Durham Influent Pump Station
Biofilter Retrofit Project

Contract Documents – Specifications

BID SET

March 2021

Prepared By

BLACK & VEATCH

CWS Project No. 7094
BV Project No. 408472

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The following Technical Specifications have been prepared by or under the direct supervision of Sean David Goris, P.E., Black & Veatch Corporation.

Division 00 – Bidding and Contractual

00030	Advertisement to Bid	00630	Payment Bond
00100	Instructions to Bidders	00700	Standard General Conditions of the Construction Contract
00300	Bid Forms	00800	Supplementary Conditions
00500	Agreement	00810	Oregon Prevailing Wage Rates
00610	Performance Bond		

Division 01 – General Requirements

01110	Summary of Work	01500	Temporary Facilities and Controls
01140	Work Restrictions	01505	Mobilization
01292	Schedule of Values	01530	Protection of Existing Facilities
01320	Web Based Construction Management	01532	Site Condition Surveys
01324	Construction Schedule	01555	Site Access and Storage
01329	Safety Plan	01560	Temporary Environmental Controls
01330	Submittal Procedures	01570	Erosion and Sediment Control Plan
01350	Special Procedures	01600	Product Requirements
01352	Alteration Project Procedures	01610	General Equipment Stipulations
01410	Permits and Regulatory Requirements	01656	Pressure Pipe Testing and Disinfection
01424	Abbreviations	01732	Cutting and Patching
01450	Quality Control	01738	Selective Demolition
01455	Special Inspections, Observations and Testing	01770	Closeout Procedures

Division 02 – Sitework

02200	Excavation and Fill for Structures	02634	High Density Polyethylene Pressure Pipe
02202	Trenching and Backfilling	02930	Soil Amendment Materials
02370	Soil Stabilization		

	Division 09 – Finishes		**Division 10 – Specialties**
09940	Protective Coatings	10400	Identifying Devices

EXPIRES: 6/30/2021

The following Technical Specifications have been prepared by or under the direct supervision of Mark Albert Lowe, P.E., Black & Veatch Corporation.

Division 03 – Concrete

03301 Miscellaneous Cast-in-Place Concrete
03600 Grouting

Division 05 – Metals

05550 Anchorage in Concrete

The following Technical Specifications have been prepared by or under the direct supervision of Erin R. Briggeman, P.E., Black & Veatch Corporation.

Division 11 – Equipment

11350 Bio-Filter System (Odor Control)

Division 15 – Mechanical

15010 Valve Installation
15020 Miscellaneous Piping and Accessories Installation
15067 Miscellaneous Plastic Pipe, Tubing, and Accessories
15091 Miscellaneous Ball Valves
15140 Pipe Supports
15250 Mechanical Insulation

Clean Water Services
Durham Influent Pump Station
Biofilter Retrofit Project
Bid Set
March 2021

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ADVERTISEMENT FOR BIDS

Sealed Bids for construction of the **Durham IPS Biofilter Retrofit Project No. 7094** (Project) will be accepted by Michelle Mann, Program Support Specialist, electronically via Bid Locker at https://bidlocker.us/details/1556_ltb___Durham_Ips_Biofilter_Retrofit_Project until 2:00 p.m., local time, on **April 20, 2021**. Any Bids received after the specified time will not be considered. Before Bidders can submit their Bids, they will need to register with Bid Locker at https://bidlocker.us/Home/bidlockerus. There is no cost to register. First-Tier Subcontractor Disclosure Forms must be delivered to the same location at or before 4:00 p.m. local time on the same day (Deadline). If Bidder fails to submit a disclosure form with the information required by the stated Deadline, the Bid will be deemed nonresponsive and will not be considered. Owner will not accept Bids by facsimile or email.

Bids will then be publicly opened and read aloud by telephone conference at 2:00 p.m. local time on April 20, 2021. Bidders can attend the opening by calling the telephone conference number (503) 681-4498.

Contractor shall complete the work as specified or indicated in Owner's Contract Documents for the Project (Work). The Project contemplated consists of, but is not limited to furnishing all labor, materials and equipment necessary to:

1. Demolish existing earthen odor control biofilter including earthen media, buried air distribution piping and irrigation piping at basin.

2. Protect in place existing temporary odor control system, in service odor control ducting, all electrical and instrumentation conduit, wiring, panels and appurtenances. Ensure continuing full function of the temporary odor control system.

3. Protect in place existing irrigation control panel and piping connections to the extents shown.

4. Install new reinforced concrete basin to house new engineered media biofilter.

5. Install new engineered media biofilter including floor system, HDPE basin liner, engineered media and other appurtenances as required.

6. Install new ductwork from existing blowers to new engineered media biofilter, connect to existing ductwork.

7. Install new irrigation piping and nozzles, connect to existing irrigation piping at existing irrigation control panel.

8. Install new biofilter drain, connect to existing drain discharge location.
9. Backfill to grade unused area of existing earthen biofilter basin.

10. Perform site grading of area.

The Work Site is located at Durham Advanced Water Resource Recovery Facility, 16580 SW 85th Ave, Tigard, OR 97224 (Site).

The Work is a public works project subject to ORS 279C.800 to 279C.870.

The estimated construction cost of the Work is **$785,033**.

The Bidding Documents are entitled "**Durham IPS Biofilter Retrofit Project No. 7094**."

Bidding Documents and Bid Results can be downloaded from the Owner's Website at http://bids.cleanwaterservices.org (Website) under the Project name by completing the section to request the document package on Owner's Website. Prospective Bidders information will be accumulated for a Bid Holders list, which is available on the Website and the Prospective Bidder's email will be used to send automatic notifications when Owner posts a new document or changes information related to this solicitation. Prospective Bidders are responsible for obtaining any Addenda from either Owner's Website under the Project name or by using the links provided in automatic emails that come from the Owner. If problems are experienced downloading the Bidding Documents, please contact Michelle Mann at 503-547-8035.

Each Bid must be submitted on the prescribed Bid Form and accompanied by Bid security as prescribed in the Instructions to Bidders. Bidders must deliver the original of the Bid security to Michelle Mann at the Owner's office: Rock Creek WRRF, Engineering Building, 3235 SE River Road, Hillsboro, OR 97123 within five business days after the Deadline or Owner may declare the Bid nonresponsive.

The Successful Bidder will be required to furnish the additional bond(s) and insurance prescribed in the Bidding Documents.

Prior to submission of its Bid, Bidder shall be registered with the Oregon Construction Contractors Board.

The Work does not involve asbestos, so the requirements of ORS 468A.700 through 468A.760 shall not apply.

Bidders must be qualified in accordance with the applicable parts of ORS 279C in order to submit a Bid for public work in Oregon.

To address technical issues, contact the Engineer: Sean Goris, 503-679-6576, gorissd@BV.com.

Prospective Bidders are **required** to attend a prebid conference and Site visit that will begin at **1:00 p.m.** local time on **April 8, 2021** and last approximately **one** hour. Attendees will be required wear a mask when on-site. Michelle Mann will provide additional instructions when scheduling the appointments. Representatives of Owner and Engineer will be present to discuss the Project.

Owner reserves its right to reject all Bids or any Bid not conforming to the intent and purpose of the Bidding Documents.

END OF SECTION

INSTRUCTIONS TO BIDDERS

1. DEFINED TERMS

1.1. Terms used in these Instructions to Bidders and the Advertisement for Bids which are defined in the General Conditions have the meanings indicated in the General Conditions and Supplementary Conditions. Certain additional terms used in the Bidding Documents have the meanings indicated below which are applicable to both the singular and plural thereof:

1.1.1 *Owner's Office*—The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered.

1.1.2 *Bidder*—One who submits a Bid directly to Owner, as distinct from a sub-bidder, who submits a price or quote to a Bidder.

1.1.3 *Successful Bidde*r—Lowest, responsible and responsive Bidder to whom Owner (on the basis of Owner's evaluation as hereinafter provided) makes an award.

2 COPIES OF BIDDING DOCUMENTS

2.1 Complete sets of Bidding Documents shall be used in preparing Bids. Neither Owner nor Engineer assumes responsibility for errors or misinterpretations resulting from use of incomplete sets of Bidding Documents.

2.2 The Bidding Documents can be downloaded from the Owner's Website at http://bids.cleanwaterservices.org (Website). Prospective Bidders are responsible for obtaining any Addenda from District's Website listed above or using links from emails from Owner. If problems are experienced downloading the Bidding Documents, please contact Michelle Mann, Program Support Specialist at the Owner's Office at 503-547-8035 or by email to MannM@CleanWaterServices.org. Full-size Drawings may be obtained from Owner at cost of reproduction and handling, plus postage for mailing (if mailing is requested) and half-size drawings and specs are $250 per set. Drawings will only be made available to firms on the Bid Holders List having complete sets of Bidding Documents.

2.3 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not authorize or confer a license or grant for any other use.

3 QUALIFICATIONS OF BIDDERS

To demonstrate qualifications to perform the Work, the apparent Successful Bidder and other Bidders as determined by Owner, must be prepared to submit within seven calendar days after Owner's written request, evidence such as financial data, previous experience, present commitments, and other such data as may be called for in the Bidding Documents.

3.1 Each Bid must contain evidence of Bidder's qualification to do business in the state where the Project is located or covenant to obtain such qualification prior to Contract award.

3.2 Nothing indicated herein will prejudice Owner's right to seek additional pertinent information as is provided in Article 24 – Evaluation of Bids and Award of Contract.

3.3 Bidders and every Subcontractor performing Work on the Project must have filed with the Construction Contractors Board a public works bond in the amount of $30,000 with a corporate surety authorized to do business in the State of Oregon before starting Work on the Project unless exempt under ORS 279C.836(4), (7), (8), or (9).

3.4 In order to perform public work, Bidder and its Subcontractors, prior to award of Contract or as otherwise required by the jurisdiction, shall hold or obtain such licenses as required by State Statutes, and federal and local Laws and Regulations.

3.5 Bidder is advised to carefully review those portions of the Bid Forms requiring representations and certifications.

3.6 Bidder shall not be listed on the Bureau of Labor and Industries list of persons having violated prevailing wage rate laws as required in ORS 701.227.

3.7 Bidder shall not be in violation of any tax laws as required in ORS 305.385.

3.8 Bidder shall have a drug-testing program as required in ORS 279C.505.

3.9 Bidders for public work in Oregon shall be qualified in conformance with ORS Chapter 279C, in the manner designated in the Advertisement for Bids.

4 REGISTRATION REQUIREMENTS

4.1 A person, partnership, corporation, limited liability company or joint venture shall have a current, valid license issued by the Oregon Construction Contractors Board, as required by ORS chapter 701 with respect to licensing, prior to submitting a Bid to do work as a Contractor or Subcontractor.

4.2 The Project does not involve asbestos, so Contractor is not required to be licensed with the Department of Environmental Quality pursuant to ORS 468A.710.

5 EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE

5.1 It is the responsibility of each Bidder before submitting a Bid to:

5.1.1 Examine thoroughly the Bidding Documents and other related data identified in the Bidding Documents.

5.1.2 Visit the Site and become familiar with and satisfy Bidder as to the general, local and Site conditions that may affect cost, progress, or performance of the Work.

5.1.3 Become familiar with and satisfy Bidder as to federal, state, and local Laws and Regulations that may affect cost, progress, or performance of the Work.

5.1.4 Study and carefully correlate the Bidder's observations with the Bidding Documents.

5.1.5 Carefully study all:

5.1.5.1 Reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in Paragraph 5.03 of the Supplementary Conditions as containing reliable "Technical Data".

5.1.5.2 Reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Paragraph 5.06 of the Supplementary Conditions as containing reliable "Technical Data".

5.1.6 Consider the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on:

5.1.6.1 Cost, progress, and performance of the Work.

5.1.6.2 Means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents.

5.1.6.3 Bidder's safety precautions and programs.

5.1.7 Agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price(s) Bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

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

5.1.9 Promptly notify the Engineer of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in or between the Bidding Documents and such other related data and confirm that written resolution thereof by Engineer is acceptable to Bidder.

5.1.10 Determine Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance of the Work.

5.2 Subsurface and Physical Conditions:

5.2.1 The Supplementary Conditions identify:

5.2.1.1 Those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site.

5.2.1.2 Those drawings known to Owner of physical conditions relating to existing surface and subsurface structures at the Site (except Underground Facilities).

5.2.2 Copies of reports and drawings utilized by the Engineer in the preparation of the Bidding Documents referenced will be made available by Owner to any Bidder on request at cost of reproduction and handling, plus postage for mailing (if mailing is requested), if the reports and drawings are not bound herein. Those reports and drawings are not part of the Bidding Documents, but the "Technical Data" contained therein upon which Bidder is entitled to rely as provided in Paragraph 5.03 of the General Conditions has been identified and established in Paragraph 5.03 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any "Technical Data" or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings. as provided in Paragraph 5.03 of the Supplementary Conditions, are incorporated herein by reference.

5.3 Underground Facilities: Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities, including Owner or others, and the Owner does not assume responsibility for the accuracy or completeness thereof unless it is expressly provided otherwise in the Supplementary Conditions.

5.4 Hazardous Environmental Condition:

5.4.1 The Supplementary Conditions identify reports and drawings known to Owner relating to a Hazardous Environmental Condition identified at the Site.

5.4.2 Copies of reports and drawings referenced will be made available by Owner to any Bidder on request. Those reports and drawings are not part of the Contract Documents, but the "Technical Data" contained therein upon which Bidder is entitled to rely as provided in Paragraph 5.06 of the General Conditions has been identified and established in Paragraph 5.06 of the Supplementary Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any "Technical Data" or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings. Costs associated with making available copies of reports and drawings shall be borne by Bidder

5.5 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraph 5.03 through Paragraph 5.05 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents as a result of any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated

on Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 5.06 of the General Conditions.

5.6 Before submitting a Bid, each Bidder will, at Bidder's own expense, make or obtain any additional examinations, investigations, explorations, tests, and studies and obtain any additional information and data which pertain to the physical conditions (surface, subsurface, and underground facilities) at or contiguous to the Site or otherwise which may affect cost, progress, or performance of the Work and which the Bidder deems necessary to determine its Bid for performing the Work in accordance with the time, price, and other terms and conditions of the Bidding Documents.

5.7 On request, a minimum of two business days in advance, Owner will provide each Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Location of any excavation or boring shall be subject to prior approval of Owner and applicable agencies. Bidder shall fill all holes, restore all pavement to match existing structural section, and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates.

5.8 Related Work at Site: Reference is made to the General Requirements for identification of the general nature of other work that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) that relates to the Work contemplated by these Bidding Documents. On request Owner will provide to each Bidder for examination, access to or copies of contract documents (other than portions thereof related to price) for such other work.

5.9 Safety: Paragraph 7.12 of the General Conditions indicates that if an Owner safety program exists, it will be noted in the Supplementary Conditions.

5.10 Submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this article;

5.10.1 that without exception the Bid is premised upon performing and furnishing the Work required by Bidding Documents and applying specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by Bidding Documents;

5.10.2 that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder; and

5.10.3 that Bidding Documents are generally sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

6 PREBID CONFERENCE

6.1 **Prospective Bidders are required to attend a pre-bid conference and Site visit** on **Tuesday, April 6, 2021 from 1:00 pm and 2:00pm.** Attendees will be required wear a mask when on-site. Representatives of Owner and Engineer will be present to discuss the Project.

7 BIDS WILL NOT BE ACCEPTED FROM BIDDERS THAT DO NOT HAVE A REPRESENTATIVE AT THE PRE-BID CONFERENCE. SITE AND OTHER AREAS

7.1 The lands upon which the Work is to be performed, rights-of-way, and easements for access thereto and other lands designated for use by the Contractor in performing the Work are identified in the Bidding Documents. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner, unless otherwise provided in the Bidding Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by Contractor.

8 ENVIRONMENTAL AND NATURAL RESOURCES LAWS AND REGULATIONS

8.1 Bidder's attention is directed to the Standard General Conditions of the Construction Contract (General Conditions) and Supplementary Conditions for ordinances and regulations dealing with the prevention of pollution and preservation of natural resources which may affect the performance of the Work. Bidder shall take such ordinances and regulations into consideration in preparing and submitting its Bid.

9 INTERPRETATIONS AND ADDENDA

9.1 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer via email. Additions, deletions, or revisions to the Bidding Documents considered necessary by Engineer in response to such questions will be issued by Addenda posted to the Website and a link to it emailed to all parties recorded by the Owner as having received the Bidding Documents. Questions received less than five calendar days prior to the date for opening of Bids may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

9.2 Addenda may also be issued to clarify, correct, or change the Bidding Documents as deemed advisable by Owner or Engineer. Bidders shall acknowledge receipt of all Addenda on the Bid Forms in the appropriate space.

9.3 Bidders shall make no special interpretation or inference of intent from differing formats in the Technical Specifications.

10 BID SECURITY

10.1 A Bid shall be accompanied by Bid security made payable to Owner in an amount of **ten** percent of Bidder's maximum Bid price and in the form of a certified or cashier's check or an approved Bid bond (on the attached form or one substantially similar to it).

10.2 The check or bond shall be given as a guarantee that the Bidder, if awarded the Work, will enter into an Agreement with Owner, and will furnish the necessary insurance certificates, Owner's Public Works Bond Information Form, Payment Bond, and Performance Bond; each of the bonds to be in the amount stated in the General Conditions and Supplementary Conditions. In case of refusal or failure to enter into the Agreement, the check or Bid Bond, as the case may be, shall be forfeited to Owner. Bid Bonds shall comply with the requirements applicable to payment and performance bonds in the General Conditions.

10.3 A copy of the original Bid security will be provided as part of the electronically submitted Bid. Bidders must deliver the original bid security to Owner's office at Rock Creek Engineering Building, 3235 SE River Road, Hillsboro, OR 97123 within five business days after the Bid Deadline in the Advertisement for Bids or Owner may declare the Bid nonresponsive. Write "BID SECURITY" on the face of the sealed envelope.

10.4 Within 14 calendar days after award of the Contract, Owner will return the Bid securities accompanying such Bids that are not being considered in making the award. All other Bid securities will be held until the Agreement has been finally executed. They will then be returned to the respective Bidders whose Bids they accompany.

11 CONTRACT TIMES

11.1 The number of days within which, or the dates by which, the Work is to be substantially completed and ready for final payment are set forth in the Agreement.

12 LIQUIDATED DAMAGES

12.1 Provisions for liquidated damages, if any, are set forth in the Agreement.

13 SUBSTITUTE AND "OR-EQUAL" ITEMS

13.1 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or "or-equal" items. Whenever it is specified or described in the Bidding Documents that a substitute or "or-equal" item of material or equipment may be furnished or used by Contractor if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the Effective Date of the Agreement.

14 SUBCONTRACTORS

14.1 Oregon Revised Statutes (ORS) 279C.370 requires Bidders for public improvement projects exceeding $100,000 in Contract Price to submit a First-Tier Subcontractor Disclosure Form with their Bid, or within two working hours of Bid closing. The disclosure form must identify first-tier Subcontractors that will furnish labor or labor and materials equal to 5 percent of the Contract Price or $15,000 whichever is greater, or $350,000, regardless of percentage of the Contract Price. If no Subcontractors are subject to the disclosure requirements, write "NONE" on the form provided in the Bidding Documents. If Bidder fails to submit a disclosure form with the dollar value and category of work information required by the stated deadline, the Bid will be considered nonresponsive and will not be considered.

14.2 The definition of a Subcontractor does not include Suppliers who provide materials only.

14.3 If the Successful Bidder declines to make a substitution of a Subcontractor, Supplier, person, or organization acceptable to Owner, as required by Paragraph 7.06 of the General Conditions, Owner may award the Contract to the next lowest Bidder that proposes to use acceptable Subcontractors, Suppliers, and other persons and organizations. Declining to make requested substitutions will not constitute grounds for sacrificing the Bid security of any Bidder. Any Subcontractor, Supplier, other person, or organization listed and to whom Owner or Engineer does not make written objection prior to giving the Notice of Award will be deemed acceptable to Owner and Engineer subject to revocation of such acceptance after the effective date of the Agreement as provided in Paragraph 7.06 of the General Conditions.

15 WAGE RATES/BOLI FEE

15.1 The Work under these Bidding Documents is to be paid for by public funds. This is a public works project subject to the state prevailing rates of wage under ORS 279C.800 to 279C.870. Unless otherwise exempt, Contractor and any Subcontractors must pay workers in each trade or occupation that Contractor or its Subcontractors or other person who is a party to the Contract uses in performing all or a part of the Contract not less than the applicable minimum Oregon prevailing wage rates in accordance with ORS 279C.838 and ORS 279C.840, or the Davis-Bacon Act (40 U.S.C. Section 3141 et seq.). The applicable Oregon minimum prevailing wage rates for such workers are contained in the publication *Prevailing Wage Rates for Public Works Contracts dated January 1, 2021* (see link titled "*January 1, 2021 PWR Rate Book*" at https://www.oregon.gov/boli/employers/Pages/prevailing-wage-rates.aspx), available at https://www.oregon.gov/boli/employers/pages/prevailing-wage.aspx and are hereby incorporated herein as of the date these Bidding Documents were first advertised.

15.2 ORS 279C.365(1)(g) requires that all Bids for public work, including those public work projects financed by federal funds and subject to the Davis Bacon Act, shall include a statement by the Bidder that it will comply with the provisions of ORS 279C.838, 279C.840 or 40 U.S.C. Section 3141 et seq. When the Bid Forms in the Bidding Documents contains a statement of Bidder's declaration of compliance with ORS 279C.838, 279C.840 or 40 U.S.C. Section 3141 et seq., the Bidder's signing of the Bid constitutes compliance with this Oregon Statute.

15.3 Owner shall be responsible for paying the fee required by ORS 279C.825(1) to the Commissioner of the Bureau of Labor and Industries.

15.4 Oregon Statute 279C.836 requires that, before starting work on a contract or subcontract for a public works project, Contractor or Subcontractor shall file with the Construction Contractors Board a public works bond with the corporate surety authorized to do business in the State of Oregon in the amount of $30,000.

16 PREPARATION OF BID FORMS

16.1 The Bid shall be submitted on the Bid Forms provided herein. No substitution of the Bid Forms will be allowed.

16.2 All blanks on the Bid Forms shall be completed by typing or printing with ink and the Bid Forms signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Forms.

16.3 A Bid by a corporation shall be executed in the corporate name by the president or a vice president or other corporate officer accompanied by enclosed Bid Certificate. The corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown.

16.4 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by enclosed Bid Certificate. The official address of the partnership shall be shown.

16.5 A Bid by a limited liability company (LLC) shall be executed in the name of the LLC and be signed by a manager if the LLC is manager managed or a member if the LLC is member managed, accompanied by the enclosed Bid Certificate. The state of formation of the firm and the official address of the LLC shall be shown.

16.6 A Bid by a joint venture shall be executed in the joint venture name and be signed by a joint venture managing partner, accompanied by the enclosed Bid Certificate, and his/her title must appear under the signature. The official address of the joint venture shall be shown.

16.7 All names shall be typed or printed in ink below the signatures.

16.8 The Bid shall contain an acknowledgement of receipt of all Addenda; the numbers of which shall be filled in on the Bid Forms.

16.9 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.

16.10 Owner will consider the signatures on the Bid Forms as electronic signatures.

16.11 Submit the completed Bid Forms and the copy of the Bid Security as one PDF file to Owner's electronic procurement site, Bid Locker, at https://bidlocker.us/details/1556_Itb___Durham_Ips_Biofilter_Retrofit_Project (Portal).

17 TRADE SECRET/CONFIDENTIAL

17.1 Any information Bidder submits in response to the Invitation to Bid (ITB) that Bidder considers a trade secret under ORS 192.345(2) or confidential proprietary information, and that Bidder wishes to protect from public disclosure, must be clearly labeled with the following: "This information constitutes a trade secret under ORS 192.345(2) or confidential proprietary information, and is not to be disclosed except in accordance with the Oregon Public Records

Law, ORS chapter 192." Bidders are cautioned that price information submitted in response to an ITB is generally not considered a trade secret under the Oregon Public Records Law. Further, information submitted by Bidders that is already in the public domain is not protected. Owner shall not be liable for disclosure or release of information when authorized or required by law or court order to do so. Owner shall also be immune from liability for disclosure or release of information under the circumstances set out in ORS 646.473(3).

18 BASIS OF BID; COMPARISON OF BIDS

18.1 The Bid will be compared and the basis for award will be set forth on the Bid Forms.

19 SUBMISSION OF BID

19.1 The Bid Forms are to be completed and submitted with the Bid security and the following:

19.1.1 First-Tier Subcontractor Disclosure Forms must be included with the Bid or delivered to the same location for delivery of the Bids within two hours of the specified time for receipt of Bids.

19.1.2 Bidder's state Contractor license number for the State of Oregon shall be shown on the Resident/Nonresident Bidder Status/Construction Contractor's Licensing and Public Works Bond Form.

19.2 The Bid shall be delivered by the time and to the place stipulated in the Advertisement for Bids. It is the Bidder's sole responsibility to see that its Bid is received in proper time and at the proper place.

19.3 The Bid shall be submitted to Owner's Portal following the instructions available on the Portal site by the date and hour of the opening of Bids. Oral, telegraphic, or telephonic Bids or modifications will not be considered.

20 MODIFICATIONS AND UNAUTHORIZED ALTERNATIVE BIDS.

20.1 Unauthorized conditions, limitations, or provisos attached to the Bid shall render it informal and may cause its rejection as being nonresponsive. The Bid Forms shall be completed without interlineations, alterations, or erasures in the printed text. Alternative Bids will not be considered unless called for.

21 MODIFICATION AND WITHDRAWAL OF BID

21.1 A Bid may be modified or 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. Bids may be withdrawn and resubmitted from the Portal up until the Bid Deadline.

21.2 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, as determined by

Oregon law and any applicable Owner's Purchasing Rules, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, that Bidder will be disqualified from further bidding on the Work.

22 OPENING OF BIDS

22.1 Bids will be opened at the time and place indicated in the Advertisement for Bids and unless obviously nonresponsive, read aloud publicly/by telephone conference. An abstract of the amounts of the base Bids and major alternates, if any, will be posted to the Website for Bidders after the opening of Bids.

23 BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

24 EVALUATION OF BIDS AND AWARD OF CONTRACT

24.1 Nonresident Bidders: In determining the lowest responsible Bidder, Owner will for the purpose of awarding the Contract, add a percent increase on the Bid of a nonresident Bidder equal to the percent, if any, of the preference given to that Bidder in the state in which the Bidder resides.

24.2 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced or conditional Bids and may cancel the procurement. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be responsible. Owner may also reject for good cause all Bids upon a finding by Owner that it is the public interest to do so. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work. No changes to the Contract Documents will be allowed. Submission of a Bid constitutes acceptance of the terms of the Contract Documents.

24.3 More than one Bid from an individual, firm, partnership, corporation, LLC or association under the same or different names will not be considered. If Owner believes that any Bidder is interested in more than one Bid for the Work contemplated, all Bids in which such Bidder is interested will be rejected. If Owner believes that collusion exists among the Bidders, all Bids will be rejected. A party who has quoted prices to a Bidder is not hereby disqualified from quoting prices to other Bidders, or from submitting a Bid directly for the Work.

24.4 In evaluating Bids, Owner will consider whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Forms or prior to the Notice of Award.

24.5 Discrepancies in Bids. In the event there is more than one Bid item in a Bid Schedule, the Bidder shall furnish a price for all Bid items in the Schedule, and failure to do so will render the Bid non-responsive and will cause its rejection. In the event there are unit price Bid items in a Bidding Schedule and the amount indicated for a unit price Bid item does not

equal the product of the unit price and quantity, the unit price shall govern and the amount will be corrected accordingly, and the Bidder shall be bound by the correction. In the event there is more than one Bid item in a Bid Schedule and the total indicated for the Schedule does not agree with the sum of the prices bid on the individual items, the prices bid on the individual items shall govern and the total for the Schedule will be corrected accordingly, and the Bidder shall be bound by the correction. In the case of discrepancies between figures and written words, words shall govern.

24.6 In evaluating Bidders, Owner may consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted either with the Bid, or otherwise prior to issuance of the Notice of Award.

24.7 Owner may conduct such investigations as Owner deems necessary to assist in Bid evaluation and to establish responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work in accordance with the Bidding Documents to Owner's satisfaction within the prescribed time.

24.8 If the Contract is to be awarded, Owner will award the Contract to Bidder whose Bid is in the best interests of District. If the Contract is to be awarded, Owner will award the Contract to the lowest, responsible Bidder whose Bid complies with the requirements of the Bidding Documents.

24.9 Owner may consider the operating costs, maintenance requirements, performance data, and guarantees of major items of materials and equipment proposed for incorporation in the Work when such data are required to be submitted prior to the Notice of Award. The evaluation criteria will be set forth on the Bid Forms.

24.10 If, at the time this Contract is to be awarded, the total of the lowest acceptable Bid exceeds the funds then estimated by Owner as available, Owner may reject all Bids or take such other action as best serves Owner's interests.

24.11 In the event of failure of the Successful Bidder to sign the Agreement and provide acceptable Performance and Payment Bond(s), insurance certificate(s), and other required documents, Owner may award the Contract to the next lowest responsive, responsible Bidder.

24.12 Award of the Contract, if awarded, will be made to the lowest responsive, responsible Bidder whose Bid complies with the requirements of the Bidding Documents. Unless otherwise specified, any such award will be made within the period stated in the Advertisement for Bids that the Bids are to remain open. Unless otherwise indicated, a single award will be made for all the Bid items in an individual Bid Schedule. In the event the Work is contained in more than one Bid Schedule, Owner will award all Schedules.

25 CONTRACT SECURITY AND INSURANCE

25.1 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to bonds and insurance. When the Successful Bidder delivers an executed Agreement to Owner, it shall be accompanied by such bonds.

26 SIGNING OF AGREEMENT

26.1 When Owner issues a Notice of Award to the Successful Bidder, it will also provide electronic access to a copy of the of unsigned counterparts of the Agreement along with the other Contract Documents that are identified in the Agreement and attached thereto. Owner would like to obtain electronic signatures on the Agreement using DocuSign. Within **15** days thereafter, the Successful Bidder will submit to Owner original paper copies of insurance certificates and Performance and Payment Bonds. Within 10 days of receipt of acceptable bonds and insurance certificates, Owner will electronically send the Successful Bidder the Agreement to sign, and once signed by all parties, will provide the Successful Bidder electronic access to one fully-signed Agreement that includes a complete set of Drawings with appropriate identification.

