      2) In addition, the surface shall be given a light broom finish with brooming perpendicular to drainage unless otherwise indicated.

3) The resulting surface shall be sufficiently rough to provide a nonskid finish.

e. Unformed surfaces shall be finished according to the following schedule:

UNFORMED SURFACE FINISH SCHEDULE	
Area	**Finish**
grade slabs and foundations to be covered with concrete or fill material	U1
floors to be covered with grouted tile or topping grout	U2
water bearing slabs with slopes 10 percent and less	U3
water bearing slabs with slopes greater than 10 percent	U4
slabs not water bearing	U4
slabs to be covered with built-up roofing	U2
interior slabs and floors to receive architectural finish	U3
top surface of walls	U3

3.8 CURING AND DAMPPROOFING

A. General: Concrete shall be cured for not less than 7 Days after placement, in accordance with the methods indicated below for the different parts of the WORK.

Surface to be Cured or Dampproofed	**Method**
unstripped forms	1
construction joints between footings and walls, and between floor slab and columns	2
encasement and ductbank concrete and thrust blocks	3
concrete surfaces not specifically indicated in this Paragraph	4
floor slabs on grade in hydraulic structures	5
slabs not on grade	6
wall sections with forms removed	6

B. Method 1

1. Wooden forms shall be wetted immediately after concrete has been placed and shall be kept wet with water until removal.

2. If steel forms are used the exposed concrete surfaces shall be kept continuously wet until the forms are removed.

3. If forms are removed within 7 Days of placing the concrete, curing shall be continued in accordance with Method 6, below.

C. Method 2

1. The surface shall be covered with burlap mats which shall be kept wet with water for the duration of the curing period, until the concrete in the walls has been placed.

2. No curing compound shall be applied to surfaces cured under Method 2.

D. Method 3

1. The surface shall be covered with moist earth not less than 4 hours nor more than 24 hours after the concrete is placed.

2. Earthwork operations that may damage the concrete shall not begin until at least 7 Days after placement of the concrete.

E. Method 4

1. The surface shall be sprayed with a liquid curing compound.

2. The compound shall be applied in accordance with the manufacturer's printed instructions at a maximum coverage rate of 200 square feet per gallon and in such a manner as to cover the surface with a uniform film that will seal thoroughly.

3. Seal Protection

   a. Where the curing compound method is used, care shall be exercised to avoid damage to the seal during the 7-Day curing period.

   b. If the seal is damaged or broken before expiration of the curing period, the break shall be repaired immediately by the application of additional curing compound over the damaged portion.

4. Wherever curing compound has been applied by mistake to surfaces against which concrete subsequently is to be placed and to which it is to adhere, such compound shall be entirely removed by wet sandblasting just prior to the placing of new concrete.

5. Application Schedule

   a. The curing compound shall be applied as soon as the concrete has hardened enough to prevent marring on unformed surfaces and within 2 hours after removal of forms.

   b. Repairs to formed surfaces shall be made within the 2 hour period; provided, however, that any such repairs which cannot be made within the said 2 hour period shall be delayed until after the curing compound has been applied.

   c. When repairs are to be made to an area on which curing compound has been applied, the area involved shall first be wet-sandblasted to remove the curing compound.

6. At locations where concrete is placed adjacent to a panel which has been coated with curing compound, the panel shall have curing compound reapplied to an area within 6 feet of the joint and to any other location where the curing membrane has been disturbed.

7. Prior to final acceptance of the WORK, visible traces of curing compound shall be removed in such a manner that does not damage the surface finish.

F. Method 5

1. Until the concrete surface is covered with curing compound, the entire surface shall be kept damp by applying water using nozzles that atomize the flow such that the surface is not marred or washed.

2. The concrete shall be given a coat of curing compound in accordance with Method 4, above.

3. Not less than one hour nor more than 4 hours after the curing compound has been applied, the surface shall be wetted with water delivered through a fog nozzle, and concrete-curing blankets shall be placed on the slabs.

4. Curing Blankets

   a. The curing blankets shall be laid with the edges butted together and with the joints between strips sealed with 2-inch wide strips of sealing tape or with edges lapped not less than 3 inches, and fastened together with a waterproof cement to form a continuous watertight joint.

   b. The curing blankets shall be left in place during the 7-Day curing period and shall not be removed until after concrete for adjacent WORK has been placed.

   c. If the curing blankets become torn or otherwise ineffective, the CONTRACTOR shall replace damaged sections.

   d. During the first 3 Days of the curing period, no traffic of any nature and no depositing, temporary or otherwise, of any materials will be permitted on the curing blankets.

   e. During the remainder of the curing period, foot traffic and temporary depositing of materials that impose light pressure will be permitted only on top of plywood sheets 5/8-inch minimum thickness, laid over the curing blanket.

   f. The CONTRACTOR shall add water under the curing blanket as often as necessary to maintain damp concrete surfaces.

G. Method 6

1. Method 6 shall apply to both walls and slabs.

2. The concrete shall be kept continuously wet by the application of water for a minimum period of at least 7 Days, beginning immediately after the concrete has reached final set or the forms have been removed.

3. Until the concrete surface is covered with the curing mats, the entire surface shall be kept damp by applying water using nozzles that atomize the flow such that the surface is not marred or washed.

4. Curing Mats

   a. Heavy curing mats shall be used as a curing medium to retain the moisture during the curing period.

b. The curing mats shall be weighted or otherwise held substantially in contact with the concrete surface to prevent dislodging by wind or other causes.

c. Edges shall be continuously held in place.

5. The curing mats and concrete shall be kept continuously wet by the use of sprinklers or other means both during and after normal working hours.

6. Immediately after the application of water has terminated at the end of the curing period, the curing mats shall be removed, the entire concrete surface shall be wetted, and curing compound shall be immediately applied to the entire surface in accordance with Method 4, above.

7. The CONTRACTOR shall dispose of excess water from the curing operation in order to avoid damage to the WORK.

H. Dampproofing

1. The exterior surfaces of roof slabs to be buried and walls to be backfilled shall be dampproofed as follows.

2. Asphalt Emulsion

a. Immediately after the completion of curing, the surface shall be sprayed with a dampproofing agent consisting of an asphalt emulsion.

b. Application of the agent shall be in 2 coats.

c. The first coat shall be diluted to 1/2 strength by the addition of water, and shall be sprayed on so as to provide a maximum coverage rate of 100 square feet per gallon of dilute solution.

d. The second coat shall consist of an application of the undiluted material, and shall be sprayed on so as to provide a maximum coverage rate of 100 square feet per gallon.

3. Whitewash

a. As soon as the material has taken an initial set, the entire area thus coated shall be coated with whitewash.

b. Any formula for mixing the whitewash may be used if it produces a uniformly-coated white surface and remains until placing of the backfill.

c. If the whitewash fails to remain on the surface until the backfill is placed, the CONTRACTOR shall apply additional whitewash.

3.9 PROTECTION

A. The CONTRACTOR shall protect the concrete against damage until final acceptance.

B. Weather Protection

1. Fresh concrete shall be protected from damage due to rain, hail, sleet or snow.

2. The CONTRACTOR shall provide such protection while the concrete is still plastic and whenever precipitation is imminent or occurring.

3.10 CURING DURING COLD WEATHER

A. Water curing of concrete may be reduced to 6 Days during periods when the mean daily temperature in the vicinity of the Site is less than 40 degrees F, provided that during the prescribed period of water curing, when temperatures are such that concrete surfaces may freeze, water curing has been temporarily discontinued.

B. Compound-Cured Concrete

1. Concrete that is to be cured by an application of curing compound shall require no additional protection from freezing if the protection at 50 degrees F for 72 hours is obtained by means of approved insulation in contact with the forms or concrete surfaces.

2. Otherwise, the concrete shall be protected against freezing temperatures for 72 hours immediately following 72 hours protection at 50 degrees F.

C. Concrete cured by water shall be protected against freezing temperatures for 72 hours immediately following the 72 hours of protection at 50 degrees F.

D. Discontinuance of Protection

1. Discontinuance of protection against freezing temperatures shall be such that the drop in temperature of any portion of the concrete will be gradual and will not exceed 40 degrees F in 24 hours.

2. In the spring, when the mean daily temperature rises above 40 degrees F for more than 3 successive Days, the required 72-hour protection at a temperature not lower than 50 degrees F may be discontinued for as long as the mean daily temperature remains above 40 degrees F, provided that the concrete shall be protected against freezing temperatures for not less than 48 hours after placement.

E. Artificial Heat

1. Where artificial heat is employed, special care shall be taken to prevent the concrete from drying.

2. The use of unvented heaters will be permitted only when unformed surfaces of concrete adjacent to the heaters are protected for the first 24 hours from an excessive carbon dioxide atmosphere by application of curing compound, provided that the use of curing compound for such surfaces is otherwise permitted.

3.11 TREATMENT OF SURFACE DEFECTS

A. General

1. Surface defects are defined in Finishing Concrete Surfaces, above.

2. As soon as forms are removed, the exposed concrete surfaces shall be carefully examined and any irregularities shall be immediately rubbed or ground in order to secure a smooth, uniform, and continuous surface satisfactory to the Engineer.

3. Plastering or coating of surfaces to be smoothed will not be permitted.

4. No repairs shall be made until after inspection by the ENGINEER.

5. In no case will extensive patching of honeycombed concrete be permitted.

6. Concrete containing minor voids, holes, honeycombing, or similar depression defects shall be repaired as indicated below.

7. Concrete containing extensive voids, holes, honeycombing, or similar depression defects shall be completely removed and replaced..