26.2 The Bidder to whom award is made shall electronically execute the Agreement with Owner on the form of agreement provided, shall secure all insurance, and shall furnish all certificates and bonds required by the Bidding Documents within the time period set forth in Section 26.1. Failure or refusal to enter into an Agreement as herein provided or to conform to any of the stipulated requirements in connection therewith shall be just cause for annulment of the award and forfeiture of the Bid security. If the lowest responsive, responsible Bidder refuses or fails to execute the Agreement, Owner may award the Contract to the second lowest responsive, responsible Bidder. If the second lowest responsive, responsible Bidder refuses or fails to execute the Agreement, Owner may award the Contract to the third lowest responsive, responsible Bidder. On the failure or refusal of such second or third lowest Bidder to execute the Agreement, each such Bidder's Bid securities shall be likewise forfeited to Owner.

27 RETAINAGE

27.1 Provisions concerning retainage and Contractor's rights to deposit securities in lieu of retainage, if applicable, are set forth in the Agreement.

28 CONTRACTS TO BE ASSIGNED

Not Applicable.

29 PROTEST PROCEDURE.

29.1 Owner has adopted its own public contracting rules and is not subject to the Attorney General's Model Public Contracting Rules. Owner's rules have opportunities for Bidders to protest at various stages in the procurement process. This section only contains a brief summary of the deadlines, conditions required to file a protest and the information required to be included in a protest. Copies of Owner's rules containing the protest process may be

obtained by contacting Owner's representative*, Michelle Mann by phone at 503-547-8035*, by email to ***MannM@CleanWaterServices.org*** or by first-class mail to 3235 SE River Road, Hillsboro, OR 97123 (Owner's Office address)

29.2 Specification Protest Process

Under Owner's rules, Prospective Bidders must submit a written protest of the Specifications to Owner not less than ten calendar days prior to the due date for Bids. The written protest must:

29.2.1 Be delivered to Michelle Mann, Owner's representative, by email or first class mail to the email address and Owner's Office Address contained in Section 29.1.

29.2.2 Reference the title of the Bidding Documents.

29.2.3 Identify the prospective Bidder's name and contact information.

29.2.4 Be signed by an authorized representative.

29.2.5 State the reason or the grounds for the protest, including;

29.2.5.1 A detailed statement of the legal and factual grounds for the request or protest;

29.2.5.2 A description of the resulting prejudice to the Bidder; and

29.2.5.2.1 A statement of the form of relief requested or any proposed changes to the Specifications.

29.2.6 Be received by Michelle Mann within ten calendar days prior to the due date for Bids. Owner shall not consider a prospective Bidder's protest if it is submitted after the established time period.

29.3 Solicitation Protest. Under Owner's rules, prospective Bidders may submit a written protest of anything contained in the Bidding Documents, including but not limited to the Invitation to Bid process, Scope of Work and the Contract Documents. This is a prospective Bidder's only opportunity to protest the provisions of the Bidding Documents, except that a Bidder may protest the award as provided below. Prospective Bidders must submit a written protest to Owner not less than ten calendar days prior to the due date for Bids. The written protest must:

29.3.1 Be delivered to Michelle Mann, by email or first-class mail to the email address or Owner's Office Address contained in Section 29.1.

29.3.2 Reference the title of the Bidding Documents.

29.3.3 Identify the prospective Bidder's name and contact information.

29.3.4 Be signed by an authorized representative.

29.3.5 State the reason or the grounds for the protest, including:

29.3.5.1 The grounds that demonstrate how the procurement process is contrary to law or unnecessarily restrictive, is legally flawed or improperly specifies a brand name;

29.3.5.2 Evidence or documentation that supports the grounds on which the protest is based; and

29.3.5.3 Relief sought.

29.3.6 State the desired changes to the procurement process or the Bidding Document provisions that the prospective Bidder believes will remedy the conditions that were the basis of the protest.

29.3.7 Be received by Michelle Mann within ten calendar days prior to the due date for Bids. Owner shall not consider a prospective Bidder's protest if it is submitted after the established time period.

29.4 Award Protest. Affected or aggrieved Bidders will also have an opportunity to protest Owner's Conditional Notice of Intent to Award that Owner will post under the title of the Bidding Documents Durham FOG Tank Retrofit, Project No. 6992 on its Website. A Bidder is adversely affected or aggrieved only if the bidder is eligible for award of the Contract as the responsible Bidder submitting the lowest responsive Bid and is next in line for award, i.e., the protesting Bidder must claim that all lower bidders are ineligible for award. The written protest must:

29.4.1 Be delivered to Michelle Mann, by email or first-class mail to the email address or Owner's Office Address contained in Section 29.1.

29.4.2 Reference the title of the Bidding Documents.

29.4.3 Identify the prospective bidder's name and contact information.

29.4.4 Be signed by an authorized representative.

29.4.5 Specify the grounds for the protest.

29.4.6 Be received by Michelle Mann within seven calendar days after issuance of the Conditional Notice of Intent to Award.

29.5 Owner shall not consider a Bidder's protest if it is submitted after the established time period. A Bidder must exhaust all administrative remedies before seeking judicial review of Owner's contractor selection or Contract award decision.

29.6 Award decision. The award by the Owner's Board of Directors of a Contract shall constitute a final decision of the Owner to award a Contract if no written protest of the award is filed.

END OF SECTION

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SECTION 00300
BID FORMS

BID TO: Clean Water Services

1. 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 entitled **Durham IPS Biofilter Retrofit Project No. 7094** for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

2. Bidder accepts all of the terms and conditions of the Bidding Documents, Contract Documents, including without limitation those in the Advertisement for Bids and Instructions to Bidders, dealing with the disposition of the Bid security.

3. This Bid will remain open for 60 calendar days from the Bid due date unless otherwise required by law or for such longer period of time that Bidder may agree to in writing upon request of Owner. Bidder will enter into an Agreement within the time and in the manner required in the Advertisement for Bids and the Instructions to Bidders, and will furnish the insurance certificates, the Payment and Performance Bonds required by the Contract Documents and Owner's Subcontractor Public Works Bond Information Form.

4. BIDDER'S REPRESENTATIONS

4.1. In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged.

Addendum No.	**Addendum Date**

(Bidder shall insert the number of each Addendum received.)

Failure to acknowledge receipt of Addenda may render the Bid non-responsive and may be cause for its rejection.

B. Bidder has familiarized itself with the nature and extent of the Contract Documents, Work, Site, locality where the Work is to be performed, the legal requirements (federal, state and local laws, ordinances, rules, and regulations), and the conditions affecting cost, progress or performance of the Work and has made such independent investigations as Bidder deems necessary.

C. Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

D. Bidder is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

E. Bidder has carefully studied: i) reports of explorations and tests of subsurface conditions at or contiguous to the Site and drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) which have been identified in Paragraph 5.03 of the Supplementary Conditions as containing reliable "Technical Data,"; and ii) reports and drawings of Hazardous Environmental Conditions, if any, at the Site that have been identified in Paragraph 5.06 of the Supplementary Conditions as containing reliable "Technical Data."

F. Bidder has considered the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs.

G. Based on information and observations referred to in paragraph above, Bidder does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) Bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

H. 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.

I. Bidder has given Engineer written notice of conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.

J. The Bidding Documents are generally sufficient to indicate and convey understanding of terms and conditions for the performance of the Work for which this Bid is submitted.

5. BIDDER'S CERTIFICATION

5.1. Bidder certifies:

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

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

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

D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Agreement. For the purposes of this paragraph:

5.1.D.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;

5.1.D.2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish Bid prices at artificial noncompetitive levels, or (c) to deprive Owner of the benefits of free and open competition;

5.1.D.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, noncompetitive levels; and

5.1.D.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 Agreement.

E. Owner is tax exempt. Required sales and use taxes are included in the stated Bid prices for the Work unless provision is made herein for the Bidder to separately itemize the estimated amount of sales tax.

F. Bidder will be bound by and comply with all of the applicable requirements of ORS 279C.800 to 279C.870 and the administrative rules of the Bureau of Labor and Industries (BOLI) regarding prevailing wage rates and will pay prevailing wage rates in accordance with 279C.840.

G. Neither Bidder nor their Subcontractors are on the Bureau of Labor and Industries list of persons having violated prevailing wage rate laws.

H. Bidder has not discriminated and will not discriminate, in violation of ORS 279A.110(1) against any disadvantaged business enterprise, a minority-owned business, woman-owned business, a business that a service-disabled veteran owns or an emerging small business that is certified under ORS 200.055, in awarding a required subcontract.

I. Bidder is not in violation of any tax laws described in ORS 305.385.

J. Bidder has established a drug-testing program for employees per ORS 279C.505 and that Bidder, if awarded the Agreement, will at the time of Agreement award represent and warrant to Owner that its employee drug-testing program remains in place and will continue in full force and effect for the duration of the Agreement.

K. In accordance with OAR 137-049-0200, Subcontractors performing work will be registered with the Construction Contractors Board before Subcontractor commences work.

L. Bidder shall comply with the prohibitions set forth in ORS 652.220 prohibiting discriminatory wage rates based upon an employee's membership in a protected class and acknowledges that compliance is a material element of the Agreement and failure to comply is a breach that entitles Owner to terminate the Agreement for cause.

M. Bidder shall comply with the prohibitions set forth in ORS 652.220 prohibiting discriminatory wage rates based upon an employee's membership in a protected class and acknowledges that compliance is a material element of the Agreement and failure to comply is a breach that entitles Owner to terminate the Agreement for cause.

N. Bidder's information contained in the Resident/Nonresident Bidder Status, Construction Contractor's Licensing and Public Works Bond Information sections is true and correct.

O. Owner shall not be liable for any expenses incurred by Bidder in preparing or submitting its Bid or in participating in the Bid evaluation/selection process.

6. BASIS OF BIDS

6.1. Bidder shall complete the Work in accordance with the Contract Documents for the price(s) described in the attached Bid Schedule.

7. TIME OF COMPLETION

7.1. Bidder agrees to complete the Work within the Contract Time stipulated in the Agreement and accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work, and any specified Milestones, within the Contract Times.

8. ATTACHMENTS TO THIS BID

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

Bid Schedule.
Bid Certificate.
Bid Bond.
Resident/Nonresident Bidder Status/Construction Contractor's Licensing and Public Works Form.
First-Tier Subcontractor Disclosure Form.

Dated: _____ Bidder: _____

By: _____
Name (Signature)

_____
Name (Type or Print)

Title: _____

BID SCHEDULE

Schedule of Bid Prices for
Durham IPS Biofilter Retrofit Project No. 7094

1. Lump Sum Work: Bidder proposes and agrees to accept as full payment the following bid amount for the **Durham IPS Biofilter Retrofit Project No. 7094** proposed within the Bidding Documents, and certifies that this amount is based upon the undersigned's own estimate of quantities and costs and includes sales, consumer, use, and other taxes, overhead and profit.

   $_____
   (figures)

   _____
   (words)

   (The amount in words takes precedence.)

BID CERTIFICATE
(if Corporation)

STATE OF _____)
) ss:
COUNTY OF_____)

I HEREBY CERTIFY that a meeting of the Board of Directors of_____

_____

_____,

a corporation existing under the laws of the State of _____, was held on _____, 2021, and the following resolution was duly passed and adopted:

"RESOLVED, that _____ as _____ of this Corporation, be and is hereby authorized to execute the Bid for **Durham IPS Biofilter Retrofit Project No**. **7094** dated _____, 2021 to Clean Water Services by this Corporation and that his/her execution thereof, attested by the Secretary of this Corporation shall be the official act and deed of this Corporation."

I further certify that the resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand this _____, day of _____, 2021.

_____
(Signature)

_____
(Title)

Attested by:

_____
Secretary

_____

_____
(Address)

BID CERTIFICATE
(if Partnership)

STATE OF _____)
) ss:
COUNTY OF _____)

I HEREBY CERTIFY that a meeting of the Partners of_____

_____

_____,

a partnership existing under the laws of the State of _____, was held on _____, 2021, and the following resolution was duly passed and adopted:

"RESOLVED, that _____, as _____ of the Partnership, be and is hereby authorized to execute the Bid for **Durham IPS Biofilter Retrofit Project No**. **7094** dated _____, 2021 to Clean Water Services by this Partnership and that his/her execution thereof, attested by the General Partner shall be the official act and deed of this Partnership."

I further certify that the resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand this _____, day of _____ _____, 2021.

_____
(Signature)

_____
(Title)

Attested by:

By:_____
General Partner

_____

_____
(Address)

BID CERTIFICATE
(if Limited Liability Company)

STATE OF _____)
) ss:
COUNTY OF _____)

I HEREBY CERTIFY that a meeting of the Members or Managers of

_____,
(Insert Limited Liability Company Name Here)

a limited liability company existing under the laws of the State of _____, was held on _____, 2021, and the following resolution was duly passed and adopted:

"RESOLVED, that_____, as _____ of this limited liability company, be and is hereby authorized to execute the Bid for **Durham IPS Biofilter Retrofit Project No. 7094** dated _____, 2021 to Clean Water Services by this limited liability company and that his/her execution thereof, attested by _____ of this limited liability company shall be the official act and deed of this limited liability company."

I further certify that the resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand this _____, day of _____, 2021.

By:_____
(Signature)

_____
(Title)

Attested by:

By:_____
(Signature)

_____
(Address)

BID CERTIFICATE
(if Joint Venture)

STATE OF _____)
) ss:
COUNTY OF _____)

I HEREBY CERTIFY that a meeting of the Principals of_____

_____

_____,

a joint venture existing under the laws of the State of _____, was held on _____, 2021, and the following resolution was duly passed and adopted:

"RESOLVED, that _____, as _____ of the Joint Venture, be and is hereby authorized to execute the Bid for **Durham IPS Biofilter Retrofit Project No**. **7094** dated _____, 2021 to Clean Water Services by this Joint Venture and that his/her execution thereof, attested by the _____ shall be the official act and deed of this Joint Venture."

I further certify that the resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand this _____, day of _____ _____, 2021.

By:_____
Managing Partner

Attested by:

By:_____
(Signature)

_____

_____
(Address)

BID BOND

Any singular reference to Bidder, Surety, Owner, or other party shall be considered plural where applicable.

BIDDER (Name and Address):

SURETY (Name and Address of Principal Place of Business):

OWNER (Name and Address):

BID

Bid Due Date:
Project (Brief Description Including Location):

BOND

Bond Number:
Date (Not later than Bid due date):

Penal sum _____ _____

(Words) (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms of this Bid Bond, do each cause this Bid Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

BIDDER	SURETY
_____(Seal) Bidder's Name and Corporate Seal	_____(Seal) Surety's Name and Corporate Seal
By: ____ Signature and Title	By: ____ Signature and Title (Attach Power of Attorney)
Attest: _ Signature and Title	Attest: _ Signature and Title

Note: Above addresses are to be used for giving required notice.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Surety's liability.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or

3.2. All Bids are rejected by Owner, or

3.3. Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default by Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

RESIDENT/NONRESIDENT BIDDER STATUS/CONSTRUCTION CONTRACTOR'S LICENSING AND PUBLIC WORKS BOND FORM

Durham IPS Biofilter Retrofit
Project No. 7094

Oregon law (ORS 279A.120) requires Owner, in determining the lowest responsible bidder, to add a percent increase on the bid of a nonresident bidder equal to the percent, if any, of the preference given to bidders in the state in which that bidder resides. Consequently, each bidder must indicate whether it is a resident or nonresident bidder. A resident bidder is a bidder who has paid unemployment taxes or income taxes in Oregon during the 12 calendar months immediately preceding submission of this bid, and has a business address in Oregon, and has stated in its bid whether the bidder is a "resident bidder." A "nonresident bidder" is a bidder who is not a resident bidder.

The bidder whose signature appears on the Bid Forms states that it is: (check one)

1. A resident bidder _____

2. A nonresident bidder _____

Indicate state in which bidder resides: _____

CONSTRUCTION CONTRACTOR'S LICENSING

Oregon law requires all contractors to be licensed with the Oregon Construction Contractors Board in order to submit a Bid to do work and to do work as a contractor. The Bidder whose signature appears on the Bid Forms states it is licensed with the Oregon Construction Contractors Board.

Indicate Bidder's Construction Contractors Board License No. _____.

PUBLIC WORKS BOND INFORMATION

Name of Bidder's Public Works Bonding Company: _____

Address of Bidder's Public Works Bonding Company _____

_____

Agent Name/Phone: _____

Bidder's Public Works Bond Number: _____

Check here if you are exempt from the public works bond requirement per ORS279C.836(7). _____

FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM
FOR
Durham IPS Biofilter Retrofit
Project No. 7094

Bid Closing: _____

Disclosure Submittal Deadline: 4:00 p.m. on _____

This form must be submitted at the location specified in the Advertisement To Bid on the advertised bid closing date and within 2 working hours after the advertised bid closing time.

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).

Subcontractor Name	**Dollar Value**	**Category of Work**

Failure to submit this form by the disclosure deadline will result in a nonresponsive bid. A nonresponsive bid will not be considered for award.

Form Submitted by (Bidder Name): _____

Contact Name: _____ Phone No.: _____

END OF BID FORMS

SECTION 00500
AGREEMENT

THIS AGREEMENT is dated as of the _____ day of _____ 2021 by and between Clean Water Services (Owner) and _____ (Contractor).

Owner and Contractor, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE 1. WORK.

1.1. Contractor shall complete the work as specified or indicated in Owner's Contract Documents (Work) entitled **Durham IPS Biofilter Retrofit Project No. 7094** (Project). The Work contemplated consists of, but is not limited to furnishing all labor, materials and equipment necessary to:

1. Demolish existing earthen odor control biofilter including earthen media, buried air distribution piping and irrigation piping at basin.

2. Protect in place existing temporary odor control system, in service odor control ducting, all electrical and instrumentation conduit, wiring, panels and appurtenances. Ensure continuing full function of the temporary odor control system.

3. Protect in place existing irrigation control panel and piping connections to the extents shown.

4. Install new reinforced concrete basin to house new engineered media biofilter.

5. Install new engineered media biofilter including floor system, HDPE basin liner, engineered media and other appurtenances as required.

6. Install new ductwork from existing blowers to new engineered media biofilter, connect to existing ductwork.

7. Install new irrigation piping and nozzles, connect to existing irrigation piping at existing irrigation control panel.

8. Install new biofilter drain, connect to existing drain discharge location.

9. Backfill to grade unused area of existing earthen biofilter basin.

10. Perform site grading of area.

ARTICLE 2. ENGINEER.

2.1. The Project has been designed by **Black & Veatch Corporation** (Engineer), who is to act as Owner's representative, assume duties and responsibilities, and has the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 3. CONTRACT TIMES.

3.1. Time of the Essence: Time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

3.2. **Days to Achieve Substantial Completion and Final Completion:**

4.1.1 **The Work shall be substantially completed within the number of days indicated below from the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions, and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within the number of days indicated below after the date when the Contract Times commence to run.**

Substantial Completion	**119** calendar days
Final Completion	**133** calendar days

3.3. Owner recognizes that the novel coronavirus (COVID-19) may impact the Project schedule. Owner will extend the schedule for COVID-19 related delays, as requested by the Contractor and in accordance with Article 4 Section 4.05.C of the General Conditions section of the Contract Documents.

ARTICLE 4. LIQUIDATED DAMAGES.

Owner and Contractor 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 time(s) specified in Article 3 herein, plus any extensions thereof allowed in accordance with Article 11 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in determining in a legal or other dispute resolution proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty) Contractor shall pay Owner the following amounts for each day that expires after the time specified in Article 3 herein:

Contract Time	Liquidated Damages per Day
1) Substantial Completion	**$500**
2) Final Completion	**$500**

4.2 In addition, Contractor shall pay damages of impacts to other contractors/suppliers affected by Contractor delays.

4.3 Owner shall recover liquidated damages by deducting the amount owed by Change Order or from the final payment or any retainage held by Owner.

ARTICLE 5. CONTRACT PRICE.

5.1 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents in current funds the amount(s) set forth in the conformed Bid Forms, which are included as an attachment to this Agreement. The contract price is as follows:

5.1.1 A Lump Sum of **$**_____

5.2 In accordance with Article 4.05.F of the General Conditions section of the Contract Documents, the contract price will not be adjusted due to schedule delays caused by COVID-19. Owner will be responsible for costs incurred for engineering, administrative and plant operations and the Contractor will be responsible for all additional direct or indirect project costs related to COVID-19 delays.

ARTICLE 6. PAYMENT PROCEDURES.

6.1 Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.2 Progress Payments and Retainage: Prior to Final Completion, Owner will retain from progress payments and any incentive payment, five percent of the value of the work completed and the monies shall be retained in one of the forms specified herein and selected by Contractor in the Selection of Retainage Option Form. Except as otherwise selected by Contractor under Article 6.3 or 6.4, for Contracts that exceed $500,000, Owner will deposit the cash retainage withheld in an interest-bearing escrow account as required by ORS 279C.570(2). Contractor shall execute such documentation and instructions respecting the interest-bearing escrow account as the Owner may require to protect its interests, including but not limited to a provision that no funds may be paid from the account to anyone without the Owner's advance written notification. Interest earned on the account shall accrue to the Contractor. Amounts retained and interest earned will be included in the final payment made according to Paragraph 15.01.C.6 of the General Conditions, unless otherwise specified in the Contract. Owner will make progress payments on account of the Contract Price on the basis of Contractor's Application for Payment on the date of each month as established in the preconstruction conference during performance of the Work as provided herein. All such payments will be measured by the Schedule of Values established as provided in Paragraph 2.05 of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided in the General Conditions.

6.3 In lieu of retainage, Contractor may elect on the Selection of Retainage Option Form to have accumulated funds deposited by Owner, as provided in ORS 279C.560, in an interest-bearing account. Interest on such an account would accrue to Contractor. Costs incurred by Owner as a result of this option will be deducted from Contractor's final payment.

6.4 In lieu of retainage, Contractor, with the approval of Owner, may elect on the Selection of Retainage Option Form to deposit a surety bond for all or any portion of the retainage in a form acceptable to Owner. Such bond and any proceeds therefrom shall be made subject to all claims and liens as provided for in ORS 279C.550 to 279C.620. Costs incurred by Owner as a result of this option will be deducted from Contractor's final payment.

6.5 Upon Substantial Completion, Owner will pay an amount sufficient to increase total payments to Contractor to 100 percent of the Work completed, less retainage and such amounts as Engineer will determine in accordance with Paragraph 15.01.C.6 of the General Conditions and less 100 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the tentative list of items to be completed or corrected attached to the certificate of Substantial Completion.

6.6 Final Payment:

6.6.1 Upon Final Completion and acceptance of the Work in accordance with Paragraph 15.06 of the General Conditions, Owner will pay the remainder of the Contract Price as recommended by Engineer as provided in Paragraph 15.06.

ARTICLE 7. INTEREST

7.1 Monies not paid when due as provided in Article 15 of the General Conditions shall bear interest at the rate as provided for in ORS 279C.570.

7.2 Interest on retainage withheld by Owner, if any, will be paid in accordance with Article 6.2.

ARTICLE 8. PREVAILING WAGE RATES/BOLI FEE/PUBLIC WORKS BOND REQUIRED.

8.1. The Project is a public works project. Contractor agrees that the provisions required by ORS 279C.830 pertaining to Contractor's payment of prevailing wage rates shall be included as part of this Agreement. Contractor must pay workers in each trade or occupation that Contractor or its Subcontractors or other person who is a party to the Contract uses in performing all or part of the Contract not less than the specific minimum hourly rate of wages in accordance with ORS 279C.838 and 279C.840 and shall require its Subcontractors to pay at such rates. The applicable Oregon prevailing wage rates for such workers are incorporated by reference in Section 00810, Oregon Prevailing Wage Rates. Contractors shall include in every subcontract a provision requiring subcontractors to pay their workers at such rates.

8.2. Owner will be responsible for paying the fee required by ORS 279C.825 to the Commissioner of the Bureau of Labor and Industries.

8.3. Before starting any Work on the Project, Contractor and every Subcontractor performing Work on the Project must have a public works bond filed with the Construction Contractors Board, unless exempt under ORS 279C.836(4), (7), (8), or (9). Contractor must require in every subcontract that the Subcontractor have a public works bond filed with the Construction Contractors Board before starting Work on the Project unless exempt under ORS 279C.836(4), (7), (8), or (9).

ARTICLE 9. CONTRACTOR'S REPRESENTATIONS

9.1. In order to induce Owner to enter into this Agreement, Contractor makes the following representations:

9.1.1. Contractor has examined and carefully studied the Contract Documents and any other related data identified in the Bidding Documents.

9.1.2. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

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

9.1.4. Contractor has carefully studied: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) if any, which have been identified in Paragraph 5.03 of the Supplementary Conditions as containing reliable "Technical Data", and (2) reports and drawings of Hazardous Environmental Conditions, if any, at the Site which have been identified in Paragraph 5.06 of the Supplementary Conditions as containing reliable "Technical Data."

9.1.5. Contractor has considered the information known to Contractor; 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 Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on 1) the cost, progress, and performance of the Work; 2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents; and 3) Contractor's safety precautions and programs.

9.1.6. Based on the information and observations referred to above, Contractor does not consider that any 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 Documents.

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

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

9.1.9. The Contract Documents are generally sufficient to indicate and convey understanding of terms and conditions for performance and furnishing of the Work.

ARTICLE 10. CONTRACT DOCUMENTS.

10.1. The Contract Documents which comprise the entire Agreement between Owner and Contractor concerning Work are:

10.1.1. This Agreement

10.1.2. Conformed Bid Forms

10.1.3. Executed Performance and Payment Bonds

10.1.4. Copies of Public Works Bonds from Contractor and every Subcontractor on the Project

10.1.5. Contract Specifications: Divisions 00 and 01 (Except Section 00030, Advertisement to Bid, and Section 00100, Instructions to Bidders); Divisions 02 through 15

10.1.6. Contract Drawings

10.1.7. General Conditions

10.1.8. Supplementary Conditions

10.1.9. Specifications as listed in the table of contents of the Project Manual.

10.1.10. Drawings consisting of 17 sheets with each sheet bearing the following general title: “Durham IPS Biofilter Retrofit, Project No. 7094”.

10.1.11. Addenda numbers ___ to ___, inclusive

10.1.12. Selection of Retainage Option Form if applicable

10.1.13. Permits from outside agencies

10.2. There are no Contract Documents other than those listed in this Article.

10.3. The Contract Documents may only be amended, modified, or supplemented as provided in Article 11 of the General Conditions.

ARTICLE 11. ASSIGNMENT.

11.1. Owner and Contractor each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect to all covenants, agreements and obligations contained in the Contract Documents.

11.2. No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and specifically but without limitation, monies that may become due and monies that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

ARTICLE 12. PAYROLL AND CERTIFIED STATEMENT FILING AND ADDITIONAL RETAINAGE.

12.1. Contractor or Contractor's surety, and every subcontractor or subcontractor's surety, shall file with Owner written payroll and certified statements (Certified Payrolls) that accurately and completely contain the payroll records for each week during which the Contractor or subcontractor employs a worker on a public works project. The Certified Payrolls shall contain the information required and conform to the requirements set forth in ORS 279C.845 and Oregon Administrative Rule 839-025-0010. Contractor shall file the Certified Payrolls with Owner once a month by the fifth business day of the following month. Once construction starts Contractor shall file a Certified Payroll with Owner containing the notation “No Work” each week that Contractor does not work on the Project.

12.2. Owner shall retain 25 percent of any amount earned by Contractor, in addition to other retainage, on the Work until Contractor has filed with Owner the required Certified Payrolls. Owner shall pay Contractor the amount retained under this Section within 14 days after the Contractor files the required Certified Payrolls required by this Article regardless of whether a subcontractor has failed to file Certified Payrolls. Owner is not required to verify the truth of the contents of the Certified Payrolls filed by Contractor.

12.3. Contractor shall retain 25 percent of any amount earned by a first-tier subcontractor on the Work until the subcontractor has filed with Owner the required Certified Payrolls. Contractor shall verify that the first-tier subcontractor has filed the Certified Payrolls before the Contractor may pay the subcontractor any amount retained under this Article. Contractor shall pay the first-tier subcontractor the amount retained under this Article within 14 days after the subcontractor files the Certified Payrolls

required by this Article. Neither Owner nor Contractor is required to verify the truth of the contents of the Certified Payrolls filed by the first-tier subcontractor.

ARTICLE 13. MISCELLANEOUS

13.1. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

13.2. Severability: Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

13.3. This Agreement, and any Change Orders may be executed in several counterparts, each of which will be an original, all of which will constitute one and the same instrument. An electronic signature will be considered an original. The individuals signing this Agreement, and any future Change Orders or amendments certify that they are authorized to execute this Agreement and any future Change Order or amendments on behalf of Contractor and Owner, respectively.

IN WITNESS WHEREOF, Owner and Contractor have caused this Agreement to be executed the day and year first above written.

OWNER	CONTRACTOR
CLEAN WATER SERVICES	
By _____	By _____
Chief Executive Officer or Designee	Title _____

APPROVED AS TO FORM

_____
Clean Water Services Counsel

AGREEMENT CERTIFICATE

(if Corporation)

STATE OF _____)
) ss:
COUNTY OF _____)

I HEREBY CERTIFY that a meeting of the Board of Directors of_____

_____
_____,

a corporation existing under the laws of the State of _____, was held on _____, 2021, and the following resolution was duly passed and adopted:

"RESOLVED, that _____(signer name), as President of the Corporation, be and is hereby authorized to execute the Agreement for the **Durham IPS Biofilter Retrofit Project No. 7094** by and between this Corporation and Clean Water Services and that his/her execution thereof, attested by the Secretary of the Corporation, shall be the official act and deed of this Corporation."

I further certify that the resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand this _____, day of _____ _____,
2021.