8. Repairs of surface defects shall be performed promptly.

B. Preparation

1. Defective surfaces to be repaired shall be cut back from trueline a minimum depth of 1/2-inch over the entire area.

2. Feathered edges will not be permitted.

3. Where chipping or cutting tools are not required in order to deepen the area properly, the surface shall be prepared for bonding by the removal of laitance and soft material, plus not less than 1/32-inch depth of the surface film from hard portions by means of an efficient sandblast.

4. After cutting and sandblasting, the surface shall be wetted sufficiently in advance of shooting with shotcrete or with cement mortar such that while the repair material is being applied the surfaces underneath will remain moist but not so wet as to overcome the suction upon which a good bond depends.

C. Materials

1. The material used for repair shall consist of a mixture of one sack of cement to 3 cubic feet of sand.

2. For exposed walls, the cement shall contain such a proportion of Atlas White Portland cement as is required to make the color of the patch match the color of the surrounding concrete.

D. Holes

1. Holes left by tie-rod cones shall be reamed with suitably toothed reamers in order to leave the surfaces of the holes clean and rough.

2. Holes then shall be repaired in an approved manner with dry-packed cement grout.

3. Holes left by form-tying devices having a rectangular cross section and other imperfections having a depth greater than their least surface dimension shall not be reamed but shall be repaired in an approved manner with dry-packed cement grout.

E. Repairs

1. Repairs shall be built up and shaped in such a manner that the completed WORK will conform to the indicated requirements, using approved methods which will not disturb the bond, cause sagging, or cause horizontal fractures.

2. The surfaces of repaired concrete shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.

F. Cracks: Prior to filling any structure with water, cracks shall be repaired in accordance with the requirements of Section 03 01 30 – Concrete Repair and Rehabilitation.

3.12 CONCRETE REPAIR AND REHABILITATION

A. All defects and repairs not covered under Treatment of Surface Defects shall be repaired per Section 03 01 30 - Concrete Repair and Rehabilitation.

3.13 CARE AND REPAIR OF CONCRETE

A. The CONTRACTOR shall protect concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until Final Acceptance.

B. Particular care shall be exercised in order to prevent the drying shrinkage damage of concrete and to avoid roughening or otherwise damaging the concrete surface.

C. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed WORK, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be repaired or removed and replaced with acceptable materials to the satisfaction of the ENGINEER.

END OF SECTION

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SECTION 03 32 00 - JOINTS IN CONCRETE

PART 1 GENERAL

1.1 THE SUMMARY

A. The CONTRACTOR shall provide joints in concrete, complete and in place, in accordance with the Contract Documents.

B. Joints in concrete structures shall be the types defined below and will be permitted only where indicated, unless specifically accepted by the ENGINEER.

1.2 TYPES OF JOINTS

A. Construction Joints

1. When fresh concrete is placed against a hardened concrete surface, the joint between the pours shall be defined as a construction joint.

2. Unless otherwise indicated, joints in water-bearing members shall be provided with a waterstop and/or sealant groove of the shape indicated.

B. Contraction Joints

1. Contraction joints are similar to construction joints except that the fresh concrete shall not bond to the hardened surface of the earlier pour.

2. The slab reinforcement shall be stopped 4-1/2 inches from the joint; which is provided with a sleeve-type dowel, in order to allow shrinkage of the concrete of the later pour.

3. Waterstop and/or sealant groove shall be provided where indicated.

C. Expansion Joints

1. In order to allow the concrete to expand freely, a space shall be provided between the 2 pours, and the joint shall be formed as indicated.

2. The space shall be obtained by placing a filler joint material against the earlier pour to act as a form for the later pour.

3. Unless otherwise indicated, expansion joints in water bearing members shall be provided with a center-bulb type waterstop.

4. Provide premolded expansion joint material with the edge at the indicated distance below or back from the finished concrete surface.

5. Provide a slightly tapered, dressed and oiled wooden strip secured to or placed at the edge of the expansion joint during concrete placement, and remove the strip later to form a space for the sealing material.

6. The space so formed shall be filled with a joint sealant material as indicated below. In order to keep the 2 wall or slab elements in line, the joint shall also be provided with a sleeve-type dowel as indicated.

D. Control Joints

1. The function of the control joint is to provide a weaker plane in the concrete where shrinkage cracks would likely occur.

2. Formed Groove

a. A groove, of the shape and dimensions indicated, shall be formed or saw-cut in the concrete and the groove shall then be filled with a joint sealant material.

b. The formed groove shall be placed in the first of the two sections cast at the control joint, in order to assure that the sealant bonds to the second section across the joint and not to the cement paste from the first pour.

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 01 33 00 – Contractor Submittals.

B. Shop Drawings

1. Furnish placement drawings showing the location and types of joints for each structure.

2. Test Reports

a. Furnish certified test reports from the sealant manufacturer on the actual batch of material supplied, demonstrating compliance with the indicated requirements.

b. Furnish the test reports before using the sealant on the Project.

3. Welding Certification

a. Furnish copies of the waterstop welding certification by manufacturer or authorized agent of the manufacturer.

b. Every person who is to be involved with waterstop installation shall be required to have individual certification on file with the ENGINEER, stating that the named individual is certified and trained to install waterstop in accordance with the manufacturer's recommendations and specifications.

4. Furnish manufacturer's information demonstrating compliance of the following with the indicated requirements:

a. bearing pad
b. neoprene sponge
c. preformed joint filler
d. backing rod
e. waterstop

f. slip dowels
g. PVC tubing

C. Samples

1. Prior to production of the material required under this Section, submit qualification samples of waterstops which accurately represent the material being provided.

2. Such samples shall be extruded or molded sections of each size or shape to be installed.

3. The balance of the material to be used shall not be produced until after the ENGINEER has reviewed the qualification samples.

D. Certificates

1. Furnish written certification from the manufacturer, as an integral part of the shipping form, that the material shipped to the Site meets or exceeds the indicated physical property requirements.

2. Supplier certificates will not be accepted.

1.4 QUALITY ASSURANCE

A. Waterstop Inspection

1. Waterstop field joints shall be subject to inspection, and no such WORK shall be scheduled or started without having made prior arrangements with the ENGINEER for the required inspections.

2. Provide not less than 24 hours notice for the scheduling of such inspections.

3. Field joints in waterstops shall be subject to inspection for misalignment, bubbles, inadequate bond, porosity, cracks, offsets, and other defects that would reduce the potential resistance of the material to water pressure at any point.

4. Defective field joints shall be replaced with material that passes inspection, and faulty material shall be removed from the Site and destroyed.

B. The following waterstop defects represent a partial list of defects which shall be grounds for rejection:

1. offsets at joints greater than 1/16 inch or 15 percent of material thickness at any point, whichever is less

2. exterior cracking at the joint due to incomplete bond, which is deeper than 1/16 inch or 15 percent of material thickness at any point, whichever is less

3. any combination of offset or exterior cracking that will result in a net reduction in the cross-section of the waterstop in excess of 1/16 inch or 15 percent of material thickness at any point, whichever is less

4. misalignment of the joint which results in misalignment of the waterstop in excess of 1/2 inch in 10 feet

5. porosity in the welded joint as evidenced by visual inspection

6. bubbles or inadequate bonding which can be detected with a penknife test. (If, while prodding the entire joint with the point of a penknife, the knife breaks through the outer portion of the weld into a bubble, the joint shall be considered defective.)

7. visible signs of separation when the cooled splice is bent by hand at any sharp angle

8. evidence of burned material

C. Waterstop Samples

1. Prior to use of the waterstop material in the field, a sample of a prefabricated (shop made fitting) mitered cross and a tee constructed of each size or shape of material to be used shall be submitted.

2. Samples shall be prefabricated (shop made fitting) so that the material and workmanship represent the fittings to be provided.

3. In addition, field samples of prefabricated fittings (crosses, tees, and the like) will be selected at random by the ENGINEER for testing by a laboratory at the OWNER's expense.

4. When tested, the tensile strength across the joints shall be at least 1120 psi for PVC waterstops.

D. Construction Joint Sealant

1. The CONTRACTOR shall prepare adhesion and cohesion test specimens at intervals of 5 Days while sealants are being installed.

2. The sealant material shall show no signs of adhesive or cohesive failure when tested in accordance with the following procedure in laboratory and field tests:

   a. Sealant specimen shall be prepared between 2 concrete blocks (1-inch by 2-inch by 3-inch).

   b. Spacing between the blocks shall be one inch.

   c. Coated spacers (2-inch by 1-1/2-inch by 1/2-inch) shall be used to set and hold sealant cross-sections of 1/2-inch by 2-inch with a width of one inch.

   d. The sealant shall be cast and cured in accordance with the manufacturer's recommendations, except that the curing period shall be not less than 24 hours.

   e. Following the curing period, the gap between the blocks shall be widened to 1-1/2 inches, and spacers shall be used to maintain this gap for 24 hours prior to inspection for failure.

1.5 SPECIAL CORRECTION OF DEFECTS REQUIREMENT

A. The CONTRACTOR shall furnish a 5-year written warranty of the entire sealant installation against faulty and/or incompatible materials and workmanship, together with a statement that the CONTRACTOR agrees to repair or replace, to the satisfaction of the OWNER, any defective areas which become evident within the 5-year period.

PART 2 PRODUCTS

2.1 GENERAL

A. Joint materials shall be listed as compliant with NSF Standard 61.

2.2 WATERSTOPS

A. PVC Waterstops

1. Waterstops shall be extruded from an elastomeric polyvinyl chloride compound containing the plasticizers, resins, stabilizers, and other materials necessary to meet the indicated requirements of this Section.

2. No reclaimed or scrap material shall be used.

3. The CONTRACTOR shall obtain from the waterstop manufacturer and shall furnish to the ENGINEER for review, current test reports and a written certification of the manufacturer that the material to be shipped to the Site meets the physical requirements as outlined in the U.S. Army Corps of Engineers Specification CRD-C572-PVC Waterstops, and those indicated.