By: _____
President

Attested:

By:_____
Secretary

Print Name: _____

AGREEMENT CERTIFICATE
(if Limited Liability Company)

STATE OF _____)
) ss:
COUNTY OF _____)

I HEREBY CERTIFY that a meeting of the Members or Managers of

_____,
(Insert Limited Liability Company Name Here)

a limited liability company existing under the laws of the State of _____, was held on _____, 2021, and the following resolution was duly passed and adopted:

"RESOLVED, that _____(signer name), as the _____ _____ (signer title) of the limited liability company, be and is hereby authorized to execute the Agreement for the **Durham IPS Biofilter Retrofit Project No. 7094** by and between this limited liability company and Clean Water Services and that his/her execution thereof, attested by the _____ (attester title) shall be the official act and deed of this limited liability company."

I further certify that the resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand this _____, day of _____, 2021.

By: _____

Title: _____

Attested:

By: _____

Name/Title: _____

AGREEMENT CERTIFICATE
(if Partnership)

STATE OF _____)
) ss:
COUNTY OF _____)

I HEREBY CERTIFY that a meeting of the Partners of_____

_____

_____,

a partnership existing under the laws of the State of _____, was held on _____, 2021, and the following resolution was duly passed and adopted:

"RESOLVED, that _____ (signer name), as
Partner of the Partnership, be and is hereby authorized to execute the Agreement for **Durham IPS Biofilter Retrofit Project No. 7094** by and between this Partnership and Clean Water Services and that his/her execution thereof, attested by the _____(attester title) shall be the official act and deed of this Partnership."

I further certify that the resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand this _____, day of _____,
2021.

By:_____
Partner

Attested:

By: _____

Name/Title: _____

AGREEMENT CERTIFICATE
(if Joint Venture)

STATE OF _____)
) ss:
COUNTY OF _____)

I HEREBY CERTIFY that a meeting of the Principals of_____

_____

_____

_____,

a joint venture existing under the laws of the State of _____, was held on _____, 2021, and the following resolution was duly passed and adopted:

"RESOLVED, that _____(signer name), as
Managing Partner of the Joint Venture, be and is hereby authorized to execute the Agreement for the **Durham IPS Biofilter Retrofit Project No. 7094** by and between this Joint Venture and Clean Water Services and that his/her execution thereof, attested by the _____(attester title) shall be the official act and deed of this Joint Venture."

I further certify that the resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand this _____, day of _____,
2021.

By:_____
Managing Partner

Attested:

By: _____

Name/Title: _____

SELECTION OF RETAINAGE OPTION FORM

(ORS 279C.560)

_____ (insert name of Contractor) (Contractor) either intends to enter or has entered into a contract with Clean Water Services (Owner) for the Durham IPS Biofilter Retrofit Project, Project Number 7094 (Project). If Owner decides to withhold retainage, it will be in the amount of five percent of the contract price of the work completed and will be held by Owner for up to 30 days after the Project has been accepted by Owner in writing. Oregon law allows specific alternatives for the holding and accounting of this retainage at the option of the Contractor. FAILURE TO EXECUTE AND SUBMIT THIS FORM WITHIN 15 DAYS OF OWNER'S REQUEST WILL RESULT IN AUTOMATIC SELECTION OF THE FIRST OPTION.

Contractor elects the following option to provide retainage for the Project. (Check one only.)

__1. **THIS OPTION APPLIES ONLY TO CONTRACTS WITH A CONTRACT PRICE THAT EXCEEDS $500,000.** Owner will withhold payment and place the retainage in an interest-bearing escrow account in accordance with ORS 279C.570. Funds in the account will be released to Contractor within 30 days of acceptance of the Project.

__2. Contractor will set up an interest-bearing account in a commercial bank or trust company in Oregon _____(name of lending institution) in the name of Owner. Owner will place the five percent retainage withheld from each progress payment, into the interest-earning account. Funds in the account will be under Owner's control and will be released to Contractor within 30 days of final acceptance of the Project. Interest on the account will accrue to Contractor.

Bank Contact_____
Contact telephone number_____

__3. Before the first progress payment is made where retainage will be withheld, Contractor will deposit acceptable bonds or securities, equal to at least five percent of the remaining contract amount, with Owner or with a bank or trust company in Oregon. The bank or trust company will provide a safekeeping receipt to Owner. **The securities must cover <u>all</u> of the retainage.**

Acceptable bonds and securities to be held in lieu of retainage:

1. Bills, certificates, notes, bonds, or other obligations of the United States, its agencies, or its wholly-owned corporations.

2. Indebtedness of the Federal National Mortgage Association.

The Contractor will deposit _____
(description of bonds or securities) in the amount of $ _____with
_____ (depository name and address) on
_____(date)

and instruct the named depository to provide Owner with a safekeeping receipt and to hold the bonds or securities until authorized by Owner to release them.

CONTRACTOR NAME

_____ _____

Company Name Federal Tax I.D. Number

_____ _____

By (Signature) By (Please print)

_____

Title Date

END OF SECTION

PERFORMANCE BOND

DURHAM IPS BIOFILTER RETROFIT
PROJECT NO. 7094

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR
(Name and Address):

SURETY
(Name and Address of Principal Place of Business):

OWNER (Name and Address):

Clean Water Services
2550 SW Hillsboro Hwy.
Hillsboro, Oregon, 97123

CONTRACT

Date:
Amount:
Description (Name and Location): Durham IPS Biofilter Retrofit Project No. 7094
Durham Advanced Wastewater Treatment Facility
16580 SW 85th Ave., Tigard, OR 97224

BOND

Bond Number:
Date (Not earlier than Contract Date):
Amount:
Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms of this Performance Bond, do each cause this Performance Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

Company:

Signature: _____(Seal)
Name and Title

Approved as to Form

_____

Owner's Counsel

SURETY

_____(Seal)
Surety's Name and Corporate Seal

By: _____
Signature and Title

(Attach Power of Attorney)

Attest: _____
Signature and Title

CONTRACTOR AS PRINCIPAL

Company:

Signature: _____(Seal)
Name and Title

SURETY

_____(Seal)
Surety's Name and Corporate Seal

By: _____
Signature and Title

(Attach Power of Attorney)

Attest: _____
Signature and Title

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner for the performance of the Contract, which is incorporated herein by reference.

2. If Contractor performs the Contract, Surety and Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 3.1.

3. If there is no Owner Default, Surety's obligation under this Bond shall arise after:

3.1. Owner has notified Contractor and Surety, at the addresses described in Paragraph 10 below, that Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with Contractor and Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If Owner, Contractor and Surety agree, Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive Owner's right, if any, subsequently to declare a Contractor Default; and

3.2. Owner has declared a Contractor Default and formally terminated Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than 20 days after Contractor and Surety have received notice as provided in Paragraph 3.1; and

3.3. Owner has agreed to pay the Balance of the Contract Price to:

1. Surety in accordance with the terms of the Contract;

2. Another contractor selected pursuant to Paragraph 4.3 to perform the Contract.

4. When Owner has satisfied the conditions of Paragraph 3, Surety shall promptly and at Surety's expense take one of the following actions:

4.1. Arrange for Contractor, with consent of Owner, to perform and complete the Contract; or

4.2. Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or

4.3. Obtain bids or negotiated proposals from qualified contractors acceptable to Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Owner and Contractor selected with Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to Owner the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by Owner resulting from Contractor Default; or

4.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

1. After investigation, determine the amount for which it may be liable to Owner and, as soon as practicable after the amount is determined, tender payment therefor to Owner; or

2. Deny liability in whole or in part and notify Owner citing reasons therefor.

5. If Surety does not proceed as provided in Paragraph 4 with reasonable promptness, Surety shall be deemed to be in default on this Bond 15 days after receipt of an additional written notice from Owner to Surety demanding that Surety perform its obligations under this Bond, and Owner shall be entitled to enforce any remedy available to Owner. If Surety proceeds as provided in Paragraph 4.4, and Owner refuses the payment tendered or Surety has denied liability, in whole or in part, without further notice Owner shall be entitled to enforce any remedy available to Owner.

6. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph 4.1, 4.2, or 4.3 above, then the responsibilities of Surety to Owner shall not be greater than those of Contractor under the Contract, and the responsibilities of Owner to Surety shall not be greater than those of Owner under the Contract. To a limit of the amount of this Bond, but subject to commitment by Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:

6.1. The responsibilities of Contractor for correction of defective Work and completion of the Contract;

6.2. Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions or failure to act of Surety under Paragraph 4; and

6.3. Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of Contractor.

7. Surety shall not be liable to Owner or others for obligations of Contractor that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than Owner or its heirs, executors, administrators, or successors.

8. Surety hereby waives notice of any change, including changes of time, to Contract or to related subcontracts, purchase orders, and other obligations.

9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located and shall be instituted within two years after Contractor Default or within two years after Contractor ceased working or within two years after 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 period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

10. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the address shown on the signature page.

11. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

12. Definitions.

12.1. Balance of the Contract Price: The total amount payable by Owner to Contractor under the Contract after all proper adjustments have been made, including allowance to Contractor of any amounts received or to be received by Owner in settlement of insurance or other Claims for damages to which Contractor is entitled, reduced by all valid and proper payments made to or on behalf of Contractor under the Contract.

12.2. Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.

12.3. Contractor Default: Failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.

12.4. Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or comply with the other terms thereof.

FOR INFORMATION ONLY – Name, Address and Telephone Surety Agency or Broker Owner's Representative (engineer or other party)

END OF SECTION

PAYMENT BOND

DURHAM IPS BIOFILTER RETROFIT
PROJECT NO. 7094

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR
(Name and Address):

SURETY
(Name and Address of Principal Place of Business):

OWNER (Name and Address): Clean Water Services, 2550 SW Hillsboro Hwy., Hillsboro, Oregon, 97123

CONTRACT

Date:
Amount:
Description (Name and Location): DURHAM IPS BIOFILTER RETROFIT Project No. 7094
Durham Advanced Wastewater Treatment Facility,
16580 SW 85th Ave., Tigard, OR 97224

BOND

Bond Number:
Date (Not earlier than Contract Date):
Amount:
Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms of this Payment Bond, do each cause this Payment Bond to be duly executed on its behalf by its authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

Company:

Signature: _____(Seal)
Name and Title

Approved as to Form

_____
Owner's Counsel

SURETY

_____(Seal)
Surety's Name and Corporate Seal

By: _____
Signature and Title

(Attach Power of Attorney)

Attest: _____
Signature and Title

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner to pay for labor, materials, and equipment furnished by Claimants for use in the performance of the Contract, which is incorporated herein by reference.

2. With respect to Owner, this obligation shall be null and void if Contractor:

2.1. Promptly makes payment, directly or indirectly, for all sums due Claimants, and

2.2. Defends, indemnifies, and holds harmless Owner from all claims, demands, liens, or suits alleging non-payment by Contractor by any person or entity who furnished labor, materials, or equipment for use in the performance of the Contract, provided Owner has promptly notified Contractor and Surety (at the addresses described in Paragraph 12) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens, or suits to Contractor and Surety, and provided there is no Owner Default.

3. With respect to Claimants, this obligation shall be null and void if Contractor promptly makes payment, directly or indirectly, for all sums due.

4. Surety shall have no obligation to Claimants under this Bond until:

4.1. Claimants who are employed by or have a direct contract with Contractor have given notice to Surety (at the addresses described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.

4.2. Claimants who do not have a direct contract with Contractor:

1. Have furnished written notice to Contractor and sent a copy, or notice thereof, to Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials or equipment were furnished or supplied, or for whom the labor was done or performed; and

2. Have either received a rejection in whole or in part from Contractor, or not received within 30 days of furnishing the above notice any communication from Contractor by which Contractor had indicated the claim will be paid directly or indirectly; and

3. Not having been paid within the above 30 days, have sent a written notice to Surety and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to Contractor.

5. If a notice by a Claimant required by Paragraph 4 is provided by Owner to Contractor or to Surety, that is sufficient compliance.

6. Reserved.

7. Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by Surety.

8. Amounts owed by Owner to Contractor under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any performance bond. By Contractor furnishing and Owner accepting this Bond, they agree that all funds earned by Contractor in the performance of the Contract are dedicated to satisfy obligations of Contractor and Surety under this Bond, subject to Owner's priority to use the funds for the completion of the Work.

9. Surety shall not be liable to Owner, Claimants, or others for obligations of Contractor that are unrelated to the Contract. Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

10. Surety hereby waives notice of any change, including changes of time, to the Contract or to related Subcontracts, purchase orders and other obligations.

11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Paragraph 4.1 or Paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, Owner, or Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

13. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory Bond and not as a common law bond.

14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. Definitions:

15.1. Claimant: An individual or entity having a direct contract with Contractor, or with a first-tier subcontractor of Contractor, to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms “labor, materials or equipment” that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of Contractor and 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.

15.2. Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.

15.3. Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or comply with the other terms thereof.

FOR INFORMATION ONLY – Name, Address and Telephone Surety Agency or Broker: Owner’s Representative (engineer or other party):

END OF SECTION

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

Issued and Published Jointly by

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

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

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

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

3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

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

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

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

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

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

9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.

10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer has declined to address. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. ("CERCLA"); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5501 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. ("RCRA"); (d) the Toxic Substances Control Act, 15 U.S.C.

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§§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

12. *Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.

13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.

14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents. .

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

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

17. *Cost of the Work*—See Paragraph 13.01 for definition.

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

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

20. *Engineer*—The individual or entity named as such in the Agreement.

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

22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.

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

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

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

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

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

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

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

30. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.

31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing

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the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.

32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or "RPR" includes any assistants or field staff of Resident Project Representative.

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

34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals and the performance of related construction activities.

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

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

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

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

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

40. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.

42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.

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

44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made

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available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.

45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

46. *Unit Price Work*—Work to be paid for on the basis of unit prices.

47. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

48. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 *Terminology*

A. The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. Intent of Certain Terms or Adjectives:

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.

C. Day:

1. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. Defective:

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:

a. does not conform to the Contract Documents; or

b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or

c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).

E. Furnish, Install, Perform, Provide:

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

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2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words "furnish," "install," "perform," or "provide," then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. *Bonds*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.

B. *Evidence of Contractor's Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.

C. *Evidence of Owner's Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.

B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

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

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

2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph

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2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.

B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Initial Acceptance of Schedules*

A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.

3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

2.06 *Electronic Transmittals*

A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.

B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.

C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

A. The Contract Documents are complementary; what is required by one is as binding as if required by all.

B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.

C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall govern.

D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.

E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

3.02 *Reference Standards*

A. Standards Specifications, Codes, Laws and Regulations

1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard specification, manual, reference

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standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard specification, manual, reference standard, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. Reporting Discrepancies:

1. *Contractor's Verification of Figures and Field Measurements*: Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents*: If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. Resolving Discrepancies:

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:

a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or

b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under

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the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.

B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.

C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

A. Contractor and its Subcontractors and Suppliers shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or

2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.

B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to such date.

4.03 *Reference Points*

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

4.04 *Progress Schedule*

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

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2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.

B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

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

C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:

1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;

2. abnormal weather conditions;

3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and

4. acts of war or terrorism.

D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.

E. Paragraph 8.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

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

G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

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

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

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

5.02 *Use of Site and Other Areas*

A. Limitation on Use of Site and Other Areas:

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.

2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

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

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

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

5.03 *Subsurface and Physical Conditions*

A. *Reports and Drawings*: The Supplementary Conditions identify:

1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;

2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and

3. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions

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with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

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

1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or
2. is of such a nature as to require a change in the Drawings or Specifications; or
3. differs materially from that shown or indicated in the Contract Documents; or
4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

B. *Engineer's Review*: After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.

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

D. Possible Price and Times Adjustments:

1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
    a. such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
    b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will

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be subject to the provisions of Paragraph 13.03; and,

c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

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

a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise; or

b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or

c. Contractor failed to give the written notice as required by Paragraph 5.04.A.

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

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

5.05 *Underground Facilities*

A. *Contractor's Responsibilities*: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and

2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:

a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;

b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;

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

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

B. *Notice by Contractor*: If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

C. *Engineer's Review*: Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to

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which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

D. *Owner's Statement to Contractor Regarding Underground Facility*: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.

E. Possible Price and Times Adjustments:

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

a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;

b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;

c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and

d. Contractor gave the notice required in Paragraph 5.05.B.

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

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

5.06 *Hazardous Environmental Conditions at Site*

A. *Reports and Drawings*: The Supplementary Conditions identify:

1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and

2. Technical Data contained in such reports and drawings.

B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

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

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

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

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

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

E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

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

G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.

H. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.H shall obligate Owner

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to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.

B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.

D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.

E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.

F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

6.02 *Insurance—General Provisions*

A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.

B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.

C. Contractor shall deliver to Owner, with copies to each named insured and additional insured

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(as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

E. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.

F. If either party does not purchase or maintain all of the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.

G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.

H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.

I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.

J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

A. *Workers' Compensation*: Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:

1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.

2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).

3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).

4. Foreign voluntary worker compensation (if applicable).

B. *Commercial General Liability—Claims Covered*: Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:

1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.

2. claims for damages insured by reasonably available personal injury liability coverage.

3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property

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wherever located, including loss of use resulting therefrom.

C. *Commercial General Liability—Form and Content*: Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:

1. Products and completed operations coverage:
    a. Such insurance shall be maintained for three years after final payment.
    b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
3. Broad form property damage coverage.
4. Severability of interest.
5. Underground, explosion, and collapse coverage.
6. Personal injury coverage.
7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.

D. *Automobile liability*: Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.

E. *Umbrella or excess liability*: Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.

F. *Contractor's pollution liability insurance*: Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.

G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.

H. *Contractor's professional liability insurance*: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.

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I. *General provisions*: The policies of insurance required by this Paragraph 6.03 shall:

1. include at least the specific coverages provided in this Article.

2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.

3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.

4. remain in effect at least until final payment (and longer if expressly required in this Article) and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract Documents.

5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.

J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

6.05 *Property Insurance*

A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."

2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by

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endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.

3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.

4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).

5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).

6. extend to cover damage or loss to insured property while in transit.

7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.

8. allow for the waiver of the insurer's subrogation rights, as set forth below.

9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.

10. not include a co-insurance clause.

11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.

12. include performance/hot testing and start-up.

13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.

B. *Notice of Cancellation or Change*: All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.

C. *Deductibles*: The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.

D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.

E. *Additional Insurance*: If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.

F. *Insurance of Other Property*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such

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property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.

B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.

D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required

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under the dispute resolution provisions of this Contract or applicable Laws and Regulations.

C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 *Supervision and Superintendence*

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.

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

7.02 *Labor; Working Hours*

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

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.03 *Services, Materials, and Equipment*

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

B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

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

7.04 *"Or Equals"*

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment, or items from other proposed suppliers under the circumstances described below.

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

    a. in the exercise of reasonable judgment Engineer determines that:

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1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;

3) it has a proven record of performance and availability of responsive service; and

4) it is not objectionable to Owner.

b. Contractor certifies that, if approved and incorporated into the Work:

1) there will be no increase in cost to the Owner or increase in Contract Times; and

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

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

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

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

E. *Treatment as a Substitution Request*: If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer considered the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 *Substitutes*

A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent possible such requests shall be made before commencement of related construction at the Site.

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

2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.

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

a. shall certify that the proposed substitute item will:

1) perform adequately the functions and achieve the results called for by the general design,

2) be similar in substance to that specified, and

3) be suited to the same use as that specified.

b. will state:

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

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

3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.

c. will identify:

1) all variations of the proposed substitute item from that specified, and

2) available engineering, sales, maintenance, repair, and replacement services.

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

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

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

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

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

F. *Effect of Engineer's Determination*: If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.

B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.

C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.

D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has

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already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.

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

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

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

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

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

J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.

K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.

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

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

N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.

O. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor

2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

7.07 *Patent Fees and Royalties*

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is

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the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.

C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.08 *Permits*

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

7.09 *Taxes*

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

7.10 *Laws and Regulations*

A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

C. Owner or Contractor may give notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and

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other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *Record Documents*

A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.12 *Safety and Protection*

A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:

1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.

C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.

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

E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

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

7.13 *Safety Representative*

A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the

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prevention of accidents and the maintaining and supervising of safety precautions and programs.

7.14 *Hazard Communication Programs*

A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.16 *Shop Drawings, Samples, and Other Submittals*

A. Shop Drawing and Sample Submittal Requirements:

1. Before submitting a Shop Drawing or Sample, Contractor shall have:

a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.

3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.

B. *Submittal Procedures for Shop Drawings and Samples*: Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.

1. Shop Drawings:

a. Contractor shall submit the number of copies required in the Specifications.

b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.

2. Samples:

a. Contractor shall submit the number of Samples required in the Specifications.

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b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.

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

C. *Other Submittals*: Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.

D. Engineer's Review:

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.

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

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

4. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order.

5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.

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

7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.

8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.

E. Resubmittal Procedures:

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

2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.

3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for

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Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 *Contractor's General Warranty and Guarantee*

A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.

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

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

2. normal wear and tear under normal usage.

C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

1. observations by Engineer;

2. recommendation by Engineer or payment by Owner of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;

4. use or occupancy of the Work or any part thereof by Owner;

5. any review and approval of a Shop Drawing or Sample submittal;

6. the issuance of a notice of acceptability by Engineer;

7. any inspection, test, or approval by others; or

8. any correction of defective Work by Owner.

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

7.18 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.

B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

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C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *Delegation of Professional Design Services*

A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.

B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.

D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 *Other Work*

A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.

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

C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.

D. If the proper execution or results of any part of Contractor's Work depends upon work

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performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

8.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:

1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
2. an itemization of the specific matters to be covered by such authority and responsibility; and
3. the extent of such authority and responsibilities.

B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

A. If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment shall take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract. When applicable, any such equitable adjustment in Contract Price shall be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.

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

D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise

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resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 *Replacement of Engineer*

A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents shall be that of the former Engineer.

9.03 *Furnish Data*

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 *Lands and Easements; Reports, Tests, and Drawings*

A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.

B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.

C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

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

9.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.

B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's

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representative during construction are set forth in the Contract.

10.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Project Representative*

A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

A. Engineer has the authority to reject Work in accordance with Article 14.

10.05 *Shop Drawings, Change Orders and Payments*

A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.

B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.

C. Engineer's authority as to Change Orders is set forth in Article 11.

D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.07 *Decisions on Requirements of Contract Documents and Acceptability of Work*

A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.08 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or

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to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 15.06.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *Compliance with Safety Program*

A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs (if any) of which Engineer has been informed.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 *Amending and Supplementing Contract Documents*

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

1. Change Orders:

a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.

b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.

2. *Work Change Directives*: A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

3. *Field Orders*: Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on

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

11.02 *Owner-Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.03 *Unauthorized Changes in the Work*

A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.

11.04 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.

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

1. where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).

C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

   a. for costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;

   b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;

   c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.01.C.2.a and 11.01.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than

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that of the Subcontractor that actually performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;

d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;

e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.

B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.

1. *Procedures*: Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.

2. *Engineer's Action*: Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.

3. *Binding Decision*: Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.

B. *Resolution of Certain Change Proposals*: If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and

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Contractor may choose to seek resolution under the terms of Article 12.

11.07 *Execution of Change Orders*

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

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

2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;

3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and

4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.

B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *Notification to Surety*

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

ARTICLE 12 – CLAIMS

12.01 *Claims*

A. *Claims Process*: The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:

1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;

2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and

3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.

B. *Submittal of Claim*: The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.

C. *Review and Resolution*: The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.

D. Mediation:

1. At any time after initiation of a Claim, Owner and Contractor may mutually

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agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.

2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.

E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.

F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.

G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:

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

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

B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours,

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on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.

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

5. Supplemental costs including the following:

    a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

    b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

    c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

    d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.

    e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

    f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the

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purpose of determining Contractor's fee.

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

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

i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

C. *Costs Excluded*: The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, 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 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.

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

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

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee*: When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.

E. *Documentation*: Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

13.02 *Allowances*

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

B. *Cash Allowances*: Contractor agrees that:

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

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

C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by

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allowances, and the Contract Price shall be correspondingly adjusted.

13.03 *Unit Price Work*

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

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

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

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

E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;

2. there is no corresponding adjustment with respect to any other item of Work; and

3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 14 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

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

14.02 *Tests, Inspections, and Approvals*

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

B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.

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

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

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

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2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;

3. by manufacturers of equipment furnished under the Contract Documents;

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

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

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

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

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

14.03 *Defective Work*

A. *Contractor's Obligation*: It is Contractor's obligation to assure that the Work is not defective.

B. *Engineer's Authority*: Engineer has the authority to determine whether Work is defective, and to reject defective Work.

C. *Notice of Defects*: Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.

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

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

F. *Costs and Damages*: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work shall be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

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14.05 *Uncovering Work*

A. Engineer has the authority to require special inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

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

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

1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.

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

14.06 *Owner May Stop the Work*

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.

C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

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ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 *Progress Payments*

A. *Basis for Progress Payments*: The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.

B. Applications for Payments:

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. Review of Applications:

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

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and

c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every

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aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or

b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

a. to supervise, direct, or control the Work, or

b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or

e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.

6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:

a. the Work is defective, requiring correction or replacement;

b. the Contract Price has been reduced by Change Orders;

c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

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

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

D. Payment Becomes Due:

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. Reductions in Payment by Owner:

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

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

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

c. Contractor has failed to provide and maintain required bonds or insurance;

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

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

f. the Work is defective, requiring correction or replacement;

g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

h. the Contract Price has been reduced by Change Orders;

i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;

j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;

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

l. there are other items entitling Owner to a set off against the amount recommended.

2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 15.01.C.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

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

15.03 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which shall fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in

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writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.

2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.05 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

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15.06 *Final Payment*

A. Application for Payment:

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

a. all documentation called for in the Contract Documents;

b. consent of the surety, if any, to final payment;

c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.

d. a list of all disputes that Contractor believes are unsettled; and

e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. Engineer's Review of Application and Acceptance:

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Completion of Work*: The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.

D. *Payment Becomes Due*: Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

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15.07 *Waiver of Claims*

A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.

B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.08 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. correct the defective repairs to the Site or such other adjacent areas;
2. correct such defective Work;
3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:

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1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);

2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;

3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or

4. Contractor's repeated disregard of the authority of Owner or Engineer.

B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:

1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and

2. enforce the rights available to Owner under any applicable performance bond.

C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.

D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.

G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and

3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.

B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or

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other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

A. *Disputes Subject to Final Resolution*: The following disputed matters are subject to final resolution under the provisions of this Article:

1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and

2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.

B. *Final Resolution of Disputes*: For any dispute subject to resolution under this Article, Owner or Contractor may:

1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or

2. agree with the other party to submit the dispute to another dispute resolution process; or

3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

18.02 *Computation of Times*

A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty,

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obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

18.07 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

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SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract as indicated below. All provisions that are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof. The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

SC-1.01.A – Add the following paragraphs after Paragraph 1.01.A.48:

49. Construction Manager: Person or entity designated by the Owner to provide construction management services for the Project with duties, responsibilities, and limitations of the Engineer, unless stipulated otherwise.

50. Equipment (Construction): All machinery and equipment, together with the necessary supplies for upkeep and maintenance, including tools and apparatus necessary for the proper construction and acceptable completion of the Work contemplated. (Installation) All material or articles used in equipping a facility or apparatus required to fulfill a functional design.

51. Geotechnical Data Report (GDR)—The factual report that collects and presents data regarding actual subsurface conditions at or adjacent to the Site, including Technical Data and other geotechnical data, prepared by or for Owner. The GDR's content may include logs of borings, trenches, and other site investigations, recorded measurements of subsurface water levels, the results of field and laboratory testing, and descriptions of the investigative and testing programs. The GDR does not include an interpretation of the data. If opinions, or interpretive or speculative non-factual comments or statements appear in a document that is labeled a GDR, such opinions, comments, or statements are not operative parts of the GDR and do not have contractual standing. Subject to that exception, the GDR is a Contract Document.

52. Geotechnical Baseline Report (GBR)—The interpretive report prepared by or for Owner regarding subsurface conditions at the Site, and containing specific baseline geotechnical conditions that may be anticipated or relied upon for bidding and contract administration purposes, subject to the controlling provisions of the Contract, including the GBR's own terms. The GBR is a Contract Document.

53. Latent Defect: A defect in the Work of which the Owner has no actual knowledge.

54. Procurement Contractor: The corporation, company, partnership, firm, or individual who has entered into a contract with Owner outside the scope of these Contract Documents, to furnish materials and equipment for this Project.

55. Specialist— The term Specialist refers to a person, partnership, firm, or corporation of established reputation (or if newly organized, whose personnel have previously established a reputation in the same field), which is regularly engaged in, and which maintains a regular force of workers skilled in either (as applicable) manufacturing or fabricating items required by the Contract Documents, or otherwise performing Work required by the Contract Documents. Where the Specifications require the installation by a Specialist, that term shall also be deemed to mean either the manufacturer of the item, a person, partnership, firm, or corporation licensed by the manufacturer, or a person, partnership, firm, or corporation who will perform the Work under the manufacturer's direct supervision.

57. Utility: Any public or private fixed works for transporting fluids, gases, electricity, signals, or communications.

SC-2.01.A - *Delivery of Bonds*

Delete 2.01.A in its entirety and replace it with the following:

A. If Contractor chooses not to sign the Contract electronically, Contractor will deliver the bonds Contractor is required to furnish with the executed counterparts of the Contract to Owner.
B. If the Contract will be signed electronically, Contractor will deliver the bonds Contractor is required to furnish within 5 days of Owner's Notice of Award of the Contract to Contractor.

SC-2.02.A -*Evidence of Insurance*

Delete 2.02.A in its entirety and replace it with the following:

A. If the Contract is not being signed electronically, when Contractor delivers the executed counterparts of the Contract to Owner, Contractor will also deliver to Owner, with copies to each additional insured identified by name in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) for the insurance coverages that Contractor is required to purchase and maintain in accordance with Article 4.

B. If the Contract is being signed electronically, when Contractor delivers the bonds to Owner, Contractor will deliver to Owner, with copies to each additional insured identified by name in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) for the insurance coverages that Contractor is required to purchase and maintain in accordance with Article 4.

SC-2.03.A - *Copies of Documents*

Delete Paragraph 2.03.A in its entirety and replace it with the following:

If the Contract is not being signed electronically, Owner will furnish Contractor up to three copies of the Contract Documents. Additional copies will be furnished upon request at the cost of reproduction.