4. Flatstrip and Center-Bulb Waterstops

a. Flatstrip and center-bulb waterstops shall be manufactured such that at no place shall the thickness of waterstops, including the center bulb type, be less than 3/8 inch.

b. The waterstop shall be provided with hog rings installed at 12 inches on centers along the waterstop.

c. Shapes shall be as indicated, or as acceptable to the ENGINEER.

5. Multi-Rib Waterstops

a. Multi-rib waterstops shall be as indicated or as acceptable to the ENGINEER.

b. Prefabricated joint fittings shall be used at intersections of the ribbed-type waterstops.

6. Retrofit Waterstops

a. Retrofit waterstops and batten bars shall be as indicated or as acceptable to the ENGINEER.

b. The waterstop shall be supplied as a complete system including waterstop, SS batten bar, SS anchor bolts, and epoxy gel.

7. When tested in accordance with the indicated test standards, the waterstop material shall meet or exceed the following requirements:

Physical Property, Sheet Material	Value	ASTM Std
Tensile Strength-min, psi	2000	D 638, Type IV
Ultimate Elongation-min, percent	350	D 638, Type IV
Low Temp Brittleness, max degrees F	-35	D 746
Stiffness in Flexure, min, psi	600	D 747
Accelerated Extraction (CRD-C572		
Tensile Strength-min, psi	1500	D 638, Type IV
Ultimate Elongation, min, percent	300	D 638, Type IV
Effect of Alkalies (CRD-C572		
Change in Weight, percent	plus 0.25/minus 0.10	------
Change in Durometer, Shore A	plus and minus 5	D 2240
Finish Waterstop		
Tensile Strength-min, psi	1400	D 638, Type IV
Ultimate Elongation, min percent	280	D 638, Type IV

B. Preformed Hydrophilic Waterstop

1. Hydrophilic (bentonite-free) waterstops shall be Hydro-Flex Waterstop as manufactured by Henry Co., or Earthshield Type 20, as manufactured by JP Specialties, or equal.

2. The cross-sectional area of the waterstop shall not be less than 0.5 square inch.

3. Hydrophilic waterstop shall be the type that expands in the presence of water to form a watertight joint seal without damaging the concrete in which it is cast.

4. The waterstop shall be manufactured from butyl rubber with hydrophilic properties.

5. The waterstop shall have a delay coating to inhibit initial expansion due to moisture present in fresh concrete.

6. The minimum expansion ratio of modified chloroprene shall be not less than 2-to-1 volumetric change in distilled water at 70 degrees F (21 degrees C).

7. The bonding agent for hydrophilic waterstop shall be the manufacturer's recommended adhesive for wet, rough concrete.

C. When types of waterstops not listed above are indicated, they shall be subjected to the same requirements as those listed in this Section.

2.3 JOINT SEALANT FOR WATER-BEARING JOINTS

A. The joint sealant shall be a polyurethane polymer designed for bonding to concrete which is continuously submerged in water.

B. No material will be accepted which has an unsatisfactory history as to bond or durability when used in the joints of water-retaining structures.

C. Joint sealant material shall meet the following requirements (73 degrees F and 5 percent R.H.):

Work Life, minutes	45 - 180
Time to Reach 20 Shore A Hardness (at 77 degrees F, 200 gram quantity), max	24 hours
Ultimate Hardness (ASTM D 2240, Shore A)	20 - 45
Tensile Strength (ASTM D 412), min	175 psi
Ultimate Elongation (ASTM D 412), minimum	400 percent
Tear Resistance (Die C, ASTM D 624), pounds per inch of thickness, min	75
Color	Light Gray

D. Polyurethane sealants for waterstop joints in concrete shall conform to the following requirements:

1. Sealant shall be 2-part polyurethane with the physical properties of the cured sealant conforming to or exceeding the requirements of ASTM C 920 – Elastomeric Joint Sealant, or Federal Specification TT-S-0227 E(3) - Sealing Compound, Elastomeric Type, Multicomponent, for Caulking, Sealing, and Glazing Buildings and Other Structures, for 2-part material, as applicable.

2. For vertical joints and overhead horizontal joints, only "non-sag" compounds shall be used, conforming to the requirements of ASTM C 920, Class 25, Grade NS, or Federal Specification TT-S-0227 E(3), Type II, Class A.

3. For plane horizontal joints, use the self-leveling compounds meeting the requirements of ASTM C 920 Class 25, Grade P, or Federal Specification TT-S-0227 E(3), Type I.

4. For joints subject to either pedestrian or vehicular traffic, a compound providing non-tracking characteristics and having a Shore A hardness range of 35 to 45 shall be used.

5. Primer materials, if recommended by the sealant manufacturer, shall conform to the printed recommendations of the manufacturer.

E. Sealant Manufacturers

1. Sealants shall be PSI-270 as manufactured by Polymeric Systems Inc., Sikaflex 2C, as manufactured by Sika Corporation, Pelseal (with Viton) 2112/2012, or equal.

F. Sealants for non-waterstop joints in concrete shall be in conformance with the requirements of Section 07 92 13 – Sealants and Caulking.

2.4 JOINT MATERIALS

A. Bearing Pad

1. The bearing pad shall be neoprene conforming to ASTM D 2000 - Standard Classification System for Rubber Products in Automotive Applications, BC 420, 40 durometer hardness, unless otherwise indicated.

B. Neoprene Sponge

1. The sponge shall be neoprene, closed-cell, expanded, conforming to ASTM D 1056 - Flexible Cellular Materials - Sponge or Expanded Rubber, Type 2C5-E1.

C. Joint Filler

1. Joint filler for expansion joints in waterholding structures shall be neoprene conforming to ASTM D 1056, Type 2C5-E1.

2. Joint filler material in other locations shall be of the preformed non-extruding type, constructed of cellular neoprene sponge rubber or polyurethane of firm texture.

3. Bituminous fiber type will not be accepted.

4. Non-extruding and resilient-type preformed expansion joint fillers shall conform to the requirements and tests set forth in ASTM D 1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction, for Type I, except as otherwise indicated.

2.5 BACKING ROD

A. The backing rod shall be an extruded closed-cell, polyethylene foam rod.

B. The rod material shall be compatible with the joint sealant material, and shall have a tensile strength of not less than 40 psi and a compression deflection of approximately 25 percent at 8 psi.

C. The rod shall be 1/8 inch larger in diameter than the joint width except that a one-inch diameter rod shall be used for a 3/4-inch wide joint.

2.6 SLIP DOWELS

A. Slip dowels in joints shall be smooth epoxy-coated bars conforming to ASTM A 775 - Epoxy Coated Reinforcing Steel Bars.

2.7 PVC TUBING

A. PVC tubing in joints shall be SDR 13.5, conforming to ASTM D 2241 - Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).

PART 3 EXECUTION

3.1 GENERAL

A. Waterstops shall be embedded in the concrete across joints as indicated.

B. Waterstops shall be fully continuous for the extent of the joint.

C. Splices necessary to provide such continuity shall conform to the printed instructions of the waterstop manufacturer.

D. The CONTRACTOR shall take suitable precautions and provide means to support and protect the waterstops during the progress of the WORK, and shall repair or replace any waterstops damaged during progress of the WORK at no additional cost to the OWNER.

E. Waterstops shall be stored so as to permit free circulation of air around the waterstop material.

F. When any waterstop is installed in the concrete on one side of a joint while the other portion of the waterstop remains exposed to the atmosphere for more than 2 Days, suitable precautions shall be taken to shade and protect the exposed waterstop from direct rays of the sun during the entire exposure time until the exposed portion of waterstop is embedded in concrete.

3.2 SPLICES IN PVC WATERSTOPS

A. Splices in PVC waterstops shall be performed by heat sealing the adjacent waterstop sections in accordance with the manufacturer's printed recommendations.

B. It is essential that:

1. The material shall not be damaged by heat sealing.

2. The splices shall have a tensile strength of not less than 80 percent of the unspliced material.

3. The continuity of the waterstop ribs and of its tubular center axis shall be maintained.

4. No edge welding will be accepted.

C. Butt joints of the ends of 2 identical waterstop sections may be made while the material is in the forms.

D. Other Joints

1. Joints with waterstops involving more than 2 ends to be jointed together, and joints that involve an angle cut, alignment change, or the joining of 2 dissimilar waterstop sections, shall be prefabricated prior to placement in the forms, allowing not less than 24-inch long strips of waterstop material beyond the joint.

2. Upon inspection and approval, such prefabricated waterstop joint assemblies shall be installed in the forms and the ends of the 24-inch strips shall be butt-welded to the straight run portions of waterstop in place in the forms.

E. Where a centerbulb waterstop intersects and is jointed with a non-centerbulb waterstop, care shall be taken to seal the end of the centerbulb, using additional PVC material if needed.

3.3 JOINT CONSTRUCTION

A. Setting Waterstops

1. In order to eliminate faulty installation that may result in joint leakage, particular care shall be taken as to the correct positioning of the waterstops during installation.

2. Adequate provisions shall be made to support and anchor the waterstops during the progress of the WORK and to ensure proper embedment in the concrete.

3. The symmetrical halves of the waterstops shall be equally divided between the concrete pours at the joints.

4. The center axis of the waterstops shall be coincident with the joint openings.

5. Thoroughly work the concrete in the vicinity of joints for maximum density and imperviousness.

B. Waterstop Placement

1. In placing waterstops in the forms, means shall be provided to prevent them from being folded over by the concrete as it is placed.

2. Waterstops shall be held in place with light wire ties on 12-inch centers, which shall be passed through hog rings at the edge of the waterstop and tied to the curtain of reinforcing steel.