If the Contract is being signed electronically, Owner will provide Contractor with an electronic copy of the complete Contract Document or access to a complete copy, and Contractor will be responsible for making its own copies.

SC-3.03.B.1 – Add the following paragraph after Paragraph 3.03.B.1.b:

c. In resolving inconsistencies among two or more components of the Contract Documents, precedence shall be given in the following order:

1. Permits
2. Agreement
3. Addenda
4. Contractor's Bid (Bid Form)
5. Supplementary Conditions
6. General Conditions
7. Specifications – Division 01
8. Specifications – All remaining Divisions
9. Drawings
10. Bonds

Change Orders, Work Change Directives, Field Orders, Engineer's written interpretation and clarifications and Notice to Proceed, in precedence listed, will take precedence over all other Contract Document components referenced herein. Figure dimensions on Drawings take precedence over scaled dimensions. The Drawings with the higher level of detail take precedence over less detailed Drawings.

SC-4.04.A –Add the following after subparagraph 4.04.A.2:

3. If Contractor falls behind the accepted Progress Schedule, Contractor shall submit for review no later than the time of submittal of the next request for partial payment, such supplementary schedule or schedules as may be necessary to demonstrate the manner in which the acceptable rate of progress will be regained, all without additional cost to Owner. Owner may set-off payment in accordance with Article 15 until updated progress schedule is submitted and approved.

SC-4.05.C.2 – Add the following at the end of Paragraph 4.05.C.2:

Such requests shall be accompanied with supporting documentation referenced to the NOAA INDEX weather in the Project vicinity.

SC- 4.05.G – Change "within 30 days" to "within 10 days"

SC-4.05 – Add the following paragraph after Paragraph 4.05.G:

H. Contractor shall proceed expeditiously with adequate forces and shall achieve the Contract Times. Contractor shall accelerate the Work as required to achieve Contract Times at no additional cost to the Owner. Accelerated Work shall include, but not be limited to, expedited delivery of materials and equipment, increasing the number of workers, working overtime, and working additional shifts.

SC-5.01.B – Delete Paragraph 5.01.B in its entirety.

SC-5.03.A.1 – Delete Paragraph 5.03.A.1 in its entirety and replace it with the following:

1. Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that Engineer has used in preparing the Contract Documents; and

SC-5.03.B – In the first sentence of 5.03.B, insert the word "reasonably" between the words "may" and "rely" and delete the second sentence (beginning with "Such" and ending with "Conditions") of Paragraph 5.03.B.

C. The following reports of explorations and tests of subsurface conditions at or adjacent to the Site are known to Owner:

1. Report dated April 2005 prepared by MWH entitled –Geotechnical Baseline Report for the Construction of the Durham WWTF Phase 4 Expansion consisting of 39 pages. The Technical Data contained in such report upon whose accuracy Contractor may rely on are: those indicated in the definition of Technical Data in the General Conditions.

D. The following drawings of physical conditions relating to existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities) are known to Owner:

1. Drawings dated November 2008 prepared by MWH, entitled Durham WWTF Phase 4 Expansion consisting of 428 sheets.

a. None of the contents of such drawings is Technical Data on whose accuracy Contractor may rely.

E. Contractor may examine copies of reports and drawings identified in SC-5.03.C and SC-5.03.D that were not included with the Bidding Documents at Durham AWWTF, 16060 SW 85th Ave., Tigard, OR 97224 during regular business hours, or may request copies from Engineer.

SC-5.06 - Delete Paragraph 5.06.A and Paragraph 5.06.B in their entirety and replace them with the following:

A. No reports or drawings related to Hazardous Environmental Conditions are known to Owner.

SC-6.01.A - Add the following language after Paragraph 6.01.A:

Provide the following additional bond(s):

1. Contractor's Public Works Bond:

a. Public works bond in the amount of $30,000 in accordance with the requirements of ORS 279C.836.

SC-6.03.A - Add the following paragraph after Paragraph 6.03.A.4:

5. The limits of liability for the insurance required by Paragraph 6.03.A shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

A. Workers' Compensation and related coverages under Paragraph 6.03.A:

1. State: Minimum limit $1,000,000

2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act Coverage: if applicable.

3. Employer's Liability:

Bodily Injury, Each Accident: $1,000,000

Bodily Injury by Disease, Each Employee: $1,000,000

Bodily Injury/Disease Aggregate: $1,000,000

For work performed in monopolistic states, stop-gap liability coverage shall be endorsed to either the worker's compensation or commercial general liability policy with a minimum limit of: $1,000,000

4. Foreign Voluntary Worker Compensation: if applicable

SC-6.03.B - Add the following paragraph after Paragraph 6.03.B:

Contractor's Commercial General Liability under Paragraph 6.03.B:

a. General Aggregate

Contract Bid	Per Occurrence Limit
< $100,000	$1,000,000
$100,000 to $1,000,000	$2,000,000
> $1,000,000	$5,000,000

b. Products - Completed Operations Aggregate

Contract Bid	Per Occurrence Limit
< $100,000	$1,000,000
$100,000 to $1,000,000	$2,000,000
> $1,000,000	$5,000,000

c. Personal and Advertising Injury (per person/Organization) $2,000,000

d. Each Occurrence (Bodily Injury and Property Damage) $2,000,000

SC-6.03.D - Add the following paragraph after Paragraph 6.03.D:

1. Contractor's Automobile Liability

a. Bodily Injury:

Each Person $1,000,000

Each Accident $1,000,000

b. Property Damage:

Each Accident $1,000,000

c. Combined Single Limit of $1,000,000

SC-6.03.E - Add the following paragraph after Paragraph 6.03.E:

1. Excess or Umbrella Liability:

a. General Aggregate	$3, 000,000
b. Each Occurrence	$3,000,000

SC-6.03.F - Add the following paragraph after Paragraph 6.03.F:

1. Pollution Liability:

a) Each Occurrence	$5,000,000
b) General Aggregate	$10,000,000

SC-6.03.G - Add the following paragraph after Paragraph 6.03.G:

1. Include the following parties or entities as additional insured:

a. Clean Water Services 2550 S.W. Hillsboro Highway, Hillsboro, Oregon 97123.

b. Black and Veatch, 19801 SW 72nd Ave Suite 200, Tualatin, OR 97062

SC-6.03.H - Add the following paragraph after Paragraph 6.03.H:

1. Contractor's Professional Liability:

a) Each Claim	$1,000,000
b) Annual Aggregate	$1,000,000

SC-6.05.A - Add the following paragraph(s) after Paragraph 6.05.A.13:

14. Property insurance furnished under this Contract shall have deductibles no greater than $5,000 for direct physical loss in any one occurrence for sub-limits except for earthquake, which shall have a maximum deductible of $50,000.

15. include for the benefit of Owner loss of profits and soft cost coverage including, without limitation, fixed expenses and debt service for a minimum of 12 months with a maximum deductible of 30 days, plus attorney's fees and engineering or other consultants' fees, if not otherwise covered;

16. Include by express endorsement coverage of damage to Contractor's equipment.

SC-7.01.B – Add the following language after the first sentence of Paragraph 7.01.B:

If a replacement is necessary, the replacement shall also be a competent resident superintendent and shall be subject to approval by Owner. The Contractor's superintendent shall be present at the Site at all times while Work is in progress and shall be available by phone for emergencies 24 hours per day, 7 days per week. If at any time the superintendent leaves the Project Site while Work is in progress, Engineer shall be notified and provided with the name of the Contractor's representative having responsible charge.

SC-7.02.B - Add the following language at the end of Paragraph 7.02.B:

Contractor shall comply with ORS 279C.520.

1. Contractor and Subcontractor regular working hours consist of **7:00** a.m. and **5:00** p.m., Monday through Friday excluding holidays. If a change to these standard hours is desired, a request must be placed with and approved by Owner and Engineer a minimum of five work days prior to the first day of altered hours.

2. Owner's legal holidays are New Year's Day, Martin Luther King Jr. Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.

SC-7.08 – Add the following paragraph after Paragraph 7.08.A:

B. Owner will pay the cost of all construction permits.

SC-7.10 - Add the following paragraph after Paragraph 7.10.C:

D. Those Laws and Regulations for which Contractor may be responsible are included as required by law or for the convenience of the Contractor in the Appendix attached as Exhibit B to the Supplementary Conditions.

SC-7.12.C – Add the following language immediately after Paragraph 7.12.C

Contractors and Owners Safety Plan requirements are in section 01329.

SC-7.19.B – Add the following sentence to the end of Paragraph 7.19.B:

The design professional shall be registered in the State of Oregon.

SC-9.02.A – In Paragraph 9.02.A, delete the words "provided Contractor makes no reasonable objection to the replacement engineer"

SC-10.03 - Add the following paragraphs after Paragraph 10.03.A:

B. Resident Project Representative (RPR) will be furnished by Owner. The responsibilities, authority, and limitations of the RPR are limited to those of Engineer in accordance with Paragraph 10.08 and as set forth elsewhere in the Contract Documents and are further limited and described below.

C. Responsibilities and Authority:

1. Schedules: Review and monitor Progress Schedule, Schedule of Submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.

2. Conferences and Meetings: Conduct or attend meetings with Contractor, such as preconstruction conferences, progress meetings, Work conferences and other Project related meetings.

3. Liaison: (i) Serve as Engineer's liaison with Contractor, working principally through Contractor's authorized representative, and assist in understanding the intent of the Contract Documents; (ii) assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's onsite operations; (iii) assist in obtaining from Owner additional details or information when required for proper execution of the Work.

4. Interpretation of Contract Documents: Inform Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.

5. Submittals: Receive submittals that are furnished at the Site by Contractor, and notify Engineer of availability for examination. Advise Engineer and Contractor of the commencement of any Work or arrival of materials and equipment at Site, when recognized, requiring a Shop Drawing or Sample if the submittal has not been approved by Engineer.

6. Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and provide recommendations to Engineer; transmit to Contractor, in writing decisions as issued by Engineer.

7. Review of Work and Rejection of Defective Work: (i) Conduct onsite observations of the Work in progress to assist Engineer in determining if the Work is, in general, proceeding in accordance with the Contract Documents; (ii) inform Engineer and Contractor whenever RPR believes that any Work is defective; (iii) advise Engineer whenever RPR believes that any Work will not produce a completed Project that conforms generally to the Contract Documents or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged or does not meet the requirements of any inspection test, or approval required to be made; and advise Engineer of that part of the Work in progress that RPR believes should be corrected or rejected or uncovered for observation, or requires special testing, inspection, or approval.

8. Inspections, Tests, and System Startups: (i) Verify tests, equipment and systems startups and operating and maintenance training are conducted in the presence of appropriate personnel, and that Contractor maintains adequate records thereof; (ii) observe, record, and report to Engineer appropriate details relative to the test procedures and system startups; and (iii) accompany visiting inspectors representing public or other agencies having jurisdiction over the Project, record the results of these inspections, and report to Engineer.

9. Records: (i) Maintain records for use in preparing Project documentation; (ii) keep a diary or log book recording pertinent Site conditions, activities, decisions and events; (iii) record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of Contractors, Subcontractors, and major Suppliers of materials and equipment.

10. Reports: (i) Furnish Engineer periodic reports of progress of the Work and of Contractor's compliance with the Progress Schedule and Schedule of Submittals; (ii) immediately notify Engineer of the occurrence of Site accidents, emergencies, acts of God endangering the Work, damage to property by fire or other causes, or the discovery of any Hazardous Environmental Condition; and (iii) assist Engineer in drafting proposed Change Orders, Work Change Directives, and Field Orders; obtain backup material from Contractor as appropriate.

11. Payment Requests: Review Applications for Payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

12. Certificates, Operation and Maintenance Manuals: During the course of the Work, verify materials and equipment certificates and operation and maintenance manuals and other data required by Specifications to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents been delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

13. Completion: (i) Participate in a Substantial Completion inspection; assist in determination of Substantial Completion and the preparation of lists of items to be completed or corrected; (ii) Participate in a final inspection in the company of Engineer, Owner, and Contractor and prepare a final list of items to be completed and deficiencies to be remedied; and (iii) observe whether items on final list have been completed or corrected, and make recommendations to Engineer concerning acceptance.

D. Limitations of Authority: Resident Project Representative will not:

1. have authority to authorize a deviation from Contract Documents or substitution of materials or equipment, unless authorized by Engineer; or

2. undertake any of the responsibilities of Contractor, Subcontractors, Suppliers, or Contractor's authorized representative; or

3. advise on, issue directions relative to, or assume control over an aspect of the means, methods, techniques, sequences, or procedures of Contractor's work unless such advice or directions are specifically required by the Contract Documents; or

4. advise on, issue directions regarding, or assume control over safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor; or

5. participate in specialized field or laboratory tests or inspections conducted offsite by others, except as specifically authorized by Engineer; or

6. accept Shop Drawings or Samples from anyone other than Contractor; or

7. authorize Owner to occupy the Project in whole or in part.

SC-11.05.B - Add the following to the end of Paragraph 11.05.B:

All requests for time extensions shall be supported by Schedule analysis showing the effect on the entire Project taking into account concurrent Work and the critical path, including float. Partial demonstration of impact on particular operations only will not be acceptable to show the criticality of any event on the Project Schedule as a whole.

SC-11.05 - Add the following paragraph after Paragraph 11.05.B:

C. Use of Float:

1. A claim for an adjustment of Contract Times (or Milestones), otherwise allowable under the Contract Documents, shall be granted only when the time lost or gained exceeds the float for the activity at the time of the event giving rise to the claim. Float, the amount of time between the early start date and the late start date, or the early finish date and the late finish date, is jointly owned by both Owner and Contractor whether expressly disclosed or implied in any manner.

2. Contractor shall not use float suppression techniques (including, but not limited to, preferential sequencing caused by late starts of follow-up trades, unreasonably small crews, extended durations, or imposed dates) in information provided to Engineer.

SC-11.07 - Add the following paragraphs after Paragraph 11.07.B:

C. In signing a Change Order, the Owner and Contactor acknowledge and agree that:

1. the stipulated compensation (Contract Price or Contract Times, or both) set forth in the Change Order includes payment for (i) the Cost of the Work covered by the Change Order, (ii) Contractor's fee for overhead and profit, (iii) interruption of progress schedules, (iv) delay and impact, including cumulative impact, on Work under the Contract Documents, and (v) extended overhead;

2. the Change Order constitutes full mutual accord and satisfaction for the change to the Work;

3. no reservation of rights to pursue subsequent claims on the Change Order will be made by either party;

4. no subsequent claim or amendment of the Contract Documents will arise out of or as a result of the Change Order;

5. in executing the Change Order, Contractor shall defend and indemnify Owner and Engineer and their officers, agents and employees from any and all claims of any kind by any Subcontractor or Supplier of any tier based upon the subject matter of any claim released hereunder by Contractor in the Change Order;

6. the individual signing the Change Order for Contractor represents by signing that he or she is fully authorized to bind Contractor; and

7. except as otherwise provided in the Change Order, the Contract, as amended, between Owner and Contractor remains in full force and effect.

D. A copy of the Change Order form that will be used on the Project is attached as Exhibit A to the Supplementary Conditions. Requests for Information (RFIs) of the Contractor and Engineer's responses to RFIs that result in the development and execution of a Change Order shall be attached to and referenced in the Change Order.

SC-11.09 – Add the following paragraphs to ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK:

11.09 Cost Reduction Incentive

A. Contractor may submit cost reduction proposals to the Engineer for modifying the plans, Specifications, or other requirements of this Contract for the sole purpose of reducing the total cost of construction. The cost reduction proposal shall not impair the essential functions or characteristics of the Project, including, but not limited to, service life, economy of operation, ease of maintenance, desired appearance, or safety standards.

B. Cost reduction proposals shall contain the following information:

1. A description of both the existing Contract requirements and the proposed changes.

2. An itemization of the change in Contract requirements if the cost reduction proposal is adopted.

3. A detailed estimate of the cost of performing the Work under the existing Contract and under the proposed change. The detailed estimates shall include all labor, material, equipment, Subcontractor, supervision, overhead and fee costs in sufficient detail as Owner deems appropriate and in accordance with Article 11. The detailed estimates shall also include adequate substantiation for such costs in the form of quantity surveys and Supplier and Subcontractor quotations. If requested by Owner, Contractor shall require any Subcontractors to provide detailed estimates in accordance with this Paragraph.

4. A CPM schedule analysis of the time associated with performing the Work under the existing Contract and under the proposed change.

5. A statement of the time within which the Engineer must make a decision on the cost reduction proposal.

C. Engineer will not be liable to the Contractor for any failure to accept or act upon any cost reduction proposal submitted, nor for any delays to the Work attributable to any such cost reduction proposal.

D. Contractor shall continue to perform the Work in accordance with the requirements of the Contract until an executed Change Order, incorporating the cost reduction proposal has been issued. If an executed Change Order has not been issued by the date indicated in the Contractor's cost reduction proposal, or such other date as the Contractor may subsequently have specified in writing, such cost reduction proposal shall be deemed rejected.

E. Engineer shall be the sole judge of the acceptability of a cost reduction proposal and of the estimated net savings in construction costs from the adoption of all or any part of such proposal. In determining the estimated net savings, the Engineer reserves the right to disregard Contract bid prices if, in the judgment of the Engineer, such prices do not represent a fair measure of the value of the Work to be performed or deleted.

F. Engineer reserves the right to require the Contractor to share in the Owner's costs of investigating a cost reduction proposal submitted by the Contractor. Where such condition is imposed, the Contractor shall indicate acceptance in writing, and such acceptance shall constitute full authority for the Engineer to deduct amounts payable to the Contractor from any monies due the Contractor under the Contract.

G. If Contractor's cost reduction proposal is accepted in whole or in part, such acceptance will be by a Contract Change Order. The Change Order shall specifically state that it is executed pursuant to this Section. Such change order will incorporate the changes in the Contract Documents which are necessary to implement the cost reduction proposal, and shall include any conditions upon which the Engineer's approval is based. The Change Order shall set forth the estimated net savings in the cost of performing the Work attributable to the cost reduction proposal, and shall further provide that the Contract cost be adjusted by crediting the Owner with 50 percent of the net cost savings. The amount specified to accrue to the Contractor in the Change Order for a cost reduction proposal shall constitute full compensation to the Contractor for all Work associated with the cost reduction proposal.

H. Acceptance of the cost reduction proposal and performance of the Work thereunder shall not extend the time of the Contract unless specifically provided for in the Contract Change Order incorporating the cost reduction proposal.

I. Owner expressly reserves the right to adopt a cost reduction proposal for general use on contracts administered by the Owner when it determines that the cost reduction proposal is suitable for application to other contracts. When an accepted cost reduction proposal is adopted for general use, only the Contractor who first submitted such proposal will be eligible for compensation, and only to those contracts awarded to the Contractor prior to submission of the accepted cost reduction proposal. Cost reduction proposals similar or identical to previously submitted proposals will be eligible for consideration and compensation if the previously submitted cost proposal was not adopted for general application. The Owner or any other public agency shall have the right to use all or any part of a cost reduction proposal without obligation or compensation of any kind to the Contractor.

J. Contractor shall bear all costs to revise all bonds for the Project to include the cost reduction incentive proposal work.

SC-12.01 - Delete Paragraph 12.01.D in its entirety and replace with the following:

D. Executive Negotiation

1. Within 10 days of the delivery of notice of appeal to Engineer's written decision regarding a Claim, dispute or other matter, senior representatives of at least Owner and Contractor, having authority to settle the dispute, and Engineer shall meet at a mutually acceptable time and place, and thereafter as often as they reasonably deem necessary, to exchange relevant information and to attempt to resolve the dispute.

2. In the event a mutually acceptable decision cannot be reached through executive negotiation within 20 days of the appealing party's notice, or mutually agreeable longer period, or if the party receiving such notice will not meet within 10 days, Owner or Contractor may make a written declaration, delivered to the other party and Engineer, that the executive negotiation is deemed unsuccessful and may initiate further dispute resolution measures in accordance with Article 17.

SC-12.01.G - Delete the words “direct” and “mediation,” in the first sentence.

SC-12.02 – Add the following paragraph to ARTICLE 12 –CLAIMS:

12.02 Right to Audit

A. If the Contractor submits a Claim to the Owner for additional compensation, the Owner shall have the right, as a condition to considering the Claim, and as a basis for evaluation of the Claim, and until the Claim has been settled, to audit the Contractor’s books to the extent they are relevant. This right shall include the right to examine books, records, documents, and other evidence and accounting procedures and practices, sufficient to discover and verify all direct and indirect costs of whatever nature claimed to have been incurred or anticipated to be incurred and for which the Claim has been submitted. The right to audit shall include the right to inspect the Contractor’s plant, or such parts thereof, as may be or have been engaged in the performance of the Work. The Contractor further agrees that the right to audit encompasses all subcontracts and is binding upon Subcontractors. The rights to examine and inspect herein provided for shall be exercisable through such representatives, as the Owner deems desirable during the Contractor’s normal business hours at the office of the Contractor. The Contractor shall make available to the Owner for auditing, all relevant accounting records and documents, and other financial data, and upon request, shall submit true copies of requested records to the Owner.

SC-13.01.A.1 – Delete Paragraph 13.01.A.1 in its entirety and replace it with the following:

1. Labor costs for employees in the direct employ of Contractor in the performance of the Work will be the actual cost for wages in accordance with the Oregon Bureau of Labor and Industries (BOLI) Prevailing Wage Rates for Public Works Contracts in Oregon for each craft or type of workers performing the Work at the time the Work is done, plus BOLI’s established Fringe Rate for employer payments of payroll taxes, worker compensation insurance, liability insurance, health and welfare, pension, vacation, apprenticeship funds, and other direct costs resulting from Federal, State or local laws, as well as assessments or benefits required by lawful collective bargaining agreements. Labor costs for equipment operators and helpers will be paid only when such costs are not included in the invoice for equipment rental. The labor costs for foremen and superintendents shall be proportioned to all of their assigned Work and only that applicable to extra Work shall be paid.

SC-13.01.B.4 – In Paragraph 13.01.B.4, delete the word “special” and replace with the word “technical”.

SC-13.01.B.5.c - Delete Paragraph 13.01.B.5.c in its entirety and replace it with the following:

c. Rentals of construction equipment at the rental rate listed for such equipment or from rate sheets from local rental companies. Such rental rate will be used to compute payments for equipment whether the equipment is under the Contractor's control through direct ownership, leasing, renting, or another method of acquisition. The rental rate to be applied for use of each item of equipment will be the rate resulting in the least total cost to the Owner for the total period of use. If it is deemed necessary by the Contractor to use the equipment not listed by the references specified herein, an equitable rental rate for the equipment will be established by the Engineer. The Contractor may furnish cost data which might assist the Engineer in the establishment of the rental rate. Payment shall be subject to the following:

1) Payment for equipment which is already on the Project Site and which is used in the completion of extra Work will not be allowed;

2) All equipment shall, in the opinion of the Engineer, be in good working condition and suitable for the purpose for which the equipment is to be used;

3) Before construction equipment is used on the extra Work, the Contractor shall plainly stencil or stamp an identifying number thereon at a conspicuous location, and shall furnish to the Engineer, in duplicate, a description of the equipment and its identifying number;

4) Unless otherwise specified, manufacturer's ratings and manufacturer approved modifications shall be used to classify equipment for the determination of applicable rental rates. Equipment which has no direct power unit shall be powered by a unit of at least minimum rating recommended by the manufacturer;

5) Individual pieces of equipment or tools having a replacement value of $500 or less, whether or not consumed by use, will be considered to be small tools and no payment will be made therefore; and

6) Rental time will not be allowed while equipment is inoperative due to breakdowns. The rental time to be paid for equipment at the Site will be the time the equipment is in productive operation on the extra Work being performed and, in addition, will include the time required to move the equipment to the location of the extra Work and return it to the original location or to another location; except, that moving time will not be paid if the equipment is used on other than the extra Work, even though located at the Site of the extra Work. Loading and transporting costs will be allowed, in lieu of moving time, when the equipment is moved by means other than its own power, except that no payment will be made for loading and transporting costs when the equipment is used at the Site of the extra Work on other than the extra Work.

SC-13.01.C.5 – Insert the words ", including lost opportunity costs" between the words "kind" and "and" in the second line. Delete the "s" on Paragraphs in this same paragraph.

SC-14.02.B - Replace "Owner shall" with "Owner shall perform testing and inspections itself or shall" at the beginning of this paragraph.

SC-14.02.D - Add the following after Paragraph 14.02.D.5:

6. retesting required because of nonconformance to the requirements of the Contract Documents

SC-14.02 - Add the following paragraph at the end of Paragraph 14.02.F:

G. Tests required by Contract Documents to be performed by Contractor that require test certificates be submitted to Owner or Engineer for acceptance shall be made by an independent testing laboratory or agency licensed or certified in accordance with Laws and Regulations and applicable state and local statutes. In the event state license or certification is not required, testing laboratories or agencies shall meet the following applicable requirements:

1. Basic requirements of ASTM E329, "Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection" as applicable.

2. Calibrate testing equipment at reasonable intervals by devices of accuracy, traceable to the National Institute of Standards and Technology or accepted values of natural physical constants.

SC-15.01.B - Add the following subparagraph after Paragraph 15.01.B.3:

4. Schedules and Data: During the progress of the Work, each Application for Payment shall be accompanied by Contractor's updated schedule of operations, or progress report, with Shop Drawings schedules, procurement schedules, value of material on hand included in the application, and other data specified in Section 01330, Submittal Procedures, or reasonably required by Engineer.

5. Unless otherwise indicated in Contract Documents, partial payment for equipment shall be as follows:

a) 25 percent upon final approval of Shop Drawings by Engineer or Owner.
b) 60 percent upon delivery of goods and O&M manual(s)
c) 15 percent upon startup and final acceptance of goods by Engineer or Owner.

SC-15.01.C - Replace "10" with "15" at the beginning of this paragraph.

SC-15.01.D - Delete Paragraph 15.01.D in its entirety and replace it with the following:

D. Payment Becomes Due:

Thirty days after presentation of the Application for Payment to Engineer or 15 days after approval of Application for Payment by Owner, whichever comes first, the amount recommended will (subject to the provisions of Paragraph 15.01.E) become due and when due will be paid by Owner to Contractor. The Engineer shall have 15 days from receipt of Application for Payment to notify Contractor if all or part of the Application for Payment is in dispute. The Application for Payment is deemed approved by Owner when Owner makes payment.

SC-15.01.E.1.e - Add the following immediately after Paragraph 15.01.E.1.e:

, including extra cost of inspection made necessary by delayed Work by Contractor under Article 4.05

SC-15.03.A - Add the following to the end of Paragraph 15.03.A:

Substantial Completion is further defined as (i) that degree of completion of the Project's operating facilities or systems sufficient to provide Owner the full time, uninterrupted, and continuous beneficial operation of the Work; (ii) all required functional, performance and acceptance or startup testing has been successfully demonstrated for all components, devices, equipment, and instrumentation and control to the satisfaction of Engineer in accordance with the requirements of the Specifications; (iii) all inspections required have been completed and identified critical defective Work has been replaced or corrected; and (iv) all appurtenant operations and maintenance features (e.g., hose bibs, drainage systems, etc.) and safety features (e.g., handrails, motor guards, etc.) have been installed and are functional. Project phases are defined in Section 01140, Work Restrictions.

1. Conditions precedent to Substantial Completion of the Work and Engineer's issuance of a Certificate of Substantial Completion shall include:

a. Conformance with all training services requirements and deliverables.

b. Acceptance of all preliminary operation and maintenance manuals by Owner and Engineer.

c. Submittal of current record documents to Owner and Engineer.

d. Correction of all state, local, and other regulatory agencies defective Work lists.

e. Submittals have been received and approved by Engineer including, but not limited to, the following:

1). Approved Shop Drawings.

2). Record Drawings and Specifications.

3). Electrical testing and wiring diagram.

4). Equipment data forms.

5). Manufacturer's certificates of proper installation.

6). Factory test reports.

7). Commissioning, testing and startup reports.

SC-15.03.B - Add the following subparagraph to Paragraph 15.03.B:

1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, shall be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off due under Article 15.01.E Reductions in payment by Owner

SC-15.06.C – The term "Final Completion" in the Agreement means the same as "Completion of the Work."

SC-16.04 – Delete Paragraph 16.04 in its entirety.

SC-17.01. – Delete Paragraph 17.01 in its entirety and replace it with the following:

17.01 Mediation, Followed by Binding Arbitration:

A. All appealed or unsettled Claims, disputes or other matters between Owner and Contractor arising out of or relating to the Contract Documents or the breach thereof, (except for Claims which have been waived by the making or acceptance of final payment as provided by Paragraph 15.06) shall first be submitted to mediation under the Construction Industry Mediation Rules of the American Arbitration Association then obtaining subject to the limitations of this Article 17. The mediator of any claim, dispute or other matter submitted to mediation under this Agreement shall not serve as arbitrator of such Claim, dispute, or other matter unless otherwise agreed.

B. Should the mediation be unsuccessful, such Claim, dispute or other matter (except for Claims which have been waived by the making or acceptance of final payment as provided by Paragraph 15.06) shall be decided by arbitration in accordance with the

Construction Industry Arbitration Rules of the American Arbitration Association subject to the limitations of this Article 17.

C. This Agreement so to mediate or to arbitrate and any other agreement or consent to mediate or to arbitrate entered into in accordance with these Contract Documents will be specifically enforceable under the prevailing law of any court having jurisdiction.

D. No demand for mediation or arbitration of any appealed or unsettled Claim, dispute or other matter that is required to be referred to Engineer initially for decision in accordance with Article 11 and 12 will be made later than 10 days after the date the executive negotiation has been declared unsuccessful by Owner or Contractor; and the failure to demand mediation or arbitration within said 10 days' period will result in Engineer's decision being final and binding upon Owner and Contractor. If Engineer renders a further decision after mediation or arbitration proceedings have been initiated, the decision may be entered as evidence but will not supersede the proceedings, except where the decision is acceptable to the parties concerned. Time deadlines specified above apply to mediation (after the executive negotiation has been declared unsuccessful by Owner or Contractor) and arbitration (after the mediation process has been declared unsuccessful by Owner or Contractor.)

E. Notice of the demand for mediation or arbitration will be filed in writing with the other party to the Agreement and with the American Arbitration Association, and a copy will be sent to Engineer for information. The demand for mediation will be made within the ten day periods specified in Paragraph 17.01.D as applicable, and in all other cases within a reasonable time after the unsettled Claim, dispute or other matter has arisen, and in no event shall any such demand be made after the date when institution of legal or equitable proceedings based on such unsettled Claim, dispute or other matter would be barred by the applicable statute of limitations.

F. Except as provided in Paragraphs 17.01.G and H below, no arbitration arising out of or relating to the Contract Documents shall include by consolidation, joinder or in any other manner any other person or entity who is not a party to the Contract unless:

1. the inclusion of such other person or entity is necessary if complete relief is to be afforded among those who are already parties to the arbitrations, and

2. such other person or entity is substantially involved in a question of law or fact which is common to those who are already parties to the arbitration and which will arise in such proceedings, and

3. the written consent of the other person or entity sought to be included and the Owner and Contractor has been obtained for such inclusion, which consent shall make specific reference to this paragraph; but no such consent shall constitute consent to arbitration of any appealed or unsettled Claim, dispute or other matter not specifically described in such consent or to arbitration with any party not specifically identified in such consent.

G. Notwithstanding Paragraph 17.01.F, if an appealed or unsettled Claim, dispute or other matter between Owner and Contractor involves any allegations relating to the design, Owner may join Engineer as a party to the mediation or arbitration between Owner and Contractor hereunder.

H. Notwithstanding Paragraph 17.01.F, if an appealed or unsettled Claim, dispute or other matter between Owner and Contractor involves the Work of a Subcontractor, either Owner or Contractor may join such Subcontractor as a party to the mediation or arbitration between Owner and Contractor hereunder. Contractor shall include in all subcontracts required by Paragraph 7.06.G of the General Conditions a specific provision whereby the Subcontractor consents to being joined in mediation or arbitration between Owner and Contractor involving the Work of such Subcontractor. Nothing in this Paragraph 17.01.H nor in the provision of such subcontract consenting to joinder shall create any Claim, right or cause of action in favor of Subcontractor and against Owner, Engineer or Engineer's Consultants that does not otherwise exist.

I. At the conclusion of the mediation process specified herein, the Contractor will, as a condition of taking any further action with respect to any Claim, be required to certify that the amount of the Claim is its best good faith estimate of the amount due ("Certified Claim"). Owner will certify its final offer of settlement ("Final Offer").

J. The results of successful mediation will be implemented by a Change Order. The award rendered by the arbitrators will be final, judgement may be entered upon it in any court having jurisdiction thereof, and will not be subject to modification or appeal.

SC-17.03. – Add the following new paragraph immediately after Paragraph 17.02:

17.03 Attorney Fees

The costs of any binding dispute resolution procedure shall be borne by the non-prevailing Party, as determined by the adjudicator of the dispute.

In the event Contractor pursues the Claim, Contractor will be entitled, in addition to whatever recovery it has on the Claim, to be reimbursed its reasonable attorney's fees incurred in the same proportion it was successful based on the difference between its Certified Claim compared to the Owner's Final Offer. Conversely, Owner will be entitled to be reimbursed its reasonable attorney's fees incurred in proportion to the amount that Contractor was unsuccessful based on the difference between its Certified Claim compared to the Owner's Final Offer. For example, if Contractor recovers 40 percent of the difference between its Certified Claim and the amount of the Owner's Final Offer, Contractor would be entitled to recover 40 percent of its reasonable attorney's fees incurred in the prosecuting the Claim and the Owner would be entitled to recover 60 percent of its reasonable attorney's fees incurred in defending the Claim. On the other hand, if the Contractor recovers 60 percent of the difference between its Certified Claim and the amount of the Owner's Final Offer, Contractor would be entitled to recover 60 percent of its reasonable attorney's fees in prosecuting the Claim and the Owner would be entitled to recover 40 percent of its reasonable attorney's fees incurred in defending the Claim. The Certified Claim and the Final Offer will be admissible in any dispute resolution proceeding.

The supplements listed below and attached after the "End of Section", are a part of this Section:

1. Exhibit A, Contract Change Order
2. Exhibit B, Appendix

END OF SECTION

EXHIBIT A

CONTRACT CHANGE ORDER **NO:**

To Contractor:		Date:	
Project:	Durham IPS Biofilter Retrofit Project	Project No.	
Owner:	Clean Water Services	Change Order Contract No.	
Engineer:	Black & Veatch		

The following change(s) to the Contract are hereby ordered (use additional pages if required):

Attachments (List Supporting Documents):

Changes to Contract Amount and Contract Times:

The stipulated compensation (Contract Price or Contract Times, or both) set forth in this Change Order includes payment for (i) the Cost of the Work covered by the Change Order, (ii) Contractor's fee for overhead and profit, (iii) interruption of progress schedules, (iv) delay and impact, including cumulative impact, on other Work under the Contract Documents, and (v) extended overheads.

This Change Order constitutes full mutual accord and satisfaction for the change to the Work.

No reservation of rights to pursue subsequent claims on the Change Order will be made by either party.

No subsequent claim or amendment of the Contract Documents will arise out of or as a result of this Change Order.

In executing this Change Order, Contractor agrees to defend and indemnify Owner and Engineer and their officers, agents, and employees from any and all claims of any kind by any subcontractor or supplier of any tier based upon the subject matter of any claim released hereunder by Contractor.

Except as otherwise provided in this Change Order, the Contract, as amended, between Owner and Contractor, remains in full force and effect.

This Change Order may be executed in several counterparts, each of which will be an original, all of which will constitute one and the same instrument. An electronic signature will be considered an original. The individuals signing this Change Order certify that they are authorized to execute this Change Order on behalf of Contractor, Owner and Engineer if required, respectively.

Contract Amount		Contract Times (Calculate Days)		
		Original Contract Time:		
Original Amount:	_____	Substantial Completion	_____	Days
Previous Contract Change Orders:	_____	Final Completion	_____	Days
Previous Contract Change Percentage:	_____	Previous Contract Change Orders:		
		Substantial Completion	_____	Days
		Final Completion	_____	Days
This Contract Change Order:	_____	This Contract Change Order:		
This Contact Change Percentage:	_____			Days
	_____	Substantial Completion	_____	
Revised Contract Amount:	_____	Final Completion	_____	Days
Contract Change Order Percentage:	_____	Revised Contract Time:		
				Days
		Substantial Completion	_____	
		Final Completion	_____	Days

The Revised Date of Substantial Completion is:

_____ , 20 _____

The Revised Date of Final Completion is:

_____ , 20 _____

This Change Order is Issued in Accordance with Paragraph SC – 11.07 of the Supplementary Conditions.

Owner	Contractor	Engineer Recommendation
By:_____	By:_____	By:_____
Date:_____	Date:_____	Date:_____

EXHIBIT B

APPENDIX

The following paragraphs include without limitation the standard contract clauses that are required in every public contract in accordance with the Oregon Revised Statutes and for which Contractor may be responsible under Paragraph 7.10 of the General Conditions. Contractor shall include any other standard contract clauses required by federal, state, and local laws, ordinances and regulations. The Contract shall include by reference any other standard contract clauses required by federal, state and local laws, ordinances and regulations.

1. *Prompt Payment:* Contractor shall promptly pay all of its obligations arising out of or in connection with the Work, including, but not limited to, payments (1) to all persons, as due, supplying to Contractor labor, equipment, services or material for the performance of the Contract, (2) of all contributions or amounts due the Industrial Accident Fund from Contractor or any Subcontractor incurred in the performance of the Contract, and (3) to the Department of Revenue of all sums withheld from employees under ORS 316.167.

2. *Prompt Payment Policy:* It is the policy of the State of Oregon that all payments due on a public improvement contract and owed by a contracting agency shall be paid promptly. No public *contracting* agency is exempt from the provisions of ORS 279C.570.

3. *Contractor's Failure to Make Prompt Payment:* If, upon reasonable concern by Owner that Contractor has failed, neglected or refused to make prompt payment of any claim for labor, equipment, services or materials furnished to Contractor or a Subcontractor by any person in connection with the Project as such claim becomes due, Owner may pay such claim to the person furnishing the labor, equipment, services or materials and charge the amount of the payment against funds due or to become due Contractor under the Contract. Owner reserves the right to make payments directly or by multiple-payee check and Contractor hereby consents to such direct and multiple-payee check payments. Upon Owner's request, Contractor shall furnish to Owner the information required to facilitate such payments with each application for payment, including (1) names, addresses, and telephone numbers of persons making any such claim for labor, equipment, services or material, and (2) a complete listing of outstanding amounts owed to all such persons.

4. *Contractor's and First-Tier Subcontractor's Failure to Make Payment After Payment From Owner; Interest Penalty:* If Contractor or a first-tier Subcontractor fails, neglects or refuses to make payment to a person furnishing labor, equipment, services or materials in connection with the Project within 30 days after receipt of payment from Owner or Contractor, 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(4) 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 Contractor or first-tier Subcontractor on the amount due shall equal nine percent per annum The amount of interest may not be waived.

5. *Construction Contractors Board Complaint:* If Contractor or a Subcontractor fails, neglects or refuses to make payment to a person furnishing labor, equipment, services or materials in connection with the Project, 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.

6. *Continuing Liability of Contractor and Surety:* Payment by Owner of a claim in the manner authorized in this paragraph does not relieve Contractor or Contractor's surety from obligation with respect to any unpaid claims.

7. *Prevailing Rate of Wage*: This Project is a public works project subject to the prevailing wage rate requirements in ORS 279C.800 to ORS 279C.870. Contractor and any Subcontractors shall comply with ORS 279C.838 and ORS 279C.840. Workers in each trade or occupation that Contractor, Subcontractors or other person who is a party to the Agreement uses in performing all or a part of the Agreement for this Project shall not be paid less than the minimum hourly rate of wage for such workers incorporated by reference in Section 00810 of the specifications for the Agreement.

8. *Fee to* be *Paid to BOLI:* Owner will pay the required fee to the Commissioner of the Bureau of Labor and Industries pursuant to the provisions of ORS 279C.825.

9. *Compliance with Laws/Tax Laws*: Contractor shall comply with all applicable federal, state, and local laws, statutes, codes, regulations, rules, orders, and rulings as well as all applicable construction industry standards, including without limitation, those governing labor, materials, equipment, construction procedures, safety, health, sanitation, and the environment. Contractor agrees to indemnify, hold harmless, reimburse, and defend Owner from and against any penalties or liabilities arising out of violations of such obligations by Contractor or its Subcontractors or Suppliers at any tier. Contractor must also comply with all Oregon tax laws.

10. *Employee Drug Testing Program:* Contractor shall demonstrate that an employee drug testing program is in place and shall remain in place through the completion of the Work of the Project.

11. *Work Day/Work Week:* No person shall be employed for more than 10 hours in any one day, or 40 hours in any one week, except in cases of necessity, emergency, or where the public policy absolutely requires it, and in such cases, except for cases of contracts for personal services as defined in ORS 279C.100, the employee shall be paid at least time and a half pay (1) for all overtime in excess of 8 hours a day or 40 hours in any one week when the work week is five consecutive days, Monday through Friday, (2) for all overtime in excess of 10 hours a day or 40 hours in any one week when the work is four consecutive days, Monday through Friday, and (3) for all work performed on Saturday, and on any legal holiday specified in ORS 279C.540. Contractor shall pay employees at least time and a half pay for work the employees perform under the

Contract on the legal holidays specified in a collective bargaining agreement or in ORS 279C.540 (1)(b)(B) to (G) and for all time the employees work in excess of 10 hours in any one day or in excess of 40 hours in any one week, whichever is greater.

12. *Prohibition Against Retaliation*. Contractor may not prohibit any of Contractor's employees from discussing the employee's rate of wage, salary, benefits or other compensation with another employee or another person and may not retaliate against an employee who discusses the employee's rate of wage, salary, benefits or other compensation with another employee or another person.

13. *Discrimination*: As required by ORS 279C.520, Contractor shall comply with ORS 652.220 and shall not discriminate against any of Contractor's employees in the payment of wages or other compensation for work of comparable character, the performance of which requires comparable skills, or pay any employee at a rate less than another for comparable work, based on an employee's membership in a protected class as defined in ORS 652.220. Contractor shall comply with the prohibition set forth in ORS 652.220, that compliance is a material element of the Contract and that a failure to comply is a breach that entitles Owner to terminate the Contract for cause.

14. *Notice of Required Work Hours*: Contractor, each Subcontractor and each lower-tier Subcontractor must give notice to its employees in writing, either at the time of hire or before commencement of Work, or by posting a notice in a location frequented by its employees, of the number of hours per day and days per week that the employees may be required to work.

15. *Claims for Overtime*: Any worker employed by Contractor shall be foreclosed from the right to collect for any overtime provided in ORS 279C.540 unless a claim for payment is filed with Contractor within 90 days from the completion of the Contract, provided Contractor has: (1) Caused a circular clearly printed in boldfaced 12-point type and containing a copy of this section to be posted in a prominent place alongside the door of the timekeeper's office or in a similar place which is readily available and freely visible to any or all workers employed on the Work; (2) Maintained such circular continuously posted from the inception to the completion of the Contract on which workers are or have been employed.

16. *Worker's Compensation:* 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.

17. *Prompt Payment for Medical Services:* Contractor shall promptly make payment, as due, to any person, co-partnership, association or corporation, furnishing medical, surgical or hospital care services or other needed care and attention, incident to sickness or injury, to the employees of Contractor, of all sums that Contractor agrees to pay for the services and all moneys and sums that Contractor collected or deducted from the

wages of employees under any law, contract or agreement for the purpose of providing or paying for the services.

18. *Prompt Payment by Contractor and Subcontractors; Interest Penalty:* Contractor shall include in each subcontract for property or services entered into by Contractor with a first-tier subcontractor, including a material supplier, for the purposes of constructing a contract:

    A. A payment clause that requires Contractor to make payment to the first-tier subcontractor or Supplier for satisfactory performance under the subcontract within 10 days out of amounts Owner pays to Contractor under the Contract;

    B. A clause that requires Contractor to provide a first-tier subcontractor with a standard form that the first-tier subcontractor may use as an application for payment or as another method by which the subcontractor may claim a payment due from the Contractor;

    C. A clause that requires Contractor, except as otherwise provided in this paragraph, to use the same form and regular administrative procedures for processing payments during the entire term of the subcontract. Contractor may change the form or the regular administrative procedures the contractor uses for processing payments if the Contractor:

        (1) Notifies the subcontractor in writing at least 45 days before the date on which the Contractor makes the change; and

        (2) Includes with the written notice a copy of the new or changed form or a description of the new or changed procedure;

    D. An interest penalty clause that obligates Contractor, if Contractor does not pay the first-tier subcontractor within 30 days after receiving payment from Owner, to pay the first-tier subcontractor an interest penalty on amounts due in each payment Contractor does not make in accordance with the payment clause included in the subcontract under paragraph A of this subsection. Contractor or a first-tier subcontractor is not obligated to pay an interest penalty if the only reason that Contractor or the first-tier subcontractor did not make payment when payment was due is that Contractor or the first-tier subcontractor did not receive payment from Owner or Contractor when payment was due. The interest penalty:

        (1) Applies to the period that begins on the day after the required payment date and that ends on the date on which the amount due is paid; and

        (2) Is computed at the rate specified in ORS 279C.515 (2);

    E. Contractor, in each of Contractor's subcontracts, will require the first-tier subcontractor to include a payment clause and an interest penalty clause that conforms to the standards of subsection A through D of this section in each of the first-tier subcontractor's subcontracts and to require each of the first-tier

subcontractor's subcontractors to include such clauses in the first-tier subcontractors' subcontracts with each lower-tier subcontractor or supplier; and

F. Contractor shall comply with all of the provisions in ORS 279C.570.

19. *List of Subcontractors/Licensing With Construction Contractors Board:* Before commencing Work, Contractor shall provide to Owner and Engineer a list of all Subcontractors and Suppliers to be involved on the Project. The list shall be attached to the Agreement as an Exhibit. The receipt of such list shall not require Owner or Engineer to investigate the qualifications of proposed Subcontractors and Suppliers, nor shall it waive the right of Owner to later object to or reject any proposed Subcontractor or Supplier. It shall be the responsibility of Contractor to assure that all Subcontractors are duly registered with the Oregon State Construction Contractors Board and have not been declared ineligible to work on a public contract.

20. *Material Salvage:* To the extent the scope of the Work for this Agreement requires demolition, Contractor must salvage or recycle construction and demolition debris, if feasible and cost-effective.

21. *Composting:* To the extent the scope of the Work for this Agreement requires lawn and landscape maintenance, Contractor must compost or mulch yard waste material at an approved site, if feasible and cost-effective.

22. *Environmental and Natural Resources Laws:* Pursuant to ORS 279C.525, the following is a list of Federal, State, and Local agencies that have enacted ordinances or regulations dealing with the prevention of environmental pollution and the preservation of natural resources that may affect the performance of this Agreement. The following list may not include all such agencies that have enacted ordinances or regulations relating to the prevention of environmental pollution and preservation of natural resources.

FEDERAL AGENCIES:
AGRICULTURE, DEPT. OF
FOREST SERVICE
NATURAL RESOURCES CONSERVATION SERVICE
DEFENSE, DEPT. OF
ARMY CORPS OF ENGINEERS
COAST GUARD
ENVIRONMENTAL PROTECTION AGENCY
INTERIOR, DEPT. OF
U.S. FISH AND WILDLIFE SERVICE
BUREAU OF LAND MANAGEMENT
BUREAU OF INDIAN AFFAIRS
BUREAU OF RECLAMATION
LABOR, DEPT. OF
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
TRANSPORTATION, DEPT. OF
FEDERAL HIGHWAY ADMINISTRATION

BUREAU OF MINES
FEDERAL ENERGY REGULATORY COMMISSION
GEOLOGICAL SURVEY
HEALTH AND HUMAN SERVICES, DEPT. OF
HOUSING AND URBAN DEVELOPMENT, DEPT. OF
MINE SAFETY AND HEALTH ADMINISTRATION
MINERALS MANAGEMENT SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
OFFICE OF SURFACE MINING, RECLAMATION AND ENFORCEMENT
WATER RESOURCES COUNCIL

STATE AGENCIES:
ADMINISTRATIVE SERVICES, DEPT. OF
AGRICULTURE, DEPT. OF
COLUMBIA RIVER GORGE COMMISSION
CONSUMER AND BUSINESS SERVICES, DEPT. OF
OREGON OCCUPATIONAL SAFETY AND HEALTH DIVISION
ENVIRONMENTAL QUALITY, DEPT. OF
FISH AND WILDLIFE, DEPT. OF
FORESTRY, DEPT. OF
GEOLOGY AND MINERAL INDUSTRIES, DEPT. OF
HUMAN SERVICES, DEPT. OF
LABOR AND INDUSTRIES, BUREAU OF
LAND CONSERVATION AND DEVELOPMENT, DEPT. OF
NATURAL RESOURCES, DEPT. OF
PARKS AND RECREATION, DEPT. OF
STATE FIRE MARSHALL
STATE LANDS, DEPT. OF
WATER RESOURCES DEPARTMENT

LOCAL AGENCIES:
CITY COUNCILS
CIRCUIT COURTS
COUNTY COMMISSIONERS, BOARDS OF
FIRE DISTRICTS
HISTORICAL PRESERVATION COMMISSION
PLANNING COMMISSIONS
PORT DISTRICTS
SPECIAL DISTRICTS

OREGON TRIBAL GOVERNMENTS

23. *Retainage:* The withholding of retainage by Contractor or Subcontractor shall be in accordance with ORS 279C.550 through ORS 279C.570, and ORS 279C.845(7).

24. *Liens:* Contractor shall not permit any lien or claim to be filed or prosecuted against the state, county, school district, municipality, municipal corporation or subdivision thereof, on account of any labor or material furnished.

25. *Notice of Claim on Bond:* The notice of claim required by ORS 279C.600 must be sent by registered or certified mail or hand-delivered no later than 180 days after the day the person last provided labor or furnished materials or 180 days after the worker listed in the notice of claim by the Commissioner of the Bureau of Labor and Industries last provided labor. The notice may be sent or delivered to Contractor or Subcontractor at any place Contractor or Subcontractor maintains an office or conducts business or at the residence of Contractor or Subcontractor. If the claim is for a required contribution to a fund of an employee benefit plan, the notice required by ORS 279C.600 must be sent or delivered within 200 Days after the employee last provided labor or materials. The notice shall be in writing substantially as follows:

_____

(insert the name of Contractor or Subcontractor and the name of the Owner):

Notice is hereby given that the undersigned (here insert the name of the claimant) has a claim for (here insert a brief description of the labor or materials performed or furnished and the person by whom performed or furnished; if the claim is for other than labor or materials, insert a brief description of the claim) in the sum of (here insert the amount) dollars against the (here insert public works bond or payment bond, as applicable) taken from (here insert the name of the principal and, if known, the surety or sureties upon the public works bond or payment bond) for the work of (here insert a brief description of the work concerning which the public works bond or payment bond was taken). Such material or labor was supplied to:

_____

(insert the name of Contractor or Subcontractor)

_____

(here to be signed)

26. Non-resident bidder reporting responsibility to Department of Revenue. Pursuant to ORS 279A.120, when a public contract is awarded to a nonresident bidder and the contract price exceeds $10,000, the bidder shall promptly report to the Department of Revenue on forms to be provided by the department the total contract price, terms of payment, length of contract and such other information as the department may require before the bidder may receive final payment on the public contract. The contracting agency shall satisfy itself that the requirement of this subsection has been complied with before the contracting agency issues a final payment on a public contract.

27. Sanitary Facilities at Construction Projects 654.150:
(1) At the site of every construction project estimated to cost $1 million or more the employer or owner of such place of employment shall provide toilet facilities and facilities for maintaining personal cleanliness for the use of employees on the

construction project. Flush toilets shall be provided and the washing facilities shall consist of warm water, wash basins and soap. A building or a mobile, self-contained unit may be provided for such facilities. The number, types and maintenance of facilities shall conform to minimum standards set by the Director of the Department of Consumer and Business Services.

(2) Subsection (1) of this section does not apply to highway construction or maintenance projects or to electricity, water, sewer or gas transmission facility construction or maintenance projects.

(3) The director may, by order, exempt or partially exempt, individual or classes of construction projects from the requirements of subsection (1) of this section when conditions are such that compliance is impractical or impossible.

END OF SECTION

SECTION 00810

OREGON PREVAILING WAGE RATES

The applicable Oregon minimum prevailing wage rates for such workers in each trade or occupation that Contractor or its Subcontractors or other person who is a party to the Contract uses in performing all or part of the Contract are contained in the publication *Prevailing Wage Rates for Public Works Contracts in Oregon dated January 1, 2021* (see link titled *January 1, 2021 Prevailing Wage Rate Book* at https://www.oregon.gov/boli/employers/Pages/prevailing-wage-rates.aspx), available at https://www.oregon.gov/boli/employers/pages/prevailing-wage.aspx, and are hereby incorporated herein as of the date these Bidding Documents were first advertised.

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SECTION 01110
SUMMARY OF WORK

PART 1 GENERAL

1.01 THE REQUIREMENTS

A. The Work in this Contract shall consist of performing all Work to fulfill the requirements set forth in the Contract Documents.

1.02 WORK COVERED BY CONTRACT

A. The Work under this Contract shall consist of, but is not limited to the following:

1. Furnishing all labor, materials and equipment necessary to:
   a. Demolish existing earthen odor control biofilter including earthen media, buried air distribution piping and irrigation piping at basin.
   b. Protect in place existing temporary odor control system, in service odor control ducting, all electrical and instrumentation conduit, wiring, panels and appurtenances. Ensure continuing full function of the temporary odor control system.
   c. Protect in place existing irrigation control panel and piping connections to the extents shown.
   d. Install new reinforced concrete basin to house new engineered media biofilter.
   e. Install new engineered media biofilter including floor system, HDPE basin liner, engineered media and other appurtenances as required.
   f. Install new ductwork from existing blowers to new engineered media biofilter, connect to existing ductwork.
   g. Install new irrigation piping and nozzles, connect to existing irrigation piping at existing irrigation control panel.
   h. Install new biofilter drain, connect to existing drain discharge location.
   i. Backfill to grade unused area of existing earthen biofilter basin.
   j. Perform site grading of area.
2. The Work also includes furnishing and installing related equipment, temporary items, and other appurtenances necessary to complete the Work and to provide a complete and functional system in accordance with the Contract Documents.

B. The Work is located at the Durham Advanced Wastewater Treatment Facility, 16580 SW 85th Ave, Tigard, OR 97224.

1.03 OTHER WORK AT THE SITE

A. Other Work or Adjacent Work at site to be coordinated per General Condition Article 8 *OTHER WORK AT THE SITE.* The following list includes, but not limited to, the additional Work occurring at the Site:

1. Secondary Train 5 Expansion
2. FOG Tank Replacement
3. Lime System Improvements
4. WASSTRIP Improvements

1.04 WORK SEQUENCE

A. Contractor's attention is directed to Contract Specification 01140 Work Restrictions for detailed information on the Work sequence restrictions.

B. Contractor shall sequence Work and Site access so that it will not interfere with wastewater treatment operations. The facility must remain in service at all times.

C. Contractor shall schedule all Work with Owner's personnel to minimize interference with operating the facility.

1.05 CONTRACTOR USE OF SITE

A. Contractor's use of the Site shall be limited to its construction operations, including onsite storage of materials, onsite fabrication facilities, and field offices.

B. Contractor access points, staging and parking areas have been designated on the Contract Drawings. Contractor shall restrict its operations to those areas and where the Contract Work shall be performed.

C. Contractor is advised that all indoor areas (buildings and galleries) are nonsmoking areas.

1.06 OWNER USE OF THE SITE

A. Owner will utilize the Site during the entire period of construction to conduct Owner's normal operations.

1.07 PROJECT MEETINGS

A. Preconstruction Conference:

1. Prior to commencing Work at the Site, a preconstruction conference will be held at Owner's office at a mutually agreed time, but no later than 7 days after the Notice to Proceed. The conference shall be attended by the Contractor's Project Manager, Superintendent, Quality Control Engineer, Safety Representative, and Subcontractors. Subcontractor attendance shall be requested and approved by Engineer. Other attendees will be:
   a. Engineer.
   b. Representatives of Owner.
   c. Governmental representatives, as appropriate.
   d. Utilities representatives, as appropriate.
   e. Others as requested by Contractor and Owner upon approval by the Engineer.
2. Contractor shall bring the preconstruction conference submittals in accordance with Section 01330, Submittal Procedures.
3. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The complete agenda will be furnished to Contractor prior to the meeting date.
4. Contractor should be prepared to discuss all of the items listed below.
   a. Contractor's initial Project Schedule that highlights key Work Restrictions and Work Sequence items.
   b. Major equipment deliveries and storage plan.
   c. Shop Drawing, Samples, and Other Submittals schedule per 01330.
   d. Submittal procedure for Submittal of Shop Drawing, Samples, and Other Submittals.
   e. Processing applications for payment.
   f. Maintaining record documents procedure.
   g. Permit Inspection and Special inspection coordination procedures.
   h. Field decisions and Change Orders procedures
   i. Use of Site, office, storage areas, and housekeeping
   j. Site security procedures
   k. Emergency alarm procedures
   l. Emergency assembly areas and emergency personnel direction
   m. Deactivation Request procedures
   n. Daily reporting of construction activities procedure
   o. Temporary utilities.
   p. Designation of Contractors Authorized Representatives and contact information
      1) Project Principal
      2) Project Manager
      3) Superintendent
      4) Subcontractor superintendent representatives

5. Engineer will preside at the preconstruction conference and will arrange for keeping and distributing the minutes to all persons in attendance. Contractor shall advise Engineer within five days of receipt of the minutes if Contractor does not agree with the content of the minutes.
6. Contractor and its subcontractors should plan on the conference taking four hours. The conference will include reviewing the Contract Drawings and Specifications with Engineer and Owner.

B. Progress Meetings:

1. Owner will schedule and hold regular onsite progress meetings at least weekly and at other times as requested by Contractor or as required by progress of the Work. Contractor and Engineer shall attend each meeting and representatives of Owner may also attend. Contractor may at its discretion request attendance by representatives of its suppliers, manufacturers, and subcontractors. Attendance by such representatives shall be subject to approval of Engineer.
2. Contractor to present the following at the progress meeting:
    a. Overall CPM schedule per Specification Section 01324 – Construction Schedule and anticipated updates to overall CPM Schedule
    b. Three-week look-ahead schedule as a detailed subset of the overall CPM schedule
    c. Submittal status
    d. Request for Information status
    e. Change order status
    f. Coordination with operations for facility deactivation and tie-in requests status
    g. Permit coordination status
    h. Issues that may impact its progress and propose solutions to resolve these issues
    i. Payment application status
    j. Contractor shall include additional status information requested by Engineer.
3. Engineer will preside at the progress meetings and will arrange for keeping and distributing the minutes. Contractor shall advise Engineer within five days of receipt of minutes if Contractor does not agree with the content of the minutes.
4. Engineer shall review the following:
    a. Actual start and finish dates of completed activities since the last progress meeting.
    b. Durations and progress of activities not completed.
    c. Percentage completion of items on the Application for Payment.
    d. Overall Project progress per the current CPM Construction Schedule and the potential effect on Contract Time and Contract Price.

1.08 POST CONSTRUCTION MEETING

A. Contractor shall meet with Owner and Engineer and inspect the Work 11 months after the date of Substantial Completion.

B. Owner shall arrange the meeting at least 7 days before meeting.

C. Contractor shall meet in Owner's office or other mutually agreed upon place.

D. Contractor shall inspect the Work with Owner and Engineer and draft a list of items to be completed or corrected.

E. Contractor shall review the service and maintenance contracts with Owner and Engineer, and take appropriate corrective action when necessary.