3. Horizontal waterstops, with their flat face in a vertical plane, shall be held in place with continuous supports to which the top edge of the waterstop shall be tacked.

4. In placing concrete around horizontal waterstops with their flat face in a horizontal plane, the concrete shall be worked under the waterstops by hand in order to avoid the formation of air and rock pockets.

C. In placing centerbulb waterstops in expansion joints, the centerbulb shall be centered on the joint filler material.

D. Waterstop in vertical wall joints shall terminate 6 inches from the top of the wall, where such waterstop does not connect with any other waterstop and is not to be connected to a future concrete placement.

E. Joint Location

1. Construction joints and other types of joints shall be provided where indicated.

2. If not indicated, construction joints shall be provided at a 25-foot maximum spacing.

3. Where joints are indicated to be spaced greater than 40 feet apart, additional joints shall be provided to maintain the 25-foot maximum spacing.

4. The location of joints, regardless of type, shall be submitted for acceptance by the ENGINEER.

F. Joint Preparation

1. Special care shall be used in preparing concrete surfaces at joints where bonding between 2 sections of concrete is required.

2. Unless otherwise indicated, such bonding shall be required at every horizontal joint in walls.

3. Surfaces shall be prepared in accordance with Section 03 31 00 – Cast-in-Place Concrete.

G. Retrofit Joint Preparation

1. Existing surfaces to receive a retrofit waterstop shall be clean and free from any loose or foreign material.

2. The surface shall be given a light sandblast or hydroblast finish to 1/8-inch amplitude prior to the application of epoxy and waterstop.

H. Construction Joint Sealant

1. Construction joints in water-bearing floor slabs and elsewhere as indicated shall be provided with tapered grooves which shall be filled with a construction joint sealant.

2. The material used to form the tapered grooves shall be left in the grooves until just before the grooves are cleaned and filled with joint sealant.

3. After removing the forms from the grooves, laitance and fins shall be removed, and the grooves shall be sand blasted.

4. The grooves shall be allowed to thoroughly dry, after which they shall be blown out and immediately thereafter they shall be primed and filled with the construction joint sealant.

5. The primer shall be furnished by the sealant manufacturer, and no sealant shall be used without a primer.

6. Care shall be used to completely fill the sealant grooves.

7. Areas designated to receive a sealant fillet shall be thoroughly cleaned as outlined for the tapered grooves prior to application of the sealant.

I. The primer and sealant shall be placed strictly in accordance with the printed recommendations of the manufacturer, taking special care to properly mix the sealant prior to application.

J. The sides of the sealant groove shall not be coated with bond breaker, curing compound, or any other substance which would interfere with proper bonding of the sealant.

K. The sealant shall achieve final cure at least 7 Days before the structure is filled with water.

L. The sealant shall be installed by a competent waterproofing specialty contractor with a successful record of performance in similar installations.

M. Mixing

1. Catalyst-cured, 2-part materials shall be thoroughly and uniformly mixed, and special care shall be taken to properly mix the sealer before its application.

2. Before any sealer is placed, the CONTRACTOR shall arrange to have workers performing the WORK carefully instructed on the proper method of mixing and application by a representative of the sealant manufacturer.

N. Failure to Cure

1. Any joint sealant that fails to fully and properly cure after the manufacturer's recommended curing time for the conditions of the WORK shall be completely removed, and the groove shall be thoroughly sandblasted to remove traces of the uncured or partially cured sealant and primer.

2. The groove shall be re-sealed with the indicated joint sealant.

3. Costs of such removal, joint treatment, re-sealing, and appurtenant WORK shall be the CONTRACTOR's responsibility as part of the WORK.

O. Hydrophilic Waterstop

1. Where a hydrophilic waterstop is indicated, it shall be installed in accordance with the manufacturer's instructions and recommendations except as may be modified in this Section.

2. When requested by the ENGINEER, the CONTRACTOR shall arrange for the manufacturer to furnish technical assistance in the field.

3. Hydrophilic waterstop shall only be used where complete confinement by concrete is provided.

4. Hydrophilic waterstop shall not be used in expansion or contraction joints nor in the first 6 inches of a non-intersecting joint.

5. Location

   a. The hydrophilic waterstop shall be located as near as possible to the center of the joint, and it shall be continuous around the entire joint.

   b. The minimum distance from the edge of the waterstop to the face of the member shall be 5 inches.

6. Placement

   a. Where the thickness of the concrete member to be placed on the hydrophilic waterstop is less than 12 inches, the waterstop shall be placed in grooves formed or ground into the concrete.

   b. The groove shall be at least 3/4 inch deep and 1-1/4 inches wide.

   c. When placed in the groove, the minimum distance from the edge of the waterstop to the face of the member shall be 2-1/2 inches.

7. Where a hydrophilic waterstop is used in combination with PVC waterstop, the hydrophilic waterstop shall overlap the PVC waterstop for a minimum of 6 inches and shall be adhered

to PVC waterstop by a single component water-swelling sealant as recommended by the manufacturer.

8. The hydrophilic waterstop shall not be installed where the air temperature falls below the manufacturer's recommended range.

9. Preparation

    a. The concrete surface under the hydrophilic waterstop shall be smooth and uniform, and the concrete shall be ground smooth if needed.

    b. Alternatively, the hydrophilic waterstop shall be bonded to the surface using an epoxy grout that completely fills voids and irregularities beneath the waterstop material.

    c. Prior to installation, the concrete surface shall be wire brushed to remove any laitance or other materials that may interfere with the bonding of epoxy.

10. Securing

    a. The hydrophilic waterstop shall be secured in place with concrete nails and washers at 12-inch maximum spacing.

    b. The above requirement shall be in addition to the adhesive recommended by the manufacturer.

P. Retrofit Waterstop

1. Retrofit waterstops shall be set in a bed of epoxy over a sandblasted surface with stainless steel batten bars and 1/4-inch diameter stainless steel anchors at 6 inches on-center, staggered, and in accordance with the manufacturer's written recommendations.

END OF SECTION

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SECTION 03 60 00 - GROUTING

PART 1 GENERAL

1.1 THE SUMMARY

A. The CONTRACTOR shall provide grout, complete and in place, in accordance with the Contract Documents. For concrete repair material and procedures, reference Section 03 01 30 – Concrete Repair and Rehabilitation.

B. Grout provided as a base support for mechanical and electrical equipment shall conform to manufacturer's requirements and the requirements of this section.

C. The following types of grout are covered in this Section:

1. Non-Shrink Grout
2. High Strength Non-Shrink Grout
3. Non-Shrink Epoxy Grout
4. Topping Grout and Concrete/Grout Fill

1.2 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)

B. ASTM C307 -- Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacings

C. ASTM C531 – Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes

D. ASTM C579 – Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes

E. ASTM C580 – Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes

F. ASTM C827 – Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures

G. ASTM C882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear

H. ASTM C1090 – Standard Test Method for Measuring Changes in Height of Cylindrical Specimens from Hydraulic-Cement Grout

I. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

J. ASTM C1116 – Standard Specification for Fiber-Reinforced Concrete

K. ASTM C1339 – Standard Test Method for Flowability and Bearing Area of Chemical-Resistant Polymer Machinery Grouts

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01 33 00 - Contractor Submittals.

1. Certified testing lab reports for tests indicated herein.

2. Test results and service report from the field tests and the demonstration and training session verifying the requirements indicated herein.

3. Manufacturer’s literature containing instructions and recommendations on the mixing, handling, placement, curing, and appropriate uses for each type of grout used in the WORK, and location of use.

4. Documentation indicating that the grouts contain no chlorides or other chemicals that cause corrosion.

5. Manufacturer’s Safety Data Sheet documenting composition of grouts.

6. Submit manufacturer's written warranty as indicated herein.

7. Name and telephone number of grout manufacturer's representative who will give on-site service. The representative shall have at least one year of experience with the indicated grouts.

1.4 QUALITY ASSURANCE

A. Field Tests

1. Compression test specimens will be taken from the first placement of each type of grout, and at intervals thereafter selected by the ENGINEER. The specimens will be made by the ENGINEER or its representative.

2. Compression tests and fabrication of specimens for cement grout and cement based non-shrink grout will be performed in accordance with ASTM C1107 at intervals during construction selected by the ENGINEER.

3. Compression tests and fabrication of specimens for topping grout and concrete/grout fill will be performed in accordance with Section 03 31 00 - Cast-in-Place Concrete at intervals during construction selected by the ENGINEER.

4. Compression tests and fabrication of specimens for epoxy grouts will be performed in accordance with ASTM C579, Method B, at intervals during construction selected by the ENGINEER. A set of 3 specimens will be made for testing at 7 Days and each earlier time period as appropriate.

5. The cost of laboratory tests on grout will be paid by the OWNER except where test results show the grout to be defective. In such case, the CONTRACTOR shall pay for the tests, removal and replacement of Defective Work, and re-testing, all as part of the WORK.

6. The CONTRACTOR shall assist the ENGINEER in obtaining specimens for testing and shall furnish materials necessary for fabricating the test specimens.

B. Construction Tolerances: Construction tolerances shall be as indicated in Section 03 31 00 unless indicated otherwise.

C. Pre-Installation Demonstration and Training

1. Non-Shrink Grouts

a. The grout manufacturer shall give a demonstration and training session for the cement based and epoxy non-shrink grouts to be used on the project before any installation of grout is allowed.

b. The CONTRACTOR shall transport the test cubes to an independent test laboratory, obtain the test reports, and report these demonstration and training test cube strengths to the ENGINEER.

1.5 SPECIAL CORRECTION OF DEFECTS PROVISIONS

A. Manufacturer's Warranty

1. Furnish one year warranty for WORK provided under this section.

2. Manufacturer's warranty shall not contain a disclaimer limiting responsibility to the purchase price of products or materials.