F. Contractor shall complete or correct defective work and extend the correction period accordingly per General Conditions 15.08 *Correction Period*

G. Contractor shall require attendance of Superintendent, appropriate manufacturers and installers of major units of constructions, and affected subcontractors.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01140
WORK RESTRICTIONS

PART 1 GENERAL

1.01 THE REQUIREMENT

A. Work shall be scheduled, sequenced, and performed in a manner which minimizes disruption to the public and the operation and maintenance of existing facilities.

B. The Contractor shall incorporate the construction and schedule constraints of this Section in preparing the construction schedules required under Section 01324, Construction Schedule.

1.02 EXISTING TREATMENT PLANT

A. The Work shall be executed while all existing wastewater treatment facilities and pump stations are in operation.

B. Operation of the existing facility shall not be jeopardized nor shall the efficiency or volume of wastewater conveyance be reduced as a result of the execution of the Work. Impairing the operational capabilities of the treatment plant will result in serious environmental damage and monetary fines.

C. Conduct Work in a manner that will not impair the operational capabilities of essential elements of the treatment process or reduce the capacity of the entire treatment plant below levels sufficient to treat the quality of wastewater to the water quality limitations specified in the discharge permit. The status of the treatment plant shall be defined as “operational” when it is capable of treating the entire quantity of wastewater received to the water quality limits specified in the discharge permit.

D. The construction sequence and constraints in this Section do not include all items affecting the completion of the Work, but are intended to describe the sequence of critical events and associated constraints necessary to minimize disruption to the ongoing treatment plant processes and to ensure compliance with NPDES Permit requirements and prevent all overflows within the collection system.

E. The Work Restrictions described are not all inclusive and that additional items of Work not included or described may be required to minimize disruption and ensure operational compliance. Deviation from or modification of these suggested sequences is permitted if techniques and methods known to the Contractor will result in reducing disruption to the facility operation and maintaining treatment efficiency, avoiding violation of scheduling constraints, and if deviation is approved in advance by the Engineer and Owner’s Representative.

1.03 OPERATION OF PLANT EQUIPMENT

A. Operational functions, deactivations, or shutdown of existing treatment plant processes or equipment required to facilitate Contractor's Work will be done by the Owner's personnel only.

B. The plant operation and maintenance personnel will cooperate as is practical in order to facilitate Contractor's Work. However, certain shutdown and connections may only be permissible at times other than normal working hours such as nights or weekends. No additional payment will be made to the Contractor for any night, weekend, or holiday premium or overtime payments.

C. If it becomes necessary for the proper operation or maintenance of portions of the plant, the Owner may require the Contractor to reschedule an approved shutdown. If notice of said rescheduling is given to the Contractor at least 24 hours in advance of the scheduled shutdown, the Contractor shall not be entitled to additional compensation due to the impacts of rescheduling. The Contractor shall then reschedule its Work so there shall be no conflict with necessary operations or maintenance of the plant. The Contractor shall, within 2 working days, furnish the Owner's Representative a revised Deactivation Request and a plan for rescheduling the shutdown in accordance with the requirements of the construction schedule.

1.04 DEACTIVATION REQUESTS

A. The Contractor shall not remove from service, operate any equipment, tie-in, de-energize, and or modify operational settings for any facility without permission from the Owner's Project Representative.

B. Modifications to existing facilities, the construction of new facilities, and the connection of new to existing facilities may require the temporary outage or bypass of existing treatment processes or facilities. In such cases, the Contractor shall coordinate Work with the Owner's Representative as described below. The Contractor shall submit a detailed Deactivation Plan and time schedule for all Work activities to accomplish modification.

C. Deactivation Plans shall be submitted to the Owner's Representative for approval a minimum of 14 days in advance of the time that such deactivations are required. The Deactivation Plan shall be coordinated with the construction schedule and shall meet the Work Restrictions. The Deactivation Plan shall describe the Contractor's method of bypassing any deactivated unit and for preventing bypassing of other treatment units; the length of time required to complete the operation; any necessary temporary power, controls, instrumentation, or alarms required to maintain control, monitoring, and alarms for the associated facilities; and the manpower, plant, and equipment which the Contractor shall provide in order to ensure proper operation of associated treatment units. All costs for preparing and implementing the Deactivation Plans shall be the responsibility of the Contractor as part of the Work.

D. The Contractor shall not begin an alteration affecting existing facilities until specific written approval has been granted by the Owner's Representative in each case.

E. The Owner's Representative will coordinate the Contractor's planned procedure with Owner personnel. The Owner's Representative have the authority to modify any proposed shutdown procedures if such procedures would adversely impact the plant operations.

F. The Owner's Representative shall be notified in writing a minimum of 7 days in advance of the required deactivation if the schedule for performing the Work has changed or if revisions to the Deactivation Plan are required. The Contractor shall provide written confirmation of the deactivation date and time 2 days prior to the actual deactivation. This notification shall also provide confirmation that the Contractor has all the required parts, materials, tools, and equipment on-hand to successfully undertake and complete the deactivation.

1.05 BYPASS FACILITIES

A. Bypassing of untreated or partially treated sewage to surface waters or drainage courses is strictly prohibited during construction. In the event accidental bypassing is caused by the Contractor's operations, the Owner shall immediately be entitled to employ others to stop the bypassing and costs incurred there from, including any regulatory agency fines resulting there from, will be deducted from the Contractor's construction progress payments. If accidental bypass occurs, the Contractor shall immediately inform the Owner's Representative.

B. Install and maintain bypass facilities, including pumping, and temporary components required to keep facility operations online.

C. Bypass pumping control must mimic typical plant flow and must be capable of evenly splitting flow and controlling flow rate based on process requirements.

D. Bypass pumping redundancy, installed or standby, must be provided and approved by Engineer and Owner prior to use.

E. Conditions that require bypass facilities include, but are not limited to:

1. Work sequencing activities required to complete Project.
2. Failure to meet Work Constraints identified herein.
3. Inclement weather during temporary shutdowns that require increased treatment or containment capacity.

1.06 TEMPORARY CONNECTIONS

A. The making of connections to existing facilities or other operations that interfere with the operation of the existing equipment or process flow paths shall be thoroughly planned in advance, and all required equipment, materials, and labor

shall be on hand at the time of undertaking the connections. Work shall be completed as quickly as possible and with as little delay as possible, and shall proceed continuously (24 hours a day and 7 days a week) if necessary to complete modifications and/or connections in the minimum time.

B. The cost of any temporary facilities and night, weekend, or holiday work and overtime payments required during process interruptions shall be included in the price of the Work.

C. Temporary facilities and piping shall be provided to minimize interference by Contractor with Owner's operation and maintenance of the wastewater treatment plant. Unless otherwise indicated, each temporary pipeline (including sample lines) shall be of the same size as its connection to the existing or permanent facility at the downstream end of the pipeline. Piping materials shall be suitable for the material being conveyed and be as required in the Contract Specifications. Temporary bulkheads necessary to isolate wetted process areas to perform Work shall be designed and stamped by an engineer registered in the State of Oregon.

D. When temporary electrical power, controls, instrumentation, or alarms are required for routine continuous operations of existing or new equipment, the Contractor shall provide the necessary equipment and appurtenances. Prior to installing said equipment and appurtenances, Contractor shall furnish a submittal on the proposed components and installation for Engineer's review and approval.

E. A plan showing the size and location of the temporary facilities and piping shall be submitted to the Engineer and Owner's Representative at the same time as the Deactivation Plan required under this Section. All costs for design, provision, operation, and removal of temporary facilities and piping shall be the responsibility of the Contractor.

1.07 SCHEDULE CONSTRAINTS

A. General: It is the Contractor's responsibility to coordinate and plan the construction activities to integrate each schedule constraint into performance of the overall Work. The constraints identified herein are general descriptions of the major activities requiring sequencing or interface with the existing plant operation. It is not the intent of this Section to list all sequences, constraints, or coordination items required for the Work. Coordination of the detailed Work constraints within Specification Sections is required.

B. Process, Facility, or Service Shutdown:

1. All diversions and shutdowns to plant flows and processes shall be subject to the requirements for a deactivation request and actual process, flow, and weather conditions existing at the time of the requested deactivation. Owner's determination regarding the acceptability of proceeding with a planned diversion or shutdown shall be final.

2. Contractor shall work continuously during diversions and shutdowns (1) if necessary, (2) when specified, or (3) when requested by Owner and Engineer to complete the work within the time allotted.

C. Work Constraints:

1. The submitted Work Sequence Plan shall incorporate the following general Work Constraints regarding treatment plant operations:
   a. Contractor must allow sludge and FOG haulers full use of and unimpeded access to WWTP roads at all hours.
   b. Contractor must allow chemical deliveries unimpeded access to the WWTP roads and deliveries at all hours.
   c. Contractor shall maintain public pedestrian and bicycle access to Cook Park via 85th Avenue at all times.
   d. Design and provide all temporary piping and support systems as required to protect and maintain existing piping in service. Coordinate temporary piping and support systems with the requirements of this Section.
   e. Contractor must allow temporary odor control system to remain in operation at all times until the biofilter is started up. District access to the temporary odor control system must be maintained at all times.
2. The submitted Work Sequence Plan shall incorporate the follow Work Constraints regarding treatment process and operations:
   a. With the exception of short-duration planned shutdowns, continuous odor control shall be provided for the Influent Pump Station.
   b. Disconnection of the existing temporary odor control system is not allowed until the new odor control system is fully in place and ready for service.
   c. Connection of the new odor control system to the existing duct shall take place over a period of no more than 24 consecutive hours.
   d. Sequencing shall be such that upon connection of the new odor control system to the existing ductwork, the new odor control system will be placed into service and commissioned.
   e. Water from dewatering operations shall be directed to the onsite sanitary sewer system. The water shall meet a 400 mg/L TSS limit or be treated by Contractor to meet the limit. Verification of discharge locations shall be coordinated with the Owner's Representative.
3. The Work will include connection to and working around facilities containing sewage, sludge, and hydrogen sulfide gas and other sewage gasses. The Contractor shall establish and abide by its Safety Plan including observing confined space testing, entry and work procedures at all times. The Contractor shall also review and include pertinent provisions of the Owner's treatment plant safety plan in its own Safety Plan with regard to working around chemicals and other conditions present at wastewater treatment plants.
4. The Contractor shall limit its work activities and traffic to the area of the Project Work and shall not enter any other plant areas without prior written

permission from the Owner. The Contractor shall strictly obey all speed limits and other traffic laws at all times.

1.08 CONSTRUCTION SEQUENCING

A. WORK SEQUENCE PLAN

1. Using Work Constraints identified herein, the Contractor shall develop an independent Work Sequence Plan and is not necessarily obligated to follow the work sequencing described herein. The Work Sequence Plan shall include:
   a. Description and sequence of major construction activities that affect plant operations.
   b. Explanation of how Work Constraints and Milestones will be met.
   c. Coordination with Facility Startup, Training and Testing and Construction Schedule.

B. All construction activities shall be scheduled and sequenced to ensure continuous operation of the existing conveyance and treatment facilities. The Contractor's scheduling shall develop all construction sequencing so that the Work will not adversely impact conveyance or treatment. The Contractor shall be responsible for development of the construction sequencing. In implementing the construction sequencing, the Contractor shall maintain the existing facilities in service until new facilities are constructed and are operational and accepted by the Owner, the existing facilities may be taken out of service upon approval by the Engineer and Owner's Representative.

C. The following general guidelines shall be used by the Contractor in planning the sequence of construction.

1. During all modification and demolition work, safe working conditions for personnel shall be maintained at all times. The foregoing includes at least proper trench excavation, the provision of temporary equipment guards, supports, warning signs, walkways, covers over openings, handrailing, lighting, traffic control measures, and protection of electrical equipment and power supply.
2. All temporary facilities shall be constructed in accordance with applicable codes and regulations to operate safely and properly.
3. Valves to be temporarily shut off during the Work shall be coordinated with the Owner's Representative, tagged as such and shall be wired shut with a crimped lead seal and padlocked for safety in accordance with the Contractor's Safety Plan and in a manner acceptable to the Owner.
4. Electrical and mechanical equipment to be temporarily shut off during the Work shall be locked out and tagged for safety in accordance with the Contractor's Safety Plan and in a manner acceptable to the Owner.
5. All in-road work shall be planned with a traffic control plan that will be reviewed and approved prior to start of work.

D. Suggested Sequencing of Major Activities: This Section provides a suggested sequence for major construction activities that incorporates the Work Constraints and Milestones specified. Additional and parallel activities will be required. The Contractor may utilize all or part of this suggested sequence in the submitted Work Sequence Plan to meet the required Work Constraints and Milestones. The Work Sequence Plan must provide an equivalent level of reliability, flexibility, and operating characteristics with respect to plant operations and meeting plant discharge permit requirements. The Contract Times, Liquidated Damages, and Contract Milestones are based, in part, on the suggested sequencing described herein. The Owner reserves the right to modify the Contract Times, Liquidated Damages, and Contract Milestones based on Contractor-initiated changes to the suggested sequencing at no additional cost to the Owner.

1. Biofilter System:
    a. Demolish existing soil biofilter
    b. Construct biofilter and new ductwork up to the connection serving Influent Pump Station (IPS) at the temporary odor control system.
    c. Disconnect existing temporary odor control system and connect new odor control system
    d. Start up biofilter system and put biofilter into service.
2. Substantial Completion: Substantial Completion shall be the point in time when the biofilter is operational and providing effective odor treatment.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01292
SCHEDULE OF VALUES

PART 1 GENERAL

1.01 SUMMARY

A. This Section defines the process whereby the Schedule of Values (lump sum price breakdown) shall be developed. Monthly progress payment amounts shall be determined, in part, from the monthly progress updates of the CPM Schedule activities.

1.02 PRELIMINARY SCHEDULE OF VALUES

A. The Contractor shall submit a preliminary Schedule of Values for the major components of the Work at the Preconstruction Conference. The listing shall include, at a minimum, the proposed value for the following major Work components:

1. Mobilization and Demobilization: Total price for mobilization shall not exceed 1.0 percent of the Contract Price. Total price for demobilization shall not be less than 2.0 percent of the Contract Price.
2. The total value of electrical Work.
3. The total value of instrumentation and control Work.
4. The total value of yard mechanical and force main Work inclusive of excavation, yard pipe installation, testing and backfill of yard pipe, and all incidental Work associated with underground yard pipe installations. Do not include trenchless undercrossings.
5. The total value of each trenchless undercrossing, separately identified.
6. The total value of all mechanical Work, exclusive of yard mechanical Work included in Item 4 above. This includes all piping, valves, HVAC, equipment, tanks, and appurtenances at new and existing structures.
7. The total value of structural Work inclusive of all reinforced concrete, precast concrete, CMUs, dewatering, subgrade preparation, backfill and incidental Work for all new structures. Additionally, this total value shall be broken down into separate values for each new structure constructed as a part of the Work. Miscellaneous and minor concrete Work may be listed as one item in this breakdown.
8. The total value of all structure excavation and excavation support Work.
9. The total value of site civil Work inclusive of clearing and grubbing, paving, grading and drainage Work, but exclusive of excavation and excavation support.
10. The total value of architectural Work.
11. The total value for protective coatings Work.
12. The total value of testing.
13. The total value of closeout Work.
14. The total value of all other Work not specifically included in the above items.

B. The Contractor and Engineer shall meet and jointly review the Preliminary Schedule of Values and make any adjustments in value allocations if, in the opinion of the Engineer, these are necessary to establish fair and reasonable allocation of values for the major Work components. Front-end loading will not be permitted. The Engineer may require reallocation of major Work components from items in the above listing if in the opinion of the Engineer such reallocation is necessary. This review and any necessary revisions shall be completed within 21 days from the date of Notice to Proceed.

1.03 DETAILED SCHEDULE OF VALUES

A. The Contractor shall prepare and submit a detailed Schedule of Values to the Engineer within 30 days from the date of Notice to Proceed. The detailed Schedule of Values shall be based on the accepted preliminary Schedule of Values for major Work components and shall be broken down by major structure or facility. The Engineer shall be the sole judge of acceptable numbers, details and description of values established. If, in the opinion of the Engineer, a greater number of Schedule of Value items than proposed by the Contractor is necessary, the Contractor shall add the additional items so identified by the Engineer. The minimum detail of breakdown of the major Work components is indicated below. Greater detail shall be provided as directed by the Engineer, which may include a value for each CSI specification for each major project element.

1. Mobilization and Demobilization: Total price for mobilization shall not exceed 1.0 percent of the total Contract Price. Total price for demobilization shall not be less than 2.0 percent of the Contract Price.
2. The electrical Work shall be broken down by structure and yard facilities. Structures electrical Work shall be broken down into conduit and raceway installation, cable and wire installation, electrical equipment installation, terminations and lighting. Yard facilities shall be broken down by duct bank designation and transformers.
3. Instrumentation and control Work shall be broken down by structure.
4. Protective coating Work shall be broken down by structure and yard area. Where specific coating Work at structures or yard areas may be critical to performing the Work to meet milestone and Contract dates, such Work shall be included as individual pay and Schedule activity items.
5. Yard piping Work shall be broken down into individual pipelines running from and to Contract termination points.
6. The total value of each trenchless undercrossing, separately identified.
7. Mechanical Work shall be broken down within each structure to identify individual piping systems, equipment installation by equipment name and number, equipment testing, checkout, and O&M manuals.
8. Concrete structures shall be broken down into excavation, subgrade preparation, and appurtenant prefoundation Work, concrete foundation construction, slabs on grade, walls/columns, suspended slabs, stairs, etc., hydrostatic structure testing where required and backfill.
9. Civil site Work shall be broken down into individual drainage piping, drainage structures, site concrete, paving, excavation cut and fill, removal of

existing pipe, clearing and grubbing and any other items determined to be necessary for the establishment of pay and Schedule activity items.

10. Equipment testing and plant startup broken down for completion milestones for each.
11. All other Work not specifically included in the above items shall be broken down as necessary for establishment of pay items.
12. CPM schedule and monthly updates (1.0 percent of the Contract Price).

B. The Contractor and Engineer shall meet and jointly review the detailed Schedule of Values within 35 days from the date of Notice to Proceed. The value allocations and extent of detail shall be reviewed to determine any necessary adjustments to the values. Any adjustments deemed necessary to the value allocation or level of detail shall be made by the Contractor and a revised detailed Schedule of Values shall be submitted within 40 days from the date of Notice to Proceed.

1.04 ESTIMATED PROGRESS PAYMENTS

A. Within 15 days after Engineer's acceptance of the Detailed Schedule of Values and the CPM Construction Schedule as per Section 01324, Construction Schedule, the Contractor shall provide the Engineer with an estimate of anticipated Progress Payments, by month, throughout the Project's construction duration.

B. Monthly Progress Payment

1. Contractor to provide the following written narrative report with Progress Payment:
    a. The status of major Project components (percent complete, amount of time ahead or behind schedule) and an explanation of how the Project will be brought back on schedule if delays have occurred.
    b. The progress made on critical activities indicated on the CPM Schedule.
    c. Explanations for any lack of Work on critical path activities planned to be performed during the last month.
    d. Explanations for any schedule changes, including changes to the logic or to activity durations.
    e. A list of the critical activities scheduled to be performed in the next two-month period.
    f. The status of major material and equipment procurement.
    g. The value of materials and equipment properly stored at the Site but not yet incorporated into the Work.
    h. Any delays encountered during the reporting period.
    i. An assessment of inclement weather delays and impacts to the progress of the Work.
    j. Contractor may include any other information pertinent to the status of the Project.
2. Contractor to provide updated CPM Schedule per 01324 Construction Schedule.

1.05 CHANGES TO SCHEDULE OF VALUES

A. In the event that the Contractor and Engineer agree to make adjustments to the original Schedule of Values because of inequities discovered in the original accepted detailed Schedule of Values, increases and equal decreases to values for activities may be made.

B. Approved change orders reflected in the CPM Schedule shall be incorporated into the Schedule of Values as a single unit identified by the change order number.

1.06 COMPLETE AND TIMELY SUBMISSIONS

A. The Schedule of Values information is an integral part of the progress payment information. As such, it is critical information for evaluating the Project's progress. Accordingly, if any submittal required by this Section is found to be incomplete or is submitted later than required, it may result in a deferral by Engineer to recommend all or any part of Contractor's Application for Payment, either partial or final.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01320
WEB-BASED CONSTRUCTION MANAGEMENT

PART 1 GENERAL

1.01 DESCRIPTION

A. The Owner and Contractor shall utilize ***PROCORE TECHNOLOGY, INC's Construction Operating System (CONSTRUCTION OS)*** web-based system for electronic submittal of all data and documents throughout the duration of the Contract. ***CONSTRUCTION OS*** is a web-based electronic media site that is hosted by **PROCORE** utilizing their ***CONSTRUCTION OS*** web solution. ***CONSTRUCTION OS*** will be made available to all contractors' project personnel, subcontractor personnel, suppliers, consultants and the Designer of Record. The joint use of this system is to facilitate; electronic exchange of information, automation of key processes, and overall management of the contract. ***CONSTRUCTION OS Project Management*** utility shall be the primary means of project information submission and management. When required by the Owners representative, paper documents will also be provided. In the event of discrepancy between the electronic version and paper documents, the paper documents will govern. ***CONSTRUCTION OS*** is a registered trademark of **PROCORE TECHNOLOGY, INC.**

1.02 USER ACCESS LIMITATIONS

A. The Owners representative will control the Contractor's access to ***CONSTRUCTION OS*** by allowing access and assigning user profiles to accepted Contractor personnel. User profiles will define levels of access into the system; determine assigned function-based authorizations (determines what can be seen) and user privileges (determines what they can do). Sub-contractors and suppliers will be given access to ***CONSTRUCTION OS*** through the Contractor. Entry of information exchanged and transferred between the Contractor and its sub-contractors and suppliers on ***CONSTRUCTION OS*** shall be the responsibility of the Contractor.

B. Joint Ownership of Data: Data entered in a collaborative mode (entered with the intent to share as determined by permissions and workflows within the ***CONSTRUCTION OS*** system) by the Owners Representative and the Contractor will be jointly owned.

C. Data Access after Project Completion: All Project participants can request a copy of their project information from ***CONSTRUCTION OS*** upon completion of the project. Participants are responsible for fees related to CONSTRUCTION OS, preparing and shipping the data archive. To request an archive complete a support request in the ***CONSTRUCTION OS*** application. The support request should include the address for shipping the archive too.

1.03 AUTOMATED SYSTEM NOTIFICATION AND AUDIT LOG TRACKING

A. Review comments made (or lack thereof) by the Owner on Contractor-submitted documentation shall not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for managing, tracking, and documenting the Work to comply with the requirements of the Contract Documents. Owner's acceptance via automated system notifications or audit logs extends only to the face value of the submitted documentation and does not constitute validation of the Contractor's submitted information.

1.04 SUBMITTALS

A. See Section 01330, Submittal Procedures.

1.05 COMPUTER REQUIREMENTS

A. The Contractor shall use computer hardware and software that meets the requirements of the ***CONSTRUCTION OS*** system as recommended by **PROCORE TECHNOLOGY, INC** to access and utilize ***CONSTRUCTION OS.*** As recommendations are modified by ***CONSTRUCTION OS***, the Contractor will upgrade their system(s) to meet the recommendations or better. Upgrading of the Contractor's computer systems will not be justification for a cost or time modification to the Contract. The contractor will ensure that connectivity to the ***CONSTRUCTION OS*** system (whether at the home office or job site) is accomplished through DSL, cable, T-1 or wireless communications systems. It is recommended a faster connection be used when uploading pictures and files into the system. ***CONSTRUCTION OS*** supports the current and prior two major versions of Chrome, Firefox, Internet Explorer and Safari on a rolling basis.

1.06 CONTRACTOR RESPONSIBILITY

A. The Contractor shall be responsible for the validity of their information placed in ***CONSTRUCTION OS*** and for the abilities of their personnel. Accepted users shall be knowledgeable in the use of computers, including Internet Browsers, email programs, cad drawing applications, and Adobe Portable Document Format (PDF) document distribution program. The Contractor shall utilize the existing forms in ***CONSTRUCTION OS*** to the maximum extent possible. If a form does not exist in ***CONSTRUCTION OS*** the Contractor must include a form of their own or provided by the Owner representative as an attachment to a submittal. Adobe PDF documents will be created through electronic conversion rather than optically scanned whenever possible. The Contractor is responsible for the training of their personnel in the use of ***CONSTRUCTION OS*** (outside what is provided by the owner) and the other programs indicated above as needed.

1. User Access Administration: Provide a list of Contractor's key ***CONSTRUCTION OS*** personnel for the Owner's Representative acceptance. Contractor is responsible for adding and removing users from the system. The Owners Representative reserves the right to perform a security check on all potential users. The Contractor will be allowed to add additional personnel and subcontractors to ***CONSTRUCTION OS***.

1.07 CONNECTIVITY PROBLEMS

A. ***CONSTRUCTION OS*** is a web-based environment and therefore subject to the inherent speed and connectivity problems of the Internet. The Contractor is responsible for its own connectivity to the Internet. ***CONSTRUCTION OS*** response time is dependent on the Contractor's equipment, including processor speed, Internet access speed, etc. and current traffic on the Internet. The Owner will not be liable for any delays associated from the usage of ***CONSTRUCTION OS*** including, but not limited to, slow response time, down time periods, connectivity problems, or loss of information. The contractor will ensure that connectivity to the ***CONSTRUCTION OS*** system (whether at the home office or job site) is accomplished through DSL, cable, T-1 or wireless communications systems. It is recommended a faster connection be used when uploading pictures and files into the system. Under no circumstances shall the usage of the ***CONSTRUCTION OS*** be grounds for a time extension or cost adjustment to the contract.

1.08 TRAINING

A. The Owner has arranged for a 2-hour training session. The Contractor will coordinate the training time. Training will be open to all appropriate Contractor, and Engineer personnel.

PART 2 PRODUCTS

2.01 DESCRIPTION

A. ***CONSTRUCTION OS*** project management application (no equal). Provided by **PROCORE TECHNOLOGY, INC,** www.procore.com.

PART 3 EXECUTION

3.01 CONSTRUCTION OS UTILIZATION

A. ***CONSTRUCTION OS*** shall be utilized in connection with submittal preparation and information management required by Sections:

1. Section 01110, Summary of Work.
2. Section 01140, Work Restrictions.
3. Section 01330, Submittal Procedures.
4. Other Division 01 sections.
5. Requirements of this section are in addition to requirements of all other sections of the specifications.

B. Design Document Submittals: All design drawings and specifications shall be submitted as CAD .dwg files or PDF attachments to the ***CONSTRUCTION OS*** submittal workflow process and form.

C. Shop Drawings:

1. Shop drawing and design data documents shall be submitted as cad.dwg files or PDF attachments to the ***CONSTRUCTION OS*** submittal workflow process and form. Examples of shop drawings include, but are not limited to:
   a. Standard manufacturer installation drawings.
   b. Drawings prepared to illustrate portions of the work designed or developed by the Contractor.

D. Product Data:

1. Product catalog data and manufacturers instructions shall be submitted as PDF attachments to the ***CONSTRUCTION OS*** submittal workflow process and form. Examples of product data include, but are not limited to:
   a. Manufacturer's printed literature.
   b. Preprinted product specification data and installation instructions.

E. Samples:

1. Sample submittals shall be physically submitted as specified in Section 01330, Submittal Procedures. Contractor shall enter submittal data information into ***CONSTRUCTION OS*** with a copy of the submittal form(s) attached to the sample. Examples of samples include, but are not limited to:
   a. Product finishes and color selection samples.
   b. Product finishes and color verification samples.
   c. Finish/color boards.
   d. Physical samples of materials.

F. Administrative Submittals:

1. All correspondence and pre-construction submittals shall be submitted using ***CONSTRUCTION OS***. Examples of administrative submittals include, but are not limited to:
   a. Digging permits and notices for excavation.
   b. List of product substitutions
   c. List of contact personnel.
   d. Notices for roadway interruption, work outside regular hours, and utility cut overs.
   e. Requests for Information (RFI).
   f. Plans for safety, demolition, environmental protection, and similar activities.
   g. Quality Control Plan(s), Testing Plan and Log, Quality Control Reports, Production Reports, Quality Control Specialist Reports, Preparatory Phase Checklist, Initial Phase Checklist, Field Test reports, Summary reports, Rework Items List, etc.
   h. Meeting minutes for quality control meetings, progress meetings, pre-installation meetings, etc.
   i. Any general correspondence submitted.

G. Compliance Submittals Test reports, certificates, and manufacture field report submittals shall be submitted on ***CONSTRUCTION OS*** as PDF attachments. Examples of compliance submittals include, but are not limited to:

1. Field test reports.
2. Quality Control certifications.
3. Manufacturers documentation and certifications for quality of products and materials provided.

H. Record and Closeout Submittals:

1. Operation and maintenance data and closeout submittals shall be submitted on ***CONSTRUCTION OS*** as PDF documents during the approval and review stage as specified, with actual set of documents submitted for final. Examples of record submittals include, but are not limited to:
   a. Operation and Maintenance Manuals: Final documents shall be submitted as specified.
   b. As-built Drawings: Final documents shall be submitted as specified.
   c. Extra Materials, Spare Stock, etc.: Submittal forms shall indicate when actual materials are submitted.

I. Financial Submittals Schedule of Value, Pay Estimates and Change Request Proposals shall be submitted on ***CONSTRUCTION OS***. Supporting material for Pay Estimates and Change Requests shall be submitted on ***CONSTRUCTION OS*** as PDF attachments. Examples of compliance submittals include, but are not limited to:

1. Contractors Schedule of Values.
2. Contractors Monthly Progress Payment Requests.
3. Contract Change proposals requested by the project owner.

END OF SECTION

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SECTION 01324
CONSTRUCTION SCHEDULE

PART 1 GENERAL

1.01 SUMMARY

A. Scheduling of the Work shall be performed by the Contractor in accordance with the requirements of this Section.

B. Development of the schedule, the project status reporting requirements of the Contract shall employ computerized Critical Path Method (CPM) scheduling. Where submittals are required hereunder, the Contractor shall submit four copies of each submittal item.

1.02 INITIAL SCHEDULE SUBMITTALS

A. The Contractor shall submit two short-term schedule documents at the Preconstruction Conference which shall serve as the Contractor's Plan of Operation for the initial 60-day period of the Contract Time and to identify the manner in which the Contractor intends to complete all Work within the Contract Time.