PART 2 PRODUCTS

2.1 APPLICATION

A. Unless indicated otherwise, grouts shall be provided as listed below whether indicated on the Drawings or not.

Application	Type of Grout
Beam and column (1 or 2 story) base plates less than 16-inches in the least dimension.	Non-Shrink
Column base plates (greater than 2 story or larger than 16-inches in the least dimension)	High Strength Non-Shrink
Under precast concrete elements	High Strength Non-Shrink
Storage tanks and other non-motorized equipment or machinery under 30 horsepower	Non-Shrink
Motorized equipment over 30 horsepower and equipment under 30 horsepower but subject to severe shock loads and high vibrations	Non-Shrink Epoxy
Filling blockout spaces for embedded items such as railing posts, gate guide frames, etc.	Non-Shrink
Toppings and concrete/grout fill less than 3-inches thick	Topping Grout
Toppings and concrete/grout fill greater than 3-inches thick	Structural Concrete per 03 31 00

Application	Type of Grout
Anchor bolts, anchor rods and reinforcing steel required to be set in epoxy or adhesive.	Post Installed Anchors in Concrete per Section 05 05 19
Repair of holes and defects in concrete members.	Concrete Repair and Rehabilitation per Section 03 01 30

2.2 NON-SHRINK GROUTS

A. General

1. All non-shrink grout shall be cement based unless otherwise noted.

2. Cement-based non-shrink grout shall be a prepackaged, inorganic, fluid, non-gas liberating, non-metallic, cement type grout requiring only the addition of water. Cement from kilns burning metal-rich hazardous waste fuel shall not be used.

3. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each non-shrink grout shall be as recommended by the manufacturer for the particular application.

4. The manufacturer’s product information shall state the acceptability of the non-shrink grout for the intended purpose and location.

5. Grout shall not contain chlorides or additives that may contribute to corrosion.

6. Grout placed in continuously wet environments or in exterior conditions shall not contain gypsum or calcium salt.

7. All cement-based non-shrink grout shall have the following general properties:

   a. Meet the requirements of ASTM C1107.

   b. Have a maximum early age height change of 4.0 percent expansion, and shall have no shrinkage (0.0 percent) in accordance with ASTM C827. The grout when tested shall not bleed or segregate at maximum allowed water.

   c. No shrinkage (0.0 percent) and a maximum of 0.3 percent expansion in the hardened state when tested in accordance with ASTM C1090.

   d. A minimum bond strength (concrete to grout) of 1900 psi per modified ASTM C882.

8. Environmental and ambient conditions shall be a factor in the selection of non-shrink grout. If a non-shrink grout is to be used in a high sulfate environment, marine environment, high temperature environment, or freeze/thaw environment, the manufacturer’s product information shall state the acceptability for each environmental condition.

9. Grout shall be suitable for use in freeze/thaw environments.

B. Non-Shrink Grout

1. Non-Shrink Grout shall have a minimum 28 Day compressive strength of 5000 psi when mixed at a fluid consistency and tested per ASTM C109.

2. Non-Shrink Grout shall be Five Star Grout by Five Star Products, Five Star Fluid Grout 100 by Five Star Products, Sikagrout 212 by Sika Corporation, or approved equal.

C. High Strength Non-Shrink Grout

1. High Strength Non-Shrink Grout shall have a minimum 28-Day compressive strength of 10,000 psi when mixed at a fluid consistency and tested per ASTM C109.

2. High Strength Non-Shrink Grout shall be Five Star High Strength Grout by Five Star Products, Sikagrout 428 FS, or approved equal.

2.3 NON-SHRINK EPOXY GROUT

A. Non-shrink epoxy grout shall be a flowable, non-shrink, 100 percent solids system. The epoxy grout system shall have 3 components: resin, hardener, and specially blended aggregate, each premeasured and prepackaged. The resin component shall not contain any non-reactive diluents.

B. The manufacturer’s product information shall state the acceptability of the epoxy grout for the intended purpose and location.

C. Variation of component ratios is not permitted unless specifically recommended by the manufacturer. Manufacturer's instructions shall be printed on each container in which the materials are packaged.

D. Resins containing butyl glycidyl ether (BGE) or other highly volatile and hazardous reactive diluents are not acceptable.

E. Non-shrink epoxy grout shall have a negligible (less than 0.0006 in/in) length change after hardening, and a coefficient of thermal expansion less than 0.00003 in/in F when tested in accordance with ASTM C531.

F. Non-shrink epoxy grout shall develop a minimum compressive strength of 9000 psi in 24 hours and 13,000 psi in seven days when tested in accordance with ASTM C579, method B.

G. The effective bearing area shall be a minimum of 85 percent effective bearing area (EBA) in accordance with ASTM C1339, for bearing area and flow.

H. The chemical formulation of the non-shrink epoxy grout shall be that recommended by the manufacturer for the particular application. Do not reduce aggregate loading or add solvents to increase flowability.

I. Non-shrink epoxy grout shall have the following minimum properties when tested at 7 Days:

1. Minimum bond strength to concrete of 3000 psi per ASTM C882 modified.
2. Minimum bond strength to steel of 1700 psi per ASTM C882 modified.
3. Minimum flexural strength of 2500 psi per ASTM C580.

4. Minimum tensile strength of 2000 psi per ASTM C307.

J. Non-shrink epoxy grout shall be Five Star DP Epoxy Grout by Five Star Products, Inc., Masterflow 648 by BASF Corporation, Sikadur 42 Grout-Pak by Sika Corporation, or approved equal.

2.4 TOPPING GROUT AND CONCRETE/GROUT FILL

A. Where fill thickness is 3-inches or greater, structural concrete as indicated in Section 03 31 00 - Cast-in-Place Concrete, may be used when accepted by the ENGINEER. Fiber reinforcing shall be as indicated below.

B. Grout for topping of slabs and concrete/grout fill for built-up surfaces of tanks, channels, and basin bottoms shall be composed of cement, fine aggregate, coarse aggregate, water, and admixtures proportioned and mixed as indicated. Materials and procedures indicated for structural concrete in Section 03 31 00 - Cast-in-Place Concrete, shall apply unless indicated otherwise.

C. Topping grout and concrete/grout fill shall contain a minimum of 564 pounds of cement per cubic yard with a maximum water/cement ratio of 0.45.

D. Coarse aggregate shall be graded as follows:

U.S. Standard Sieve Size	Percent By Weight Passing
1/2 in	100
3/8 in	90-100
No. 4	20-55
No. 8	5-30
No. 16	0-10
No. 30	0

E. Final mix design shall be as determined by trial mix design as indicated in Section 03 31 00, except that drying shrinkage tests are not required.

F. Topping grout and concrete grout/fill shall contain air-entraining agent per Section 03 31 00.

G. Strength: Minimum compressive strength of topping grout and concrete/grout fill at 28 days shall be 4500 psi.

H. Topping grout used in clarifiers, or where the fill thickness is 3 inches or greater shall contain fiber reinforcing, unless otherwise shown on the Contract Documents. Fiber reinforcing shall be 100 percent virgin polypropylene fibrillated fibers specifically manufactured in a blended gradation for use as concrete secondary reinforcement. Fibers shall be added at a rate of 1.5 pounds per cubic yard of concrete. Fibers shall conform to ASTM C1116.

2.5 CURING MATERIALS

A. Curing materials shall be in accordance with Section 03 31 00 and as recommended by the manufacturer of prepackaged grouts.

2.6 CONSISTENCY

A. The consistency of grout shall be as necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is defined such that the grout is plastic and moldable but will not flow. Where "dry pack" is called for in the Contract Documents, it shall mean a grout of that consistency; the type of grout to be used shall be as indicated herein for the particular application.

B. The slump for topping grout and concrete/grout fill shall be adjusted to match placement and finishing conditions but shall not exceed 4-inches.

2.7 MEASUREMENT OF INGREDIENTS

A. Measurements for cement grout shall be made accurately by volume using containers. Shovel measurements shall not be allowed.

B. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

PART 3 EXECUTION

3.1 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Grout shall be stored in accordance with manufacturer's recommendations.

3.2 GENERAL

A. CONTRACTOR shall arrange for the manufacturer of prepackaged grouts to provide on-site technical assistance within 72 hours of request, as part of the WORK.

B. Grout shall not be placed until base concrete or masonry has attained its design strength, unless authorized otherwise by the ENGINEER.

C. When cementitious grouts are used on concrete surfaces, the concrete surface shall be saturated with water for 24 hours prior to placement. Upon completion of the saturation period, excess water shall be removed with clean, oil free compressed air prior to grouting. Concrete substrate shall not be wet prior to placement of epoxy grouts.

D. Surface preparation, curing, and protection of cement grout shall be in accordance with Section 03 31 00. The finish of the grout surface shall match that of the adjacent concrete unless otherwise indicated.

E. Surfaces that will be in contact with grout shall be free of dirt, loose rust, oil, wax, grease, curing compounds, laitance, loose concrete, and other deleterious materials.

F. Shade the WORK from sunlight for at least 24 hours before and 48 hours after grouting.

G. Contact the grout manufacturer's representative for assistance on hot and cold weather grouting techniques and precautions if applicable.

3.3 GROUTING PROCEDURES

A. General: Mixing, surface preparation, handling, placing, consolidation, curing, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.

B. Structural, equipment, tank, and piping support bases shall be grouted, unless indicated otherwise.

1. The original concrete shall be blocked out or finished off a sufficient distance below the plate to provide for a minimum one-inch thickness of grout or other thickness if indicated.