1. 60-Day Plan of Operation: During the initial 60 days of the Contract Time, the Contractor shall conduct operations in accordance with a 60 day bar chart type plan of operation. The bar chart so prepared shall show the accomplishment of the Contractor's early activities (mobilization, permits, submittals necessary for early material and equipment procurement, submittals necessary for long-lead equipment procurement, CPM submittals, initial Site work and other submittals and activities required in the first 60 days). Refer to Section 01140, Work Restrictions, for milestones and submittals required within the first 60 days.
2. Project Overview Bar Chart: The overview bar chart shall indicate the major components of the Work and the sequence relations between major components and subdivisions of major components. The overview bar chart shall indicate the relationships and time frames in which the various components of the Work will be made substantially complete and placed into service in order to meet the project milestones. Sufficient detail shall be included for the identification of subdivisions of major components into such activities as (1) site work, (2) completion of all structural concrete, (3) major mechanical work, (4) equipment procurement, (5) equipment installation, (6) major electrical work, (7) instrumentation and control work, (8) time requirements for start-up and testing from Section 13400, Instrumentation and Control for Process Systems, and (9) other important work within the overall project scope. Planned durations and start dates shall be indicated for each work item subdivision. Each major component and subdivision component shall be accurately plotted on time scale sheets not to exceed 36 inches by 60 inches in size. Not more than four sheets shall be employed to represent this overview information.

B. The Engineer and the Contractor shall meet to review and discuss the 60-day plan of operation and project overview gantt chart within 5 days after submittal to the Engineer. The Engineer's review and comment on the schedules will be limited to conformance with the sequencing and milestone requirements in the Contract Documents. The Contractor shall make corrections to the schedules necessary to comply with the requirements and shall adjust the schedules to incorporate any missing information requested by the Engineer.

1.03 CPM SCHEDULE SUBMITTALS

A. Original CPM Schedule Submittal: Within 30 days after the commencement date stated in the Notice to Proceed, the Contractor shall submit for review by the Engineer a hard copy of the CPM Schedule and appropriate schedule logic information. The Contractor shall also submit an electronic copy of all the schedule submittal information. The electronic version shall be compatible with Microsoft Project 2013 to generate network diagrams and schedule reports identical to the hard copies submitted. This submittal shall have already been reviewed and approved by the Contractor's Project Manager, Project Superintendent, and the Project Estimator prior to submission. The CPM Schedule shall be a time-scaled network diagram of the "i-j" activity-on-arrow or precedence type. The Network Diagram shall describe the activities to be accomplished and their logical relationships and show the critical path.

B. The Computerized Schedule Report tabulations shall include the following:

1. Report of activities sorted by activity number. Activity numbers, where practical, shall correlate to the area numbers, if so designated in the Contract Drawings.
2. Report of activities sorted by early start date.
3. Report of activities sorted by total float.
4. A successor-predecessor report which shall identify the successor and predecessor activities for each activity and ties between schedule activities.

C. Original CPM Schedule Review Meeting: The Contractor shall, within 40 days from the commencement date stated in the Notice to Proceed, meet with the Engineer to review the original CPM schedule submittal. The Contractor shall have the Project Manager, Project Superintendent, and the Project Scheduler in attendance. The Engineer's review will be limited to the conformance to the Contract Documents. However, the review may also include:

1. Clarifications of the design intent, process, and startup requirements.
2. Directions to include activities and information missing from the submittal.
3. Requests to the Contractor to clarify the schedule.

D. Revisions to the Original CPM Schedule: Within 50 days after the commencement date stated in the Notice to Proceed, the Contractor shall have revised the original CPM schedule submittal to address all review comments from the original CPM schedule review meeting and resubmit the network diagrams

and reports for the Engineer's review. The Engineer, within 10 days from the date that the Contractor submitted the revised schedule will either (1) accept the schedule as submitted, or (2) advise the Contractor in writing to review any part or parts of the schedule which either do not meet the Contract requirements or are unsatisfactory for the Engineer to monitor the project's progress and status. The Engineer may accept the schedule with conditions that the first monthly CPM schedule update be revised to correct deficiencies identified. When the schedule is accepted, it shall be considered as the "Original CPM Construction Schedule" until an updated schedule has been submitted. The Owner reserves the right to require that the Contractor adjust, add to, or clarify any portion of the schedule which may later be discovered to be insufficient for the monitoring of the Work. No additional compensation will be provided for such adjustments, additions, or clarifications.

E. Acceptance:

1. Acceptance of the Contractor's schedule by the Engineer and Owner will be based solely upon compliance with the requirements. By way of the Contractor assigning activity durations and proposing the sequence of the Work, the Contractor agrees to utilize sufficient and necessary management and other resources to perform the work in accordance with the schedule. Upon submittal of a schedule update, the updated schedule shall be considered the "current" project schedule.
2. Submission of the Contractor's progress schedule to the Owner or Engineer shall not relieve the Contractor of total responsibility for scheduling, sequencing, and pursuing the Work to comply with the requirements of the Contract Documents, including adverse effects such as delays resulting from ill-timed Work.

F. Monthly Updates and Periodic CPM Schedule Submittals:

1. Following the acceptance of the Contractor's original CPM Schedule, the Contractor shall monitor the progress of the Work and adjust the schedule each month to reflect actual progress and any changes in planned future activities. Each schedule update submitted shall be complete including all information requested in the original schedule submittal and be in the schedule report format indicated below. Each update shall continue to show all work activities including those already completed. Completed activities shall accurately reflect "as built" information by indicating when the work was actually started and completed.
2. Neither the submission nor the updating of the Contractor's original schedule submittal nor the submission, updating, change, or revision of any other report, curve, schedule, or narrative submitted to the Engineer by the Contractor under this Contract, nor the Engineer's review or acceptance of any such report, curve, schedule, or narrative shall have the effect of amending or modifying, in any way, the Contract Times or milestone dates or of modifying or limiting, in any way, the Contractor's obligations under

this Contract. Only a signed, fully executed Change Order can modify contractual obligations.

3. The monthly schedule update submittal will be reviewed monthly with the Contractor during a weekly construction progress meeting. The goal of these schedule review meetings is to enable the Contractor and the Engineer to initiate appropriate remedial action to minimize any known or foreseen delay in completion of the Work and to determine the amount of Work completed since the last month's schedule update. The status of the Work will be determined by the percent complete of each activity in the updated CPM Schedule. These meetings are considered a critical component of the overall monthly schedule update submittal, and the Contractor shall have appropriate personnel attend. As a minimum, these meetings shall be attended by the Contractor's Project Manager and Project Superintendent. Within 7 working days after the monthly schedule review meeting, the Contractor shall submit the revised CPM Schedule, the revised CPM computerized tabulations as noted in this Section, the revised successor/predecessor report, the Project Status Reports as defined below and the Contractor's Application for Payment. Within 5 working days of receipt of the revised submittals, the Engineer will either accept or reject the monthly schedule update submittal. If rejected, the update shall be corrected and resubmitted by the Contractor before the Application for Payment for the update period will be processed.

G. Schedule Revisions: The Contractor shall highlight or otherwise identify all changes to the schedule logic or activity durations made from the previous schedule. The Contractor shall modify any portions of the CPM schedule which become infeasible because of activities behind schedule or for any other valid reason.

H. The Contractor shall include plan and actual progress for each task.

I. Three-Week Look-Ahead Schedule Submittals: Each week, the Contractor shall submit a schedule of planned activities and progress detailing activities for the 3-week period following the date of the weekly submission to the Engineer.

1.04 CHANGE ORDERS AND WORK CHANGE DIRECTIVES

A. Upon approval of a Change Order, or upon receipt by the Contractor of a signed Work Change Directive or other authorization to proceed with additional work, the change shall be reflected in the next submittal of the CPM Schedule. The Contractor shall utilize a sub-network in the schedule depicting the changed work and its effect on other activities. This sub-network shall be tied to the main network with appropriate logic so that a true analysis of the critical path can be made.

1.05 CPM STANDARDS

A. Definitions: CPM, as required by this Section, shall be interpreted to be generally as outlined in the Association of General Contractors (AGC) publication, "The Use of CPM in Construction." except that either "i-j" arrow diagrams or precedence diagramming format may be utilized. In the case of conflicts between this specification and the AGC document, this specification shall govern.

B. Construction Schedules: Construction schedules shall include a graphic network diagram and computerized construction schedule reports as required below for status reporting.

C. Networks: The CPM network shall be in a form of a time scaled "i-j" activity-on-arrow or precedence type diagram and may be divided into a number of separate sheets with suitable match lines relating the interface points among the sheets. Individual sheets shall not exceed 24 inches by 36 inches.

D. Construction and procurement activities shall be presented in a time-scaled format with a calendar time line along the entire sheet length. Each activity arrow or node shall be plotted so that the beginning and completion dates of each activity are accurately represented along the calendar time line. All activities shall use symbols that clearly distinguish between critical path activities, noncritical activities, and free float for each noncritical activity. All activity items shall be identified by their respective activity number, responsibility code, and work duration. All noncritical path activities shall show total float time in scale form by utilizing a dotted line or some other graphical means.

E. Duration Estimates: The duration estimate for each activity shall be computed in working days and shall represent the single best estimate considering the scope of the work and resources planned for the activity. Except for certain nonlabor activities, such as curing of concrete or delivery of materials, activity duration shall not exceed 10 working days nor be less than 1 working day unless otherwise accepted by the Engineer.

F. Float Time:

1. Definition: Unless otherwise provided herein, float is synonymous with total float. Total float is the period of time measured by the number of working days each noncritical path activity may be delayed before it and its succeeding activities become part of the critical path. If a noncritical path activity is delayed beyond its float period, then that activity becomes part of the critical path and controls the end date of the work. Thus, delay of a noncritical path activity beyond its float period will cause delay to the project itself.
2. Float Ownership: Neither the Owner nor the Contractor owns the float time. The project owns the float time. As such, liability for delay of the project completion date rests with the party actually causing delay to the project completion date. For example, if Party A uses some, but not all of the float

time and Party B later uses the remainder of the float time as well as additional time beyond the float time, Party B shall be liable for the costs associated with the time that represents a delay to the project's completion date. Party A would not be responsible for any costs since it did not consume all of the float time and additional float time remained, therefore, the project's completion date was unaffected.

1.06 SCHEDULE REPORT FORMAT

A. Schedule Reports: Schedule Reports shall be prepared based on the CPM Schedule, and shall include the following minimum data for each activity:

1. Activity numbers.
2. Work Order No.
3. Estimated activity duration.
4. Activity description.
5. Activity's percent completion.
6. Early start date (calendar dated).
7. Early finish date (calendar dated).
8. Late start date (calendar dated).
9. Late finish date (calendar dated).
10. Status (whether critical).
11. Total float for each activity.
12. Free float for each activity.

B. Project Information: Each Schedule Report shall be prefaced with the following summary data:

1. Project name.
2. Contractor.
3. Type of tabulation.
4. Project duration.
5. Contract Times (revised to reflect time extensions by Change Order).
6. The commencement date stated in the Notice to Proceed.
7. The data date and plot date of the CPM Schedule.
8. If an update, cite the new schedule completion date.

1.07 COMPLETE AND TIMELY SUBMISSIONS

A. The CPM Construction Schedule information is an integral part of the Project scheduling and reporting. As such, it is critical information to evaluating the project's progress and the proper planning of the Owner's and Engineer's work effort associated with this Project. Accordingly, if any submittal required by this Section is found to be incomplete or is submitted later than required, it may result in a deferral by Engineer to recommend whole or any part of Contractor's Application for Payment, either partial or final.

1.08 NETWORK DETAILS AND GRAPHICAL OUTPUT

A. Produce a clear, legible, and accurate calendar based, time scaled, graphical network diagram. 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. Incorporate the basic concept of the precedence diagram network method to show how the start of one activity is dependent upon the start or completion of preceding activities and its completion restricts the start of following activities.

D. Indicate the critical path for the project.

E. Delineate the specified contract duration and identify the planned completion of the Work as a milestone. The time period between the planned and Contract completion dates, if any, shall be shown on the schedule as an activity identified as project float unless a Change Order is issued pursuant to CPM Standards.

F. Identify system shutdown dates, system tie-in dates, specified interim completion or milestone dates and contract completion date as milestones.

G. Include, in Addition to Construction Activities:

1. Submission dates and review periods for major equipment submittals, shoring submittals, and indicator pile program:
    a. Shoring Reviews: Allow 4-week review period for each shoring submittal.
    b. Pile Indicator Program (If Applicable): Allow 3-week review period for analysis of program.
2. Any activity by the Owner or the Engineer that may affect progress or required completion dates.
3. Equipment and long-lead material deliveries over 8 weeks.
4. Approvals required by regulatory agencies or other third parties.

H. Produce network diagram on 22-inch by 34-inch sheets with grid coordinate system on the border of all sheets utilizing alpha and numeric designations.

I. Identify the execution of the following, but no limited, and omitting items not applicable to the Work:

1. Mobilization.
2. All required submittals and submittal review times showing 30-calendar day duration for such activities and equal amount of time for resubmittal reviews.
3. Equipment and materials procurement/fabrication/delivery.

4. Excavation.
5. Shoring design and submission of detailed shoring submittals. Identify submission as a milestone.
6. Shoring review, shoring materials procurement, shoring installation and shoring removal.
7. Piles.
8. Backfill and compaction.
9. Dewatering.
10. Grading, subbase, base, paving, and curb and gutters.
11. Fencing and landscaping.
12. Concrete, including installation of forms and reinforcement, placement of concrete, curing, stripping, finishing and patching.
13. Tests for leakage of concrete structures intended to hold water.
14. Masonry.
15. Precast panels.
16. Metal fastenings, framing, structures, and fabrications.
17. Wood structures, finish carpentry, architectural woodwork, and plastic fabrications.
18. Waterproofing and dampproofing, insulation, roofing and flashing, and sealants.
19. Doors and windows, including hardware and glazing.
20. Finishes including coating and painting, flooring, ceiling, and wall covering.
21. Building specialties including furnishings, laboratory equipment, and toilet and bath accessories.
22. Process equipment, including identification of ordering lead time, factory testing and installation.
23. Pumps and drives, including identification of ordering lead time, factory testing and installation.
24. Conveying equipment including hoists and cranes, conveyor systems, and materials handling equipment, including identification of ordering lead time and installation.
25. Other mechanical equipment including fans and heating, ventilating, and air conditioning equipment.
26. Trenching, pipe laying, and trench backfill and compaction.
27. Piping, fittings and appurtenances, including identification of ordering and fabrication lead time, layout, installation and testing.
28. Valves, gates and operators, including identification of order lead time, installation and testing.
29. Plumbing specialties.
30. Electric transmission, service, and distribution equipment, including identification of ordering lead time, and factory testing.
31. Other electrical work including lighting, heating and cooling, and special systems, including identification of ordering lead time.
32. Instrumentation and controls, including identification of ordering lead time.
33. Preliminary testing of equipment, instrumentation and controls.
34. Final testing, including preparation time.
35. All operational testing.

36. Substantial completion. Substantial completion activity shall meet all requirements set forth in Section 00800, Supplementary Conditions.
37. Punch list work.
38. Operation and maintenance training.
39. Demobilization.

1.09 SCHEDULE OF SHOP DRAWING AND SAMPLE SUBMITTALS

A. After Preliminary Schedule has been submitted and accepted by Owner, Contractor shall submit a list of all Shop Drawings and sample submittals anticipated in first 90 calendar days after Notice to Proceed using early start dates.

B. Submittal of this preliminary list shall be a condition precedent to making of progress payments during the first 90 calendar days after Notice to Proceed.

C. After Baseline Schedule has been submitted and accepted by Owner, Contractor shall print out and submit list of all Shop Drawings and sample submittals for all Work using early start dates. This listing will contain all submittals required for the entire Work including those listed above.

D. Submittal of final list shall be a condition precedent to making of progress payments after the first 90 calendar days after Notice to Proceed.

E. These schedules shall conform to the requirements of the General Conditions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01329
SAFETY PLAN

PART 1 GENERAL

1.01 SUMMARY

A. Requirements for Contractor's development and maintenance of a Project Specific Safety Plan.

B. Before any Work at the Site is started, Contractor shall have prepared Contractor's written Project Specific Safety Plan and make available both printed and electronic versions to all Contractors, Subcontractors, Engineering, Inspection, and Owner's staff involved in the Work.

C. Project Specific Safety Plan shall be in accordance with *General Conditions 7.12 Safety and Protection. 7.13 Safety Representative. 7.14 Hazard Communication Programs. 7.15 Emergencies,* and including but not limited to additional hazards identified in this section.

D. A specific employee or officer will be designated by the Contractor to enforce compliance with all requirements set forth by the Oregon Health Authority and OSHA, including social distancing policies. Contractor will minimize all contact with Owner's personnel and occupied areas, and provide notice to the Owner when occupied areas will be encroached on.

E. Contractor shall require all Subcontractors to adhere to the Contractor's project specific safety plan, all applicable Safety Laws and Regulations, and Owner's Safety Programs.

1.02 SAFETY AND HEALTH REGULATIONS

A. Contractor's safety plan shall comply with all federal, state, and local safety and health regulations and laws including, but not limited to, the following:

1. Oregon Revised Statutes, ORS 654.
2. Oregon Safe Employment Act (OSEA).
3. Oregon Occupational Safety and Health Code of the Oregon Occupational Safety and Health Division (OR-OSHA), Oregon Administrative Rules (OAR), Chapter 437.
    a. Division 01, General Administrative Rules.
    b. Division 02, General Occupational Safety and Health Rules.
    c. Division 03, Construction.
4. Oregon Executive Order No. 20-12

1.03 CONSTRUCTION SAFETY PLAN – OWNERS SAFETY PROGRAMS

A. Permit-Required Confined Space Entry (PRCSE)
http://osha.oregon.gov/OSHAPubs/2864.pdf

1. Project specific PRCSE spaces include, but not limited to, the following:
   a. Manholes
   b. Open tanks
   c. Structures above and below grade with the potential to contain wastewater
   d. Enclosed tanks
   e. Wet wells and dry wells of pump stations
   f. Electrical vaults

B. Factory Mutual (FM) Global - Hot Work Yellow Tag Permit Program

1. Project specific hot work yellow tag permit activities include, but not limited to, the following:
   a. Grinding
   b. Torch cutting
   c. Welding
   d. Pipe cutting
   e. Gas piping

C. Transmit to Owner and Engineer copies of reports and other documents related to accidents or injuries encountered during construction.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

3.01 SUPPLEMENTS

A. The supplements listed below, following "End of Section," are a part of this Specification:

1. Oregon OSHA – Confined Spaces and Permit Spaces
2. Facilities Management – Hot Work Yellow Permit

3.02 COMPLIANCE

A. If Contractor or Subcontractor or personnel of either entity fail to adhere to the Contractor's Safety Plan submitted under Specification Section 01329, Safety Laws and Regulations, or the Owner's Safety Programs, Owner reserves the right to the require the Contractor to take immediate corrective action, which may include, but is not limited to:

1. submittal of a written corrective action plan to Owner;
2. additions or modifications to Contractor's Safety Plan, resubmittal required;
3. removal from the Site of any Contractor or Subcontractor personnel not implementing, maintaining, or following the necessary safety and health measures to protect persons or property from damage injury, or loss; and
4. increasing the amount of Contractor or Subcontractor safety and health training.

END OF SECTION

Confined spaces and permit spaces

How to comply with *Oregon* OSHA's confined space rule 437-002-0146 for general industry and construction work

About this guide

Confined spaces are harmless as long as they are not occupied. But when workers enter a confined space to inspect equipment, fix leaks, or do construction work, they can encounter toxic gasses, corrosive chemicals, flammable solvents, or machines that start unexpectedly. If something goes wrong, a confined space can be difficult or impossible to exit. And would-be rescuers can share the fate of those they are trying to rescue.

This guide explains how to identify confined spaces and how to protect general-industry and construction workers who may need to enter them.

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Additional content available online:

- Confined space evaluation survey: Use this survey to evaluate confined spaces at your workplace. http://www.orosha.org/pdf/pubs/forms/confined_space_permit_space_survey.doc
- Sample confined space entry permits: Examples of entry permits. http://www.orosha.org/pdf/pubs/forms/entry-permit.doc
- Sample permit-space program: A written confined space program for your workplace. http://www.orosha.org/pdf/pubs/forms/permit-space-booklet.doc
- Permit space evaluation form: Use this form to identify hazards in permit spaces at your workplace. http://www.orosha.org/pdf/pubs/forms/permit-space-eval-form.doc

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About Oregon OSHA's confined space rule: 437-002-0146

Oregon OSHA's confined space rule – 437-002-0146 – protects general industry and construction industry employees who enter confined spaces that have serious or life-threatening hazards.

What 437-002-0146 requires you to do

The rule requires you to:

- Survey your workplace to identify permit spaces
- Inform employees about the location of the permit spaces and the hazards associated with those spaces
- Keep unauthorized employees out of the spaces
- Prepare a written permit-space program to protect employees who must enter a permit space
- Include a catalog of your permit spaces in your written program that describes why they are permit spaces
- Ensure that any equipment is used in accordance with the manufacturer's instructions and that your employees who use the equipment have been trained
- Ensure that employees who work around permit spaces are trained so that they understand the presence, location, and hazards associated with the spaces, and they are aware of your permit-space program
- Have an agreement with another rescue service provider if your employees will not provide rescue services

Exceptions to 437-002-0146

The rule does not apply to:

- Construction work regulated by Division 3/P Excavations, except for entry into sanitary sewer spaces that are large enough to bodily enter.
- Construction work regulated by Division 3/S Underground Construction, Caissons, Cofferdams and Compressed Air, except for sewers.
- Enclosed spaces regulated by 1910.269 in Division 2/R Electric Power Generation, Transmission and Distribution, except when that standard requires compliance with this standard.
- Enclosed spaces regulated by 1926.953 in Division 3/V Electric Power Generation, Transmission and Distribution, except when that standard requires compliance with this standard.
- Manholes and vaults regulated by 1910.268(o) in Division 2/R Telecommunications, unless the space cannot be made safe to enter even after following the requirements of 1910.268(o).
- Welding in confined spaces regulated by Division 2/Q Welding, Cutting & Brazing, when the only hazards are related to the welding process.
- Grain bins, silos, tanks, and other grain storage structures regulated by 1910.272, Grain Handling Facilities.
- Diving operations regulated by Division 2/T, Commercial Diving Operations.

Key sections of 437-002-0146

Oregon OSHA's confined space rule has 13 sections:

1. Purpose and application
2. Exceptions
3. Definitions
4. Evaluation
5. Permit-required confined space entry programs and permits
6. Permit entry
7. Equipment
8. Personnel
9. Rescue
10. Alternate entry
11. Training
12. Multi-employer worksites
13. Records

The table below shows which of the rule's key sections apply to confined spaces, permit spaces, and confined spaces that are never entered. The table also shows which sections apply if you use alternate entry procedures, have other employers enter your confined space, or if you provide rescue services.

	Key sections of Oregon OSHA's confined space rule: 437-002-0146									
	4	5	6	7	8	9	10	11	12	13
For spaces that are:	*Evaluation*	*Permit space entry programs and permits*	*Permit Entry*	*Equipment*	*Personnel*	*Rescue*	*Alternate entry*	*Training*	*Multi-employer worksites*	*Records*
Confined spaces	✓									
Permit spaces	✓	✓	✓	✓	✓	✓		✓	✓	✓
Never entered	✓									
If you only:										
Use alternate entry procedures	✓			✓			✓	✓		
Have other employers enter your space	✓								✓	✓
Are a rescue service provider		✓	✓	✓	✓	✓		✓		✓

Common questions about 437-002-0146

Q: I have a permit-space program for my facility that meets the requirements for federal OSHA's confined space rule, 1910.146, and my employees follow those requirements when they enter permit spaces. Are the requirements for 1910.146 and 437-002-0146 the same?

A: Many of the requirements are the same; however, there are also new requirements under 437-002-0146 as shown in the table below.

Similar requirements under 1910.146 and 437-002-0146	New requirements under 437-002-0146
• **Definition of a confined space** • **Definition of a permit space** • **Requirement for a written program when employees enter a permit space** • **Roles, responsibilities, and training of entrants, attendant, and entry supervisors** • **Requirement that unauthorized persons do not enter a permit space** • **Process for entering, performing work, and exiting a permit space** • **Information required on the entry permit (1910.146 requires the duration of the entry; 437-002-0146 requires starting and stopping times).** • **Requirement for pre-planning non-entry and entry rescues** • **Training requirements, practice, and qualifications of rescue personnel**	• **Include a catalog of your permit spaces in your written program that describes why they are permit spaces.** • **Ensure that any equipment is used in accordance with the manufacturer's instructions and that employees who use the equipment have been trained.** • **Ensure that employees who work around permit spaces are trained so that they understand the presence, location, and hazards associated with the spaces, and they are aware of your permit-space program.** • **Have an agreement with another rescue service provider if your employees will not provide rescue services.**

Q: We enter a confined space under the alternate entry procedures in 1910.146(c)(5) or reclassify the space according to 1910.146(c)(7). Are these requirements included in Oregon OSHA's confined space rule?

A: No. Oregon OSHA's confined space rule does not include these requirements. Under Oregon OSHA's rule, workers can use alternate entry procedures to enter a permit space without a permit (documentation is required to verify safe entry) and attendants, an entry supervisor, and rescue services are not required. See Page 25 in this guide for more information on alternate entry procedures.

What is a confined space?

A confined space is a space that meets all of the following conditions:

- It is large enough and so configured that an employee can fully enter the space and perform work.
- It has limited or restricted means for entry, exit, or both.
- It is not designed for continuous human occupancy.

It is large enough and so configured that an employee can fully enter the space and perform work. A space that is just large enough for a person to squeeze into, but not perform any work, is not a confined space. Similarly, a space that is too small for a person to enter completely is not a confined space.

It has limited or restricted means for entry, exit, or both. If a person must contort his or her body to enter or move around inside a space, it probably has a limited means of entry and exit. Climbing through a porthole to enter a space or crawling through a tunnel toward an exit are examples of spaces that have limited means of entry and exit.

Another way of measuring limited means of entry and exit is to determine how difficult it would be to remove an injured person from the space; if there is a need for a technical rescue to remove an injured person, you probably have a limited means entry and exit. Evaluate each space on a case-by-case basis.

It is not designed for continuous human occupancy. What is the primary function and purpose of the space? A space that is designed for periodic occupancy is not the same as a space that is designed for continuous occupancy.

The presence of a fixed ladder, lighting, or ventilation does not always mean that the space was designed for continuous occupancy. Is the space designed for a person to work there or is it designed to house and protect equipment that needs to be monitored or occasionally maintained? For example, a space may have lighting for periodic occupancy that may be necessary to safely enter and exit, read gauges, or perform maintenance or repairs. Similarly, ventilation may be necessary to keep equipment from overheating or to provide fresh air for temporary job assignments or tasks. In both cases, the work performed is intermittent or temporary.

Examples of confined spaces

Confined spaces include those with depth and open tops and those with narrow openings.	
Spaces with depth and open tops	**Spaces with narrow openings**
Pits	Ship compartments
Wells	Silos
Vats	Pipes
Bins	Tunnels
Hoppers	Tanks
Degreasers	Casings
Kettles	Sewers

Evaluate the Space

1) Is the space large enough to fully enter and perform work?
2) Is there limited means of entry and exit that hinders the ability to escape?
3) Is the space not designed for continuous occupancy and is it unsuitable for occupancy under normal operating conditions without safety and health considerations?

If you answered "yes" to all three criteria → You have a confined space

If you answered "no" to any of the three criteria → The space is not a confined space and Oregon OSHA's confined space rules do not apply. You can enter the space after addressing any safety and health hazards.

What is a permit space?

A permit space is a confined space that has one or more of the following characteristics:

- It has — or could have — a hazardous atmosphere.
- It contains material that could trap or bury a person.
- It is shaped so that a person could become trapped or asphyxiated.
- It has other safety or health hazards that could harm a person.

Hazards in permit spaces

Most accidents in permit spaces happen when workers and untrained rescuers do not recognize hazards in the spaces or they do not control the hazards before they enter. Never assume a permit space is safe to enter.

Permit spaces can have two types of hazards: hazardous atmospheres and physical hazards.

Hazardous atmospheres

A hazardous atmosphere affects the air in the space and can cause death or acute illness, or impair the ability of workers to escape. Hazardous atmospheres include:

- **Corrosive atmospheres.** Corrosive atmospheres accumulate from some manufacturing processes and biological or chemical reactions. Some cause immediate damage to the skin and eyes; some have no immediate effect, but cause cancer with prolonged exposure.
- **Flammable or explosive gasses, liquids, vapors, mists, fibers, or dusts.** Flammable gasses such as acetylene, butane, propane, hydrogen, and methane are common in permit spaces. Grain, nitrated fertilizers, and ground chemicals can produce combustible dusts.
- **Air or oxygen displacement.** Some substances (such as inerting gasses) can displace air or oxygen in a confined space; examples include nitrogen, helium, steam, Freon, argon, and carbon dioxide.
- **Oxygen deficiency.** Oxygen-deficient atmospheres (oxygen concentration below 19.5 percent) affect heart rate, muscle coordination, and breathing. Unprotected workers cannot survive in an oxygen-deficient atmosphere.
- **Oxygen enrichment.** Oxygen-enriched atmospheres (oxygen concentration above 23.5 percent), which can be caused by welding and from the improper use of oxygen for breathing air, increase the risk of fire or explosions.
- **Toxic dusts, mists, fumes, smoke, vapors, fibers, or gasses.** These can be released by manufacturing processes, stored materials, and work tasks. A hazardous atmosphere that poses a threat to life, would cause irreversible adverse health effects, or that would interfere with an individual's ability to escape from a confined space is called immediately dangerous to life or health (IDLH).

Some hazardous atmospheres (hydrogen fluoride gas and cadmium vapor, for example) may cause serious health effects that result 12 to 72 hours after exposure.

Air-monitoring equipment: Trained employees can use an air-monitoring meter to test for hazardous atmospheres. However, they must first calibrate the meter and use it according to the manufacturer's instructions. Inaccurate instruments can expose workers to excessive levels of toxic gas or an oxygen-deficient atmosphere. The only way to guarantee that an instrument will detect gas accurately is to test it.