2. After the base plate has been set in position at the proper elevation by steel wedges or double nuts on the anchor bolts, the space between the bottom of the plate and the original pour of concrete shall be filled with non-shrink-type grout through a headbox of appropriate size. The mixture shall be of a fluid consistency and poured continuously into the space between the plate and the base concrete. Forms for grout shall be tight against retaining surfaces, and joints shall be sealed as recommended by the grout manufacturer to be liquid-tight. Forms shall be coated as recommended by the grout manufacturer for easy form release. Where this method of placement is not practical or where required by the ENGINEER, alternate grouting methods shall be submitted by the CONTRACTOR for acceptance by the ENGINEER.

3. Concrete equipment pads for equipment bases that will be epoxy-grouted shall be sized so that, when the equipment base is fully grouted, the epoxy grout is stopped not less than 4-inches from the edge of the pad.

C. Topping Grout and Concrete/Grout Fill

1. Mechanical, electrical, and finish WORK shall be completed prior to placement of topping or concrete/grout fill. To ensure bonding to the base slab, the base slab shall be given an exposed aggregate finish. Alternatively, where accepted by the ENGINEER, the base slab shall be given a roughened textured surface by a close-spaced rake while the surface is green. After curing, high pressure washing shall expose the aggregates and produce not less than a 3/16-inch amplitude roughness. Jackhammers or chipping hammers shall not be used.

2. The minimum thickness of grout topping and concrete/grout fill shall be one-inch. Where the finished surface of concrete/grout fill is to form an intersecting angle of less than 45 degrees with the concrete surface it is to be placed against, a key shall be formed in the concrete surface at the intersection point. The key shall be a minimum of 3-1/2 inches wide by 1-1/2 inches deep.

3. The base slab shall be thoroughly cleaned and wetted to saturated surface dry (SSD) condition per the International Concrete Repair Institute (ICRI) -- Technical Guide for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays, prior to placing topping grout and grout fill. No topping grout shall be placed until the slab is completely free from standing pools or ponds of water. A thin coat of neat cement grout shall be broomed into the surface of the slab just before topping or fill placement. The neat cement grout shall not be allowed to dry before topping placement.

If it does dry, it must be immediately removed using wet stiff brooms and reapplied. The topping and fill shall be compacted by rolling or thorough tamping, brought to established grade, and floated. Grouted fill for tank and basin bottoms where scraping mechanisms are to be installed shall be screeded by blades attached to the revolving mechanism of the equipment in accordance with the procedures outlined by the equipment manufacturer after the grout is brought to the established grade. Coat surface with evaporation retardant as needed to prevent plastic shrinkage cracks.

4. Topping grout placed on sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the placement.

5. The surface shall be tested with a straight edge to detect high and low spots which shall be immediately eliminated. When the topping or fill has hardened sufficiently, it shall be steel troweled to a smooth surface free from pinholes and other imperfections. An approved type of mechanical trowel may be used as an assist in this operation, but the last pass over the surface shall be by hand-troweling. During finishing, no water, dry cement, or mixture of dry cement and sand shall be applied to the surface.

6. As soon as topping or fill finishing is completed, coat surface with curing compound. After the topping is set and sufficiently hard in clarifiers and where required by the ENGINEER, the tank shall be filled with sufficient water to cover the entire floor for 14 days.

3.4 CONSOLIDATION

A. Grout shall be placed in such a manner, for the consistency necessary for each application, to assure that the space to be grouted is completely filled.

END OF SECTION

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SECTION 04 05 19.29 - POST-INSTALLED ANCHORS IN MASONRY

PART 1 GENERAL

1.1 THE SUMMARY

A. Provide post-installed anchors and appurtenances, complete and in place, as indicated in accordance with the Contract documents.

B. Unless otherwise indicated, drilled masonry anchors shall be adhesive anchors.

C. Section Includes:

1. Adhesive anchors
2. Expansion anchors
3. Screw anchors

D. American Iron and Steel (AIS) Compliance: Materials provided under work of this Section shall comply with the AIS requirements of the Water Infrastructure Finance and Innovation Act (WIFIA). All materials provided and incorporated into this Project shall meet the AIS requirements of P.L. 113-76, Consolidated Appropriations Act, 2014.

1.2 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Definitions

1. Epoxy anchors are considered adhesive anchors.

2. Expansion anchors, screw anchors, and undercut anchors are considered mechanical anchors.

B. References

1. ICC ES AC01 – Acceptance Criteria for Expansion Anchors in Masonry Elements

2. ICC ES AC58 –Acceptance Criteria for Adhesive Anchors in Masonry Elements

3. ICC ES AC106 –Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements

1.3 SUBMITTALS

A. Furnish submittals in accordance with Section 01 33 00 - Contractor Submittals.

B. Submit the following:

1. Product data and technical information

2. Safety Data Sheets (SDS) for adhesives

3. Manufacturer's literature containing installation instructions and appropriate uses for each type of post-installed anchor and location of use

4. Current ICC-ES or IAPMO-UES Evaluation Reports

5. Certification for each installer demonstrating that they have been qualified in accordance with the Quality Assurance requirements below

C. No substitution for the indicated anchors will be considered unless accompanied with an ICC-ES or IAPMO-UES report verifying strength and material equivalency.

D. Complete structural calculations and anchorage details shall be prepared and submitted by the Contractor for all anchors and anchor groups that are shown but not completely detailed (type, size, location, spacing and embedment) on the Contract Documents. Calculations and anchorage details shall be completed and submitted in accordance with Section 01 33 17 – Structural Design, Support and Anchorage.

1. Where adhesive anchors are used for structural applications (such as dowels between new and existing masonry) and an embedment depth is not shown on the contract documents, the anchor shall be installed in accordance with Method 1 or Method 2 below:

a. Method 1: The minimum depth of embedment shall be greater than or equal to the development length (ld) determined in accordance with TMS 402 for a cast in place reinforcing bar of the same diameter and grade, unless it can be shown by calculation that the anchor spacing and edge distance is sufficient to develop the tensile strength of the anchor in a lesser depth of embedment. Calculations shall be submitted in accordance with Section 01 33 00 – Contractor Submittals.

b. Method 2: Adhesive anchors in masonry that cannot develop the tensile capacity of the steel element may be used to transfer forces, provided that the loads on the anchor are amplified by the system overstrength factor (Ωo) in Table 12.2-1 of ASCE 7, or where unreduced forces are used in accordance with ASCE 41 for existing structures. Calculations shall be submitted in accordance with Section 01 33 00 – Contractor Submittals.

1.4 QUALITY ASSURANCE

A. Special inspection for all post-installed anchor installations shall be provided:

1. As recommended or required by the ICC-ES or IAPMO-UES report.
2. As required by the enforceable building code.
3. As otherwise indicated in the Contract Documents.

B. The most stringent of the above requirements shall be used. The cost of Special Inspection of post-installed anchors shall be paid for by the OWNER.

C. Before installing adhesive anchors in the WORK, anchor installers shall be trained and qualified at the Site by the manufacturer's representative. Training and qualification for each installer shall include at least:

1. Hole drilling procedure, hole preparation and cleaning techniques, adhesive injection technique and dispenser training/maintenance, rebar dowel preparation and installation, and proof loading if required.

2. Each installer shall be re-qualified every 6 months for the duration of the project by the same qualifying procedure.

D. Before installing mechanical anchors in the WORK, anchor installers shall be trained and qualified at the Site by the manufacturer's representative. Training and qualification for each installer shall include at least:

1. Hole drilling procedure, hole preparation and cleaning techniques, and torquing.

2. Each installer shall be re-qualified every 6 months for the duration of the project by the same qualifying procedure.

E. Defective anchors noted by the Special Inspector shall be replaced and re-installed by the CONTRACTOR without any additional compensation.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to job site in manufacturer’s or distributor’s packaging undamaged, complete with installation instructions.

B. Protect and handle materials in accordance with manufacturer’s recommendations to prevent damage or deterioration.

C. Anchoring adhesives shall be stored at temperatures prescribed by the manufacturer and must not be used beyond the expiration date.

1.6 FIELD [OR] SITE CONDITIONS

A. Post-installed anchors shall be installed in grout filled, concrete masonry having the minimum age required by the ICC-ES or IAPMO-UES report, or manufacturer’s instructions, at the time of anchor installation.

B. The anchor or fastener coating, plating, or steel type must provide suitable corrosion resistance for the environment in which the anchor or fastener is installed. Anchors, nuts, and washers in the locations listed below shall be fabricated from type 316 or 304 stainless steel:

1. buried locations

2. submerged locations

3. locations subject to seasonal or occasional flooding

4. inside buried vaults, manholes, and structures that do not drain through a gravity sewer or to a sump with a pump

5. chemical handling areas

6. inside trenches, containment walls, and curbed areas

7. locations indicated or designated by the ENGINEER to be provided with stainless steel anchors.

PART 2 PRODUCTS

2.1 ADHESIVE ANCHORS

A. General

1. The adhesive anchor system shall consist of: 1) adhesive product; and 2) threaded rod or reinforcing bar insert. The complete system shall be compatible as required by the adhesive manufacturer.

2. Adhesives shall be injectable, two-component, cartridge-type systems dispensed and mixed through a static mixing nozzle supplied by the manufacturer.

3. The evaluation report issued by ICC-ES or IAPMO-UES shall state the acceptability of the adhesive anchor for the intended purpose and location.

4. Adhesive anchors shall be permitted when regular ambient temperatures are consistent with manufacturer's recommendation for long and short term temperatures.

5. Adhesive anchors shall not be used where anchors are subject to vibration or fire.

6. Adhesive anchors shall not be used in overhead applications.

7. Adhesive shall be capable of being used in submerged applications once cured.

B. Adhesive Anchors in Grout Filled Concrete Masonry Units

1. Threaded rod inserts shall meet the requirements of Section 05 50 00- Miscellaneous Metalwork.

2. Reinforcing dowel inserts shall meet the material requirements of Section 03 21 00 – Reinforcement Steel and 03 31 00 – Cast-in-Place Concrete.

3. Adhesive anchors shall have an evaluation report issued by ICC-ES or IAPMO-UES and shall have been tested and qualified for performance in grout filled concrete masonry adhesive anchors in accordance with ICC-ES AC 58 to resist static, wind, and earthquake (Seismic Design Categories A through F).

4. Adhesive anchors for masonry shall be HIT-HY 270 by Hilti, SET-XP by Simpson Strong-Tie, or equal.

2.2 EXPANSION ANCHORS

A. General

1. Expansion anchors are post-installed torque-controlled mechanical expansion anchors used to resist structural loads.

2. Expansion anchors shall be an imperial sized, threaded stud with an integral cone expander, expansion clip, nut and washer.

3. Lead caulking anchors will not be permitted.

4. Non-embedded buried or submerged anchors shall be fabricated from stainless steel.

5. The evaluation report issued by ICC-ES or IAPMO-UES shall state the acceptability of the expansion anchor for the intended purpose and location.

6. Anchors subjected to dynamic or vibratory loading shall be suitable for the intended loading and location as indicated in the manufacturer's technical product data.

B. Expansion Anchors for Grout Filled Concrete Masonry Units

1. Anchors shall have an evaluation report issued by ICC-ES or IAPMO-UES and have been tested and qualified for performance in grout filled, uncracked concrete masonry units in accordance with ICC-ES AC01.

2. Expansion anchors for grout filled concrete masonry shall be Strong-Bolt 2 by Simpson Strong-Tie, Kwik-Bolt TZ by Hilti, or equal.

2.3 SCREW ANCHORS

A. General

1. Screw anchors used in exterior and corrosive environments shall be fabricated from stainless steel.

2. The evaluation report issued by ICC-ES or IAPMO-UES shall state the acceptability of the screw anchor for the intended purpose and location.

3. Anchors subjected to dynamic or vibratory loading shall be suitable for the intended loading and location as indicated in the manufacturer's technical product data.

B. Screw Anchors for Grout Filled Concrete Masonry

1. Anchors shall have an evaluation report issued by ICC-ES or IAPMO-UES and have been tested and qualified for performance in grout filled concrete masonry in accordance with ICC-ES AC106.

2. Screw anchors for grout filled concrete masonry shall be Titen HD by Simpson Strong-Tie, Kwik HUS-EZ (KH-EZ) by Hilti, or equal.

PART 3 EXECUTION

3.1 INSTALLATION REQUIREMENTS

A. Post-installed anchors shall be installed in strict accordance with the manufacturer's instructions, the ICC-ES or IAPMO-UES report, and project specific design requirements indicated on the Contract Documents or in the design calculations provided by the CONTRACTOR per Section 1.3.D.

B. Where holes are drilled in masonry, holes shall be accurately and squarely drilled, and the holes shall be cleaned in accordance with the manufacturer's recommendations.

C. Acceptable installation and performance temperature ranges shall be verified with manufacturer’s literature prior to installation. Minimum substrate temperatures shall be maintained during the full curing period as required by the manufacturer.

D. Adhesive anchors shall not be loaded until the adhesive has reached its indicated strength in accordance with the manufacturer's instructions.

E. The CONTRACTOR shall identify the position of reinforcing steel and other embedded items prior to drilling holes. Care shall be exercised in drilling to avoid damaging existing reinforcing or embedded items. The location of drilled holes shall be adjusted to avoid drilling through or cutting any existing reinforcing bars or embedded items. Notify the ENGINEER if reinforcing steel or other embedded items are encountered during drilling. Take precautions as necessary to avoid damaging prestressing tendons, electrical and communications conduit, and piping.

F. Core drilling of holes is not allowed.

G. Identification of reinforcing steel and/or embedded items, relocation of drilled holes and adjustments or modifications to anchored or fastened items shall be considered part of the WORK and shall be provided at no additional cost to the OWNER.

H. All abandoned drilled holes shall be repaired in accordance with Section 03 01 30 - Concrete Repair and Rehabilitation at no additional cost to the OWNER.

END OF SECTION

SECTION 04 21 15 – MASONRY VENEER

PART 1 GENERAL

1.1 THE SUMMARY

A. The CONTRACTOR shall provide masonry veneer and appurtenant WORK, complete and in place, in accordance with the Contract Documents.

B. The CONTRACTOR shall coordinate color samples with other Sections through the submittal process, as required by the ENGINEER.

1.2 REFERENCES

A. Where reference is made to any of the below, the revision in effect at the time of bid opening shall apply.

B. American Concrete Institute/American Society of Civil Engineers:

ACI/ASCE 530 Building Code Requirements for Masonry Structures

C. American Society for Testing and Materials (ASTM):

ASTM A 153Standard Specification for Zinc-coating (hot-dip) on steel

ASTM A 951Masonry Joint Reinforcement

ASTM C 90 Loadbearing Concrete Masonry Units

ASTM C 114Standard Test Methods for Chemical Analysis of Hydraulic Cement

ASTM C 140Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units

ASTM C 144Aggregate for Masonry Mortar

ASTM C 150Portland Cement

ASTM C 207Hydrated Lime for Masonry Purposes

ASTM C 270Mortar for Unit Masonry

ASTM C 272Standard Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions

ASTM C 426Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units

ASTM C 518Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

ASTM C 979Pigments for Integrally Colored Concrete

ASTM D 1621 Standard Test Method for Compressive Properties of Rigid Cellular Plastics

ASTM D 1752 Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction

ASTM D 2000 Standard Classification System for Rubber Products in Automotive Applications

ASTM E 96 Standard Test Method for Water Vapor Transmission of Materials

ASTM E 514 Standard Test Method for Water Penetration and Leakage Through Masonry

D. Building Code: Refer to the Drawings to determine which building code applies. The applicable building code, defined by the Drawings, is referenced herein as "the CODE."

1.3 CONTRACTOR SUBMITTALS

A. The CONTRACTOR shall furnish submittals in accordance with Section 01 33 00 – Contractor Submittals.

B. Literature: Manufacturer's specifications, technical data, installation methods, maintenance instructions, and the following:

1. Literature for masonry veneer units:

a. Literature for integral color pigment admixtures.

1) Manufacturer's standard and extended color range for color selection by the OWNER.

b. Literature for integral water repellent admixture.

2. Literature for Mortar:

a. Literature for integral color pigment admixtures:

1) Manufacturer's standard and extended color range for color selection by the OWNER.

b. Literature for integral water repellent admixtures.

3. Literature for masonry cleaners.

4. Literature for joint reinforcement, anchors, straps, and ties.

5. Literature for accessories.

C. Warranty: Submit a copy of the warranty.

D. Certifications:

1. Certification by the integral water repellent admixture Manufacturer that the integral water repellent admixture is suitable for, and compatible with, the masonry veneer, masonry veneer mortar, and admixtures provided under this Section.

2. Certification by the masonry cleaner Manufacturer that the masonry cleaners are suitable for, and compatible with, the masonry veneer, masonry veneer mortar, and admixtures provided under this Section.

3. Certification by the masonry cleaner Manufacturer that the masonry cleaner is suitable for, and compatible with, the surface applied water repellent provided under Section 07 19 00 – Surface Applied Water Repellant and Anti-Graffitiant.

4. Certification of Manufacturer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects with addresses of the project location, date of project completion, Manufacturer's products, and contact information of the consultant firm of record, general contractor and owner.

5. Certification of installer qualifications demonstrating compliance with the qualifications requirements indicated. Include a list of 5 similar completed projects with addresses of the project location, date of project completion, and contact information of the consultant firm of record, general contractor and owner.

6. Certification that the CONTRACTOR is not associated with the independent testing laboratory and that the CONTRACTOR has no beneficial interest in the laboratory.

7. Certification from the masonry veneer unit Manufacturer certifying that the units conform to ASTM C 90.

8. For each type of masonry veneer unit, certified preconstruction test reports, including compressive strength, absorption, dimensional analysis, unit weight, and moisture content in accordance with ASTM C 140.

9. Certification from the mortar Manufacturer certifying that the mortar conforms to the property specifications of ASTM C 270. Certification shall indicate the proposed mortar proportions and admixtures to be used.

    a. Submit laboratory test data demonstrating that the mortar, including admixtures, has the minimum compressive strength when sampled and tested in accordance with ASTM C 270.

10. Certification of conformance to ASTM standards for the following materials: cement, hydrated lime, coarse and fine aggregate, and admixtures.

11. When requested by the ENGINEER, furnish other certifications as may be required to demonstrate compliance with the Contract Documents.

E. Shop Drawings: Complete Shop Drawings showing location and detail of installation.

1. Shop Drawings shall be drawn to sufficient scale and shall include dimensions, show elevations and details of construction of masonry veneer, thickness of materials, joints, provisions for expansion and contraction, connections, accessories, and trim. Shop Drawings shall show installation conditions at openings with various wall thickness and materials.

a. Shop Drawings shall include material descriptions, finish, color, details of construction, installation, and accessories for masonry veneer.

F. Samples: The CONTRACTOR shall submit 2 samples of each of the following. Unless otherwise indicated, samples shall be full size and shall show thicknesses, configuration, construction, finish and color proposed for the various components. Samples shall be clearly marked to show the Manufacturer's name, product identification, finish and color. New samples shall be resubmitted of each, as required, until approved by the ENGINEER. Upon approval, the samples shall become the standard for acceptance for the project with regard to color, finish, and quality of each item. Approval of samples shall not relieve the CONTRACTOR from compliance with the Contract Documents.

1. Four-inch (101.6 mm) by 6-inch (152.4 mm) samples of masonry veneer units.
2. Representative samples of masonry veneer mortar.
3. Representative samples of joint reinforcement, anchors, ties, and straps.
4. Representative samples of accessories.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility:

1. Masonry veneer units shall be provided by a single Manufacturer.

2. Integral color pigment admixture shall be provided by single Manufacturer.

3. Integral water repellent admixture, for both block and mortar, shall be provided by a single Manufacturer.

4. Masonry cleaner shall be provided by a single Manufacturer.

5. Joint reinforcement, anchors, ties, and straps shall be provided by a single Manufacturer, each.

6. Each masonry accessory shall each be provided by a single Manufacturer.

B. Manufacturer's Qualifications:

1. Integral Water Repellent Admixture Manufacturer Qualifications:

a. Integral water repellent admixture Manufacturer, for both block and mortar admixtures, shall have a minimum of 10 years of integral water repellent admixture manufacturing experience.

b. Integral water repellent admixture Manufacturer shall have a minimum of 5 similar successful projects over the most recent 10 years, employing similar products, materials, applications, and performance requirements.

2. Masonry Cleaner Manufacturer Qualifications:

a. Masonry cleaner Manufacturer shall have minimum of 15 years of masonry cleaner manufacturing experience.

b. Masonry cleaner Manufacturer shall have a minimum of 5 similar successful projects over the most recent 10 years, employing similar products, materials, applications, and performance requirements.

3. Manufacturers without these qualifications will not be accepted.

C. Installer Qualifications:

1. A minimum of 5 years experience in the successful completion of at least 5 projects of similar size and scope, employing similar products, materials, applications, and performance requirements.

2. Installers without these qualifications will not be accepted.

D. Field Sample:

1. Coordinate field sample with other field samples required in other Sections.

2. Prior to installation, erect field sample wall panel mock-up at the Site using materials and details required for final WORK. The panel shall be approximately 6-feet (1.82 m) long by 4-feet (1.2 m) high and of the same construction as the exterior cavity walls for the building, and shall include the masonry WORK in Section 04 22 00 – Reinforced Concrete Block Masonry. Field sample panel shall show the workmanship, coursing, bond, thickness, and tooling of joints, range of color and texture of the masonry veneer, the color of the mortar, and installation of joint reinforcement, anchors, ties, straps, and accessories.

a. Field sample shall also demonstrate cleaning materials, means, and methods as indicated in Part 3 below.

3. The field sample shall be erected in a location as designated by the ENGINEER.

4. Obtain the ENGINEER'S acceptance of qualities of field sample before installation. Modify and/or reconstruct field sample at the direction of the ENGINEER until acceptance. Retain mock-up during construction as a standard for judging completed WORK. Do not alter, move, or destroy field sample until approved by the ENGINEER.

5. Acceptance of field sample shall not relieve the CONTRACTOR from compliance with the Contract Documents.

E. Inspections will be performed in accordance with Special Inspections per the CODE.

F. Testing services required to fulfill the requirements of Part 1.3, and to otherwise demonstrate that the materials proposed for incorporation into the WORK comply with the requirement of the Contract Documents shall be provided by the CONTRACTOR. The cost of such testing, unless specifically stated otherwise, shall be performed by an independent testing laboratory approved by the ENGINEER, and paid by the CONTRACTOR.

1. Field testing and inspection services necessary to confirm that the properties of the materials actually incorporated into the WORK conform to the Contract Documents, and to satisfy the CODE requirements, will be provided by the OWNER, at the OWNER'S expense.

G. The CONTRACTOR shall facilitate testing and inspection as follows:

1. Advise the ENGINEER of installation far enough in advance to allow for assignment and scheduling of inspection and testing personnel.

2. Furnish labor necessary to assist the OWNER'S testing agency in obtaining and handling samples.

H. Independent Testing Laboratory:

1. Provide masonry veneer unit, mortar, and grout testing prior to installation by an independent testing laboratory engaged by the CONTRACTOR and acceptable to the ENGINEER.

2. Laboratories affiliated with the CONTRACTOR or in which the CONTRACTOR or its officers have a beneficial interest will not be accepted.

I. When requested by the ENGINEER, additional tests may be required. Upon such request, the CONTRACTOR shall confirm properties of materials used for construction and test results for compressive strength as follows:

1. During construction, the OWNER'S testing lab may test the following specimens for compressive strength. Provide and test one set of specimens for each 5,000 sq. ft. (1524 sq. m) of masonry wall area, but not less than one set per building, for testing.

a. One set of 3 masonry veneer units to be tested in compliance with ASTM C 140 (concrete masonry).

b. One set of 3 cube mortar specimens mixed and tested in compliance with ASTM C 270.

1.5 SPECIAL WARRANTY PROVISIONS

A. Warranties shall be non-prorated for the entire warranty period.

B. The term of the warranties shall begin on the date of Substantial Completion.

PART 2 PRODUCTS

2.1 GENERAL

A. Masonry veneer shall be suitable for, and compatible with, the required installation.

B. Admixtures shall be suitable for, and compatible with, the masonry veneer, masonry veneer mortar, and other admixtures provided under this Section.

C. Admixtures shall be suitable for, and compatible with, surface applied water repellent in Section 07 19 00 – Surface Applied Water Repellant and Anti-Graffitiant.

D. Masonry cleaners shall be suitable for, and compatible with, the masonry veneer, masonry veneer mortar, and admixtures provided under this Section.

E. Masonry cleaners shall be suitable for, and compatible with, surface applied water repellent in Section 07 19 00 – Surface Applied Water Repellant and Anti-Graffitiant.

F. Description:

1. Masonry veneer units shall be solid and hollow concrete masonry architectural facing units conforming to ASTM C 90, normal weight, loadbearing units of the nominal size and bed dimension as indicated.

2. Masonry veneer includes split-face and smooth-face concrete masonry units, as indicated on the Drawings.

   a. Provide internal corner units, external corner units, solid units, sills, caps, keystone, arches, and special shapes as indicated or as required.

   b. Precast sills and caps shall be 3,000 PSI concrete using ASTM C-150 Type II Portland Cement. Finish shall be smooth face.

3. Masonry veneer units shall be nominal 8-inch (203 mm) high by 16-inch (406 mm) long by width (thickness) as indicated.

4. The bed dimension of masonry veneer shall be as follows: For single face units, the actual thickness (and length for corner units) shall be 7/16-inch (11 mm) less than the nominal thickness on the Drawings with a tolerance of plus or minus 1/16-inch (1.6 mm). For units with 2 faces, the actual thickness shall be 1/2- inch (12.7 mm) less than the nominal thickness on the Drawings with a tolerance of plus or minus 1/16-inch (1.6 mm).

5. Cementitious and pozzolanic (or siliceous) materials, admixtures, and normal weight aggregates shall conform to their respective ASTM Standards and shall be suitable for use in autoclaved concrete.

6. Masonry veneer units shall be sound and free of cracks or other defects that would interfere with the proper placing of the units or impair the strength or permanence of the construction.

7. Masonry veneer units shall be free from substances that will cause staining or pop-outs and units shall have straight and true edges, with surface texture to be approved by the ENGINEER.

   a. Minor cracks or defects incidental to the usual method of manufacture, or minor chipping resulting from customary methods of handling in shipment and delivery, will not be deemed grounds for rejection except that not more than 3 percent of a shipment will be permitted to contain chips larger than 1/4-inch (6.4 mm) from any edge or corner on the faces.

   b. Compressive strength of masonry veneer and mortar assembly, f'm, shall be 1,500 psi (10.34 MPa). The ENGINEER has selected this compressive strength based on the Unit Strength Method in accordance with the CODE. Refer to Section 04 22 00 – Reinforced Concrete Block Masonry.

8. Masonry Veneer Unit Admixtures:

    a. Masonry veneer units shall have integral colored pigment, as indicated herein, added during manufacture in accordance with Manufacturer's written instructions.

    b. Masonry veneer units shall have integral water repellent, as indicated herein, added during manufacture in accordance with Manufacturer's written instructions.

    c. Masonry veneer admixtures shall be non-staining and shall not contain fillers, adulterants, or additives that will negatively affect the characteristics or performance of the masonry veneer, or mortar mix design.

    d. Amount of admixtures used shall be as recommended in writing by the Manufacturer.

9. Masonry Veneer Unit Appearance:

    a. Surface texture and aggregate exposure shall be uniform within the industry's normal manufacturing accepted range as represented by accepted field sample erected at the Site.

        1) Units shall be "architectural-grade," of high visual quality, with uniform color and texture characteristics, and shall have very dense surfaces, with tight, closed pores, suitable for exterior use, and readily capable of shedding rainwater. Heavily pitted units, with large, open surface pores, and/or large exposed aggregate will be rejected. All visual qualities are subject to the approval of the ENGINEER.

    b. Provide in 2 color groups as indicated on the Drawings:

        1) Colors shall be selected and approved by the OWNER from Manufacturer's full color range including custom colors, and may be required to exactly match other building components, as determined by the OWNER.

            a) Tentative color selection: Color A: To Be Selected, Color B: To Be Selected

            b) The OWNER reserves the option of changing this tentative color selection during the submittal process.

10. Cure masonry veneer units in an autoclave in a saturated steam atmosphere at an average temperature exceeding 350 deg F (176 deg C) for a period of time sufficient to assure that the units will meet the requirements for drying shrinkage.

11. At the time of delivery to the Site, masonry veneer units shall conform to the physical requirements given in ASTM C 90, and the linear shrinkage of units shall not exceed 0.030 percent when tested in accordance with ASTM C 426.

2.2 INTEGRAL COLOR PIGMENT ADMIXTURE (BLOCK, CAPS, SILLS)

A. Description:

1. Colored pigment shall be made of iron oxides that provide natural tinting strength, durability, and pure chemical resistance. Pigments shall be non-fading.