"Bump test" your air-monitoring meter every day – before you use it. A bump test verifies that an air-monitoring meter is properly calibrated. You perform a bump test by exposing the meter to a known concentration of test gas. Compare the instrument reading to the actual quantity of gas present. If the instrument's response is within an acceptable tolerance range of the actual concentration, then the meter is calibrated properly.

Physical hazards

Physical hazards come in many different forms and can cause death or serious physical harm. Examples include:

- **Access problems.** In an emergency, entrants may not be able to exit quickly.
- **Absorbed chemicals.** Chemicals can be absorbed through the skin or other tissues or membranes such as the eyes.
- **Corrosive chemicals.** Corrosive chemicals can cause severe eye or skin damage if exposed workers are not wearing protective clothing or eyewear.
- **Falling objects.** Objects can fall into the space because topside openings are unguarded or improperly guarded.
- **Illumination problems.** Poor lighting makes it difficult for workers to enter, work in, and exit a permit space.
- **Inwardly converging surfaces.** Inwardly converging walls and downward sloping floors that taper to a smaller cross section can trap a worker.
- **Material that could trap or bury a person.** Loose materials drawn from the bottom of storage bins can suffocate or bury a worker. Liquids or materials that are suddenly released into the space can have the same effect.
- **Mechanical, electrical, hydraulic, and pneumatic energy.** Mechanical and hydraulic equipment can move unexpectedly. Workers servicing mechanical and hydraulic equipment can be seriously injured or killed if the energy is not properly controlled.

- **Noise.** Noise interferes with essential communication between workers in a confined space and those who are monitoring their work on the outside. High noise levels can impair hearing and cause hearing loss. Permit spaces can amplify sounds produced by tools and equipment.
- **Radiation.** Sources of radiation include x-rays, isotopes, lasers, and welders.
- **Slippery surfaces.** Wet, slippery surfaces increase the risk of falls. Leaks, spills, and condensation are common in permit spaces.
- **Extreme temperatures.** Hot environments put workers at risk for heat stress, especially when they do strenuous work or are wearing protective clothing. Cold environments make their tasks more difficult to accomplish.

Eliminating physical hazards. Ways to eliminate physical hazards in a confined space include:

- Locking out equipment (following the requirements in 1910.147, Lockout/Tagout)
- Blanking and blinding piping systems
- Physically separating piping systems from the space

Always evaluate the space in its normal state before eliminating hazards.

Evaluating confined spaces and permit spaces: 437-002-0146(4)

Determine if any of your confined spaces have hazards that make them permit spaces.

Do not allow any employees to enter a confined space until it has been fully evaluated.

At workplaces where confined spaces are being built, host employers or controlling contractors do not need to evaluate confined spaces unless:

- One of their employees will enter the space
- An employee of an employer responsible to the host employer or controlling contractor will enter the space
- A host employer or controlling contractor assumes control over the space

If your workplace has a permit space, your employees must know where it is located, that it is hazardous, and that it is a permit space.

- Allow employees to observe the evaluation of the space.
- Identify the space as a permit space. You can use signs, labels, or tags to identify the space.
- When conditions within the space change, re-evaluate it.
- Prevent unauthorized employees from entering the space.

If someone else will enter a permit space under your control (employees of another employer, for example), inform them:

- About all hazards or potential hazards in the spaces
- If the spaces have been evaluated before and what that evaluation discovered
- What your precautions or procedures are for entering the spaces

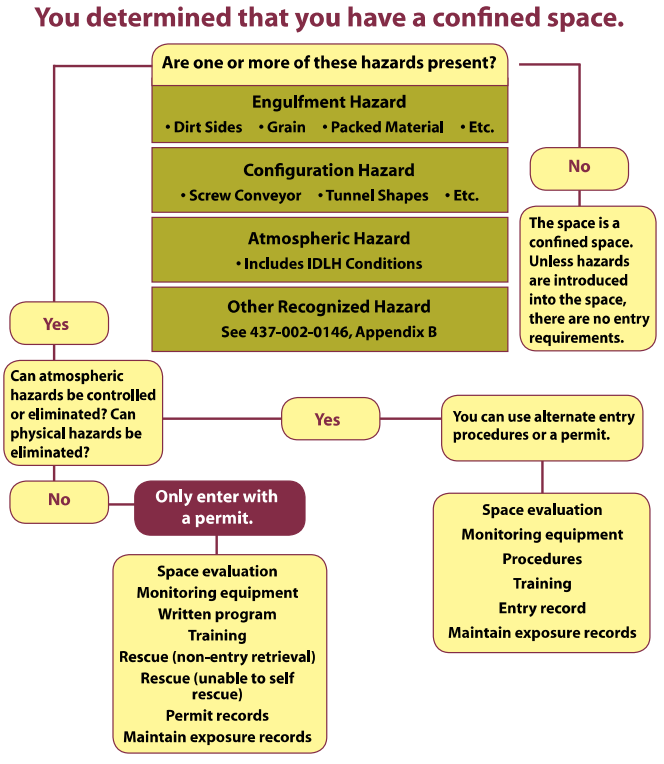
If your employees will enter a permit space, they must follow the requirements of your written permit-space program.

If you have mobile employees, you must determine whether there are confined spaces at the sites where they will be working. If confined spaces are present, the space must be evaluated to identify any physical or atmospheric hazards that make it a permit space.

The permit-space program and the entry permit: 437-002-0146(5)

If your employees will enter a confined space that has one or more of the hazards shown in the chart to the right, the space is a permit space and you must prepare a written permit-space program before they enter. Entry occurs when any part of a worker's body enters the space opening.

- An entry permit is required if atmospheric and physical hazards cannot be controlled or eliminated.
- You can use alternate entry procedures to enter a permit space if all physical hazards can be eliminated and all atmospheric hazards can be eliminated or controlled with continuous ventilation.



Requirements for a written permit space program

A written permit-space program must include:

- A procedure for issuing an entry permit
- Provisions for training employees about the written program and entry permits
- Measures taken to prohibit unauthorized employees from entering permit spaces
- The roles of entrants, attendants, entry supervisors, rescuers, and those who test or monitor the atmosphere in the space
- Provisions for training employees about their roles
- Duties of designated employees
- Instructions for identifying and evaluating hazards
- Methods for eliminating or controlling hazards
- Instructions for using and maintaining equipment
- Instructions for coordinating entry with another employer
- Procedures for concluding entry and canceling the entry permit

At fixed sites, the written program must include a list of all of your permit spaces (or the types of permit spaces if you have several of the same kind). For example, if you have sewer manholes, you do not have to include each one on the list; identify them as "sewer manholes," describe how to recognize them, and describe the hazards that make them permit spaces.

Employees must have access to the written permit-space program before entering a permit space.

Requirements for the entry permit

The entry permit describes acceptable entry conditions and verifies that a permit space is safe for workers to enter. No one can enter a permit space until a completed entry permit verifies that the hazards in the space have been eliminated or controlled. An entry supervisor must sign the entry permit, post it on the space where employees can see it, and cancel it after the work is finished.

The entry permit must include the following information:

- Description of the space that will be entered
- Purpose of the entry
- Entry date and the start and stop times of the work
- Hazards associated with the space
- Acceptable entry conditions
- Results of tests and monitoring performed to evaluate hazardous atmospheres
- Names or initials of the testers and the date the tests were performed
- Measures used before entry to isolate the space and eliminate or control hazards
- Names of entrants and attendants
- Name of the current entry supervisor
- Signature of the entry supervisor
- Communication procedures necessary for entrants and attendants to maintain contact during the entry
- Equipment necessary for safe entry
- Rescue services available and contact information for the service providers
- Permits for other work in the space (such as hot work)
- Description of problems encountered during entry

You must also develop a procedure for issuing an entry permit that describes how to:

- Evaluate the space's hazards
- Evaluate work-related hazards
- Identify safe entry conditions

Employees must have access to the completed permit before they enter a permit space so they can confirm that pre-entry preparations have been completed.

You must review your entry program when there is any reason to believe employees are not protected. Situations that require a review include:

- Unauthorized entry
- When a new hazard is identified
- When a condition prohibited by the permit occurs during entry
- When an injury or near miss occurs during entry
- When an employee reports concerns about the permit's effectiveness or the procedure for issuing the permit

When you revise your program, do not allow anyone into the affected space until the revisions are complete.

Permit entry: 437-002-0146(6)

Before workers enter a permit space, you must ensure that the hazards associated with the space have been eliminated or controlled. A completed entry permit verifies that hazards have been eliminated or controlled and the space is safe.

The entry supervisor must certify that the space is safe to enter, sign the entry permit, and post it on the space so that authorized entrants can see it.

Establishing safe entry conditions

Essential conditions for safe entry include:

- **Guarding the space.** Use warning signs or barriers to keep out unauthorized people and to protect entrants from falling objects.
- **Isolating the space.** Disconnect, lock out, or tag out hazardous equipment in the space. If you lock out equipment, remember that "lock out" includes testing to ensure the lockout method works.
- **Testing the space for hazardous atmospheres.** Test the atmosphere from outside the space for all potential atmospheric hazards, which may include oxygen; flammable gasses, dusts, or vapors; toxic gasses or vapors; and corrosive atmospheres. Provide entrants with test results. Re-test the space if an entrant believes that initial testing was inadequate.
- **Eliminating or controlling hazardous atmospheres.** Eliminate or control the hazards in the space then document the method and the steps necessary to eliminate or control the hazards. Allow entrants to observe testing, monitoring, and any other activity necessary to eliminate or control hazards.
- **Providing necessary equipment.** Ensure that entrants have the equipment they need to do their jobs (including rescue equipment) and that they know how to use the equipment.
- **Planning for emergencies.** Attendants must know how to respond to emergencies, including who to contact and how to remove entrants.

Maintaining safe entry conditions

When work begins inside the space, you must ensure safe conditions are maintained until the work is finished.
Essential conditions for maintaining safe entry include:

- **Monitoring activity inside and outside the space.** Attendants must constantly monitor the space for hazards while employees are inside.
- **Maintaining communications between attendants and entrants.** Attendants and entrants must keep in contact with each other. They must know what communications equipment to use and how to use it.
- **Keeping unauthorized people away from the space.** The entry supervisor and the attendants are responsible for keeping people away.

If the space must be evacuated, do not allow re-entry unless you do either of the following:

- Evaluate the conditions in the space to ensure it is safe for re-entry and ensure that the permit notes the evacuation
- Issue a new entry permit

Equipment necessary for entering a permit space: 437-002-0146(7)

You must have all necessary equipment to ensure safe entry into permit spaces. This equipment can include:

- Testing and monitoring equipment
- Ventilating equipment to maintain acceptable entry conditions
- Communication equipment, such as a two-way radio, for communication between the attendant and entrants, and to initiate a rescue
- Appropriate lighting, so they can see and can exit the space quickly in an emergency
- Barriers or shields to protect them from hazards outside the space such as pedestrians and vehicles
- Ladders or similar equipment so they can enter and exit the space
- Rescue equipment, if they are unable to evacuate in an emergency
- Appropriate personal protective equipment

The equipment must be available to the employees at no cost, must be used in accordance with the instructions from the manufacturer, and the employees must be trained to use it properly.

Employees' duties and responsibilities: 437-002-0146(8)

Working in a permit space involves entrants, attendants, and entry supervisors. Before anyone enters, you must designate who has each of these duties.

Entrants are the employees you allow to enter a permit space. Attendants monitor the entrants' activities from outside the space. The entry supervisor ensures that attendants and entrants follow entry procedures.

Entrants must

- Know the about hazards that they may face during entry and the signs, symptoms, and consequences of exposure
- Communicate with the attendants so the attendants can monitor their status and warn them when they need to evacuate
- Tell the attendants about hazardous conditions in the space or symptoms of exposure
- Leave the space immediately when:
  - ⛔ An order to evacuate is given by an attendant or the entry supervisor
  - ⛔ An entrant recognizes any warning sign or symptom of exposure to a dangerous situation
  - ⛔ An entrant detects a dangerous or hazardous condition
  - ⛔ An evacuation alarm is activated

Attendants must

- Know the hazards entrants may face during entry and the signs, symptoms, and consequences of exposure
- Be aware of the behavioral effects of hazards on entrants
- Keep an ongoing count of entrants and ensure that the count identifies who is in the space
- Remain outside the space during entry operations until relieved by another attendant
- Communicate with entrants to monitor their status and to alert them if they need to evacuate
- Summon emergency responders as soon as entrants need to escape from the space
- Perform non-entry rescues following your established rescue procedure
- Do nothing that would interfere with monitoring and protecting an entrant

- Monitor activity inside and outside the space and order an immediate evacuation when:
- There is a hazardous condition in the space
- An entrant's behavior is affected by exposure to a hazard
- A situation outside the space could endanger the entrants
- It is not possible to perform the duties required of an attendant

An attendant can monitor more than one space at a time if the duties for one space do not interfere with duties for another space. If an attendant's attention is focused on one space – during a rescue, for example – all other spaces that the attendant is monitoring must be evacuated or another attendant must take over those duties.

When unauthorized people approach or enter a permit space while entry is under way, attendants must:

- Warn them to stay away from the space
- Tell them that they must exit immediately if they have entered the space
- Inform the authorized entrants and the entry supervisor if unauthorized people have entered the space

You can give attendants authority to remove unauthorized people who attempt to enter a space during entry operations as long as the attendants do not enter the space.

Entry supervisors must

- Know the hazards that entrants may face during entry, including the signs, symptoms, and consequences of exposure
- Understand how to control or eliminate hazards associated with the space
- Verify that all tests specified by the entry permit have been conducted and that all procedures and equipment specified by the permit are in place before signing the permit and allowing entry to begin
- Inform entrants and attendants about the hazards and conditions associated with the space and the methods used to eliminate or control the hazards
- Terminate the entry and cancel the entry permit as required by the entry procedure
- Verify that rescue service providers are available and that they can be contacted in an emergency
- Remove unauthorized people who enter or who attempt to enter the space during entry operations
- Re-evaluate conditions in the space whenever responsibility for an entry operation is transferred, new hazards are identified, or when the work performed in the space changes

Performing rescues: 437-002-0146(9)

Before you authorize employees to enter a permit space, you must ensure that trained emergency responders will be available if an entrant needs help. Responders must be able to reach the site promptly and know how to deal with the emergency. You can use an on-site rescue team or a third-party rescue service as long as the responder meets your needs in an emergency. Third-party rescue services must agree to provide the service. (Emergency responders are not required when you use alternate entry procedures.)

Those who do not understand permit-space hazards or who respond inappropriately are often the victims in many permit-space accidents. Keep in mind that many fire departments are not equipped to respond to permit-space emergencies.

Firefighters who are not on your designated rescue team and who respond to emergency (911) calls for a confined space rescue must comply with Subdivision 2/L, 437-002-0182, Oregon Rules for Fire Fighters.

Developing a rescue procedure

Before your employees enter a permit space, you must have a procedure for removing them when they are unable to evacuate. The procedure must include the process for summoning rescue services and transporting injured entrants to a medical facility. Safety Data Sheets (SDS) must be kept at worksites. If an entrant is exposed to a hazardous substance, that written material must be made available to the treating medical facility.

Performing non-entry rescues

Use non-entry rescue methods and equipment unless they would increase the overall risk to an entrant. Each entrant must use a chest or full-body harness with a retrieval line attached at the center of the entrant's back near shoulder level, above the entrant's head, or at a similar point that makes it possible to remove the entrant from a confined space. Equipment such as wristlets or ankle straps may be used if a chest or full-body harness is not feasible.

The other end of the retrieval line must be attached to a mechanical device or to a fixed point outside the space so that the rescue can begin immediately. A mechanical device must be available to retrieve entrants from permit spaces greater than five feet deep.

Designate a rescue person or team to perform rescues in a timely manner. Response time is based on the hazards associated with the space. For example, immediately dangerous to life or health (IDLH) hazards require an immediate response and responders must be available on site for the duration of the entry. All rescuers must be knowledgable in basic first aid and cardiopulmonary resuscitation (CPR) and at least one rescuer must be certified in first aid and CPR.

Rescuers must practice non-entry rescues within 12 months before an entry. Practice rescues must include:

- Every type of space in which the rescue team might perform rescues
- Removing people or mannequins from the actual permit spaces or a simulated space that has similar characteristics

Performing entry rescues

Consider entry rescues only when a non-entry rescue would increase the overall risk to an entrant or is not feasible.

Designate a rescue team that can respond in a timely manner, can rescue entrants efficiently, and has the appropriate equipment. Ensure that the rescue team has:

- Information about the hazards it may encounter during a rescue
- Access to the permit spaces they need to enter
- Appropriate personal protective equipment (PPE)
- Any other equipment necessary for safe entry

The team must practice rescues within12 months before an entry. Rescues must involve removing people or mannequins from the actual permit spaces or from spaces that have similar characteristics. Rescuers must have the same training as entrants, attendants, and entry supervisors. All rescue team members must be knowledgeable in basic first aid and CPR and at least one rescuer must be certified in first aid and CPR.

Experienced emergency responders must be available if an entrant needs help.

Mobile workers and rescue

When your workers are mobile, they do not need to do an annual practice rescue (either entry or non-entry) if the rescue team does a practice rescue in the space that needs to be entered.

The rescue team must have access to the space before the entry because they need to develop a rescue plan and practice before the actual entry. If the team has access to a space similar to the one that needs to be entered, they can use that space for the practice rescue instead.

Third-party rescue service providers

When a third-party rescue service is used, ensure that the service:

- Agrees to provide the service
- Is capable of performing all necessary rescue operations
- Is knowledgable in first aid and CPR and at least one member is certified in first aid and CPR

Third-party rescue service providers must:

- Obtain the evaluation information about every permit space they may need to enter
- Be familiar with procedures necessary to remove entrants from permit spaces in an emergency or when they are not able to evacuate
- Use the entry permit to identify all physical and atmospheric hazards in the space and determine the procedure to follow for entering the space

Third-party rescue services must be capable of performing all necessary rescue operations.

Alternate entry: 437-002-0146(10)

What is alternate entry?

Alternate entry is a set of specific procedures for entering a permit space without an entry permit; however, the space remains a permit space under alternate entry. The following sections of 437-002-0146 apply under alternate entry:

- Evaluation, 437-002-0146(4)
- Equipment, 437-002-0146(7)
- Alternate entry, 437-002-0146(10)
- Training, 437-002-0146(11)

Employees may enter a permit space under alternate entry only after you do one of the following:

- Eliminate all physical hazards and hazardous atmospheres in the space so that conditions that caused the hazards no longer exist
- Eliminate all physical hazards in the space and control all hazardous atmospheres with continuous ventilation

Alternate entry procedures

Develop and implement alternate entry procedures that address:

- The hazards associated with the space
- The methods used to eliminate the hazards
- The methods used to ensure that the hazards have been eliminated
- The methods used to test the space for all hazardous atmospheres
- The methods used to determine if unsafe conditions occur before or during entry
- The criteria and conditions for evacuating the space
- The methods for training employees in these procedures
- The methods for ensuring employees follow these procedures

Ensure that all employees who enter:

- Have the opportunity to observe the activities required to comply with the alternate entry procedures
- Have an effective means of communication, such as a two-way radio, cellphone, or voice (if other employees are present) to request help in an emergency

Documenting alternate entry

Document each entry. Include:

- The location of the space
- The hazards associated with the space
- Measures taken to eliminate the hazards
- Measures used to control hazardous atmospheres (when applicable)
- The identity of the direct-reading instruments used to test the atmosphere (when applicable)
- The results of atmospheric testing (when applicable)
- The entry date
- The duration of the entry
- Any conditions that caused the evacuation of the space
- The name, title, and signature of the person responsible for ensuring that the space is safe to enter

Keep the document where the space is located for the duration of the entry.

Alternate entry in continuous systems

Alternate entry cannot be used to enter a permit space that is a continuous system (such as a sewer) unless you segregate the area to be entered from the rest of the space, demonstrate that engulfment can't happen and the only hazard is atmospheric, or you demonstrate and document that the hazardous conditions do not exist within the entire system during the entry.

Alternate entry with continuous ventilation

When using ventilation to control hazardous atmospheres:

- Use only properly calibrated direct-reading meters to test the atmosphere
- Ensure that direct-reading instruments are used and tested according to the manufacturer's instructions
- Test the space for hazardous atmospheres before entering
- Ensure that employees do not enter the space until testing has verified that all hazardous atmospheres are controlled by ventilation
- Perform continuous monitoring for all hazardous atmospheres while employees are in the space

Rescue procedure not required under alternate entry

There is no requirement for a rescue procedure when workers enter a confined space under alternate entry because hazards in the space have been eliminated or controlled.

Evacuating a permit space under alternate entry

Employees must immediately evacuate a space:

- When monitoring indicates the presence of a hazardous atmosphere
- When a direct-reading meter used for monitoring fails
- When ventilation fails
- When a new hazard is identified or conditions in the space change

When a space is evacuated, it cannot be re-entered unless the conditions that caused the evacuation are corrected. Re-entry must be treated and documented as a new entry.

Training employees: 437-002-0146(11)

Training employees involved in permit space work

Train employees involved in permit space activities so they acquire the understanding, knowledge, and skills necessary to safely perform their duties and their assigned responsibilities.

Training is required for new employees and for all other employees:

- Before an employee is assigned permit-space duties
- Before there is a change in an employee's assigned duties
- When there is a new permit space hazard for which an employee has not been trained
- When there are changes to the written permit-space program
- When a review of an entry permit identifies problems with an entry
- When there is a deviation from established procedures or an employee's knowledge of the procedures is inadequate

Record each employee's training, including the employee's name, the trainer's signature, the training date, and the employee's responsibilities. Employees must be able to inspect their training records.

Awareness training for employees

Awareness training is required for employees who work in areas (or who may work in areas) where permit spaces are present. The purpose of awareness training is to ensure that employees understand that their employer has permit spaces, there is a process for entering the spaces, and that they can identify the spaces.

Awareness training is not required for employees when the exposure to those spaces is negligible – such as office workers walking in a parking lot that has a sewer manhole or entering a building with a baghouse near it – as long as those employees have no other exposures to permit spaces. Awareness training is also not required when the entrances to all permit spaces are locked and access would require extraordinary means (such as a chop saw or cutting torch).

Awareness training must provide a basic overview of:

- The written permit-space program
- How to recognize a permit space
- How entry is authorized by the entry permit
- How entry is authorized by the alternate entry procedures (if used)

Repeat the training when there is a change in the written permit-space program and when there are new or previously unidentified permit spaces.

Entry operations at multi-employer worksites: 437-002-0146(12)

Before someone else's employees enter permit spaces under your control

Let their employers know about the hazards of those spaces and about any precautions or procedures that you require to protect your employees.

When your employees are working in a space, and someone else's employees will be working in or around that space, coordinate entry operations with the other employers so your employees are not exposed to hazards created or discovered by the other employees, and vice-versa.

After the operations are finished, discuss any hazards that employees created or encountered.

After your employees enter someone else's permit space

Let whoever is in control of that space (it might be a property owner or a general contractor) know about the precautions and procedures you followed and about any hazards that you or your employees found during entry.

Recordkeeping: 437-002-0146(13)

Permit entry. Keep cancelled entry permits for at least one year from the date the permit expires. Review permits within one year of their cancellation to ensure that the procedures for issuing them are still effective and the information on them still protects employees who enter the space.

Alternate entry. Keep the entry document where the space is located for the duration of the entry; after the entry, there is no requirement to keep it. However, the document may be helpful when you review the effectiveness of your confined space program.

Notes:

*Oregon*OSHA Services

Oregon OSHA offers a wide variety of safety and health services to employers and employees:

Appeals

503-947-7426; 800-922-2689; admin.web@oregon.gov

- Provides the opportunity for employers to hold informal meetings with Oregon OSHA on concerns about workplace safety and health.
- Discusses Oregon OSHA's requirements and clarifies workplace safety or health violations.
- Discusses abatement dates and negotiates settlement agreements to resolve disputed citations.

Conferences

503-378-3272; 888-292-5247, Option 1; oregon.conferences@oregon.gov

- Co-hosts conferences throughout Oregon that enable employees and employers to learn and share ideas with local and nationally recognized safety and health professionals.

Consultative Services

503-378-3272; 800-922-2689; consult.web@oregon.gov

- Offers no-cost, on-site safety and health assistance to help Oregon employers recognize and correct workplace safety and health problems.
- Provides consultations in the areas of safety, industrial hygiene, ergonomics, occupational safety and health programs, assistance to new businesses, the Safety and Health Achievement Recognition Program (SHARP), and the Voluntary Protection Program (VPP).

Enforcement

503-378-3272; 800-922-2689; enforce.web@oregon.gov

- Offers pre-job conferences for mobile employers in industries such as logging and construction.
- Inspects places of employment for occupational safety and health hazards and investigates workplace complaints and accidents.
- Provides abatement assistance to employers who have received citations and provides compliance and technical assistance by phone.

Public Education

503-947-7443; 888-292-5247, Option 2; ed.web@oregon.gov

- Provides workshops and materials covering management of basic safety and health programs, safety committees, accident investigation, technical topics, and job safety analysis.

Standards and Technical Resources

503-378-3272; 800-922-2689; tech.web@oregon.gov

- Develops, interprets, and gives technical advice on Oregon OSHA's safety and health rules.
- Publishes safe-practices guides, pamphlets, and other materials for employers and employees
- Manages the Oregon OSHA Resource Center, which offers safety videos, books, periodicals, and research assistance for employers and employees.

Need more information? Call your nearest Oregon OSHA office.

Salem Central Office

350 Winter St. NE
Salem, OR 97301-3882

Phone: 503-378-3272

Toll-free: 800-922-2689

Fax: 503-947-7461

en Español: 800-843-8086

Web site: www.orosha.org

Bend

Red Oaks Square
1230 NE Third St., Suite A-115
Bend, OR 97701-4374
541-388-6066
Consultation: 541-388-6068

Eugene

1140 Willagillespie, Suite 42
Eugene, OR 97401-2101
541-686-7562
Consultation: 541-686-7913

Medford

1840 Barnett Road, Suite D
Medford, OR 97504-8250
541-776-6030
Consultation: 541-776-6016

Pendleton

200 SE Hailey Ave.
Pendleton, OR 97801-3056
541-276-9175
Consultation: 541-276-2353

Portland

Durham Plaza
16760 SW Upper Boones Ferry Road, Suite 200
Tigard, OR 97224-7696
503-229-5910
Consultation: 503-229-6193

Salem

1340 Tandem Ave. NE, Suite 160
Salem, OR 97303
503-378-3274
Consultation: 503-373-7819

Oregon OSHA

440-2864 (11/14) OR-OSHA

DEPARTMENT OF CONSUMER & BUSINESS SERVICES

Facilities Management
The University of Iowa

HOT WORK PERMIT

STOP!

Avoid hot work or seek an alternative/safer method, if possible.

This *Hot Work Permit* is required for any temporary operation involving open flames or producing heat and/or sparks. This includes, but is not limited to: brazing, cutting, grinding, soldering, torch-applied roofing and welding.

Part 1

Instructions

1. **Firesafety Supervisor:**

A. Specify the precautions to take

B. Fill out and keep **Part 1** during the hot work process

C. Issue **Part 2** to the person doing the job.

D. Keep **Part 2** on file for future reference, including signed confirmation that the one-hour fire watch and three-hour monitoring have been completed.

HOT WORK BY
☐ Employee
☐ Contractor _____

DATE	JOB NUMBER

LOCATION/BUILDING AND FLOOR

IDENTIFY OBJECT/SPECIFIC LOCATION

NATURE OF JOB

NAME (PRINT) AND SIGNATURE OF PERSON PERFORMING HOT WORK

I verify the above location has been examined, the precautions checked on the Required Precautions Checklist have been taken to prevent fire, and permission is authorized for this work.

NAME (PRINT) AND SIGNATURE OF FIRESAFETY SUPERVISOR/OPERATIONS SUPERVISOR

TIME STARTED: a.m. p.m. TIME FINISHED: a.m. p.m.

Permit Expires	DATE	TIME a.m. p.m.

Note: Emergency notification on back of form.
Use as appropriate for your facility.

To order additional hot work permits or other FM Global resources, order online 24 hours a day, seven days a week, at www.fmglobalcatalog.com.

FM Global

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Required Precautions Checklist

Y	NA	
☐	☐	The fire pump is in operation and switched to automatic.
☐	☐	Control valves to water supply for sprinkler system are open.
☐	☐	Hose streams and extinguishers are in service/operable.
☐	☐	Hot work equipment in good working condition.
		Requirements within 35 ft. (11 m) of hot work
☐	☐	Ignitable liquid, dust, lint and oily deposits removed.
☐	☐	Explosive atmosphere in area eliminated.
☐	☐	Floors swept clean.
☐	☐	Combustible floors wet down, covered with damp sand or fire-resistive sheets.
☐	☐	Remove other combustible material where possible. Otherwise, protect with FM Approved welding pads, blankets and curtains, fire-resistive tarpaulins or metal shields.
☐	☐	All wall and floor openings covered.
☐	☐	FM Approved welding pads, blankets and curtains installed under and around work.
☐	☐	Protect or shut down ducts and conveyors that might carry sparks to distant combustible material.
		Hot work on walls, ceilings or roofs
☐	☐	Construction is noncombustible and without combustible covering or insulation.
☐	☐	Combustible material on other side of walls, ceilings or roofs is moved away.
		Hot work on enclosed equipment
☐	☐	Enclosed equipment cleaned of all combustible material.
☐	☐	Containers purged of ignitable liquid/vapor.
☐	☐	Pressurized vessels, piping and equipment removed from service, isolated and vented.
		Fire watch/hot work area monitoring
☐	☐	Fire watch will be provided during and for one (1) hour after work, including any break activity.
☐	☐	Fire watch is supplied with suitable extinguishers, and where practical, a charged small hose.
☐	☐	Fire watch is trained in use of equipment and in sounding alarm.
☐	☐	Fire watch may be required in adjoining areas, above and below.
☐	☐	Monitor hot work area for up to an additional three (3) hours after the one (1) hour fire watch.
☐	☐	**Other precautions taken:**

Facilities Management
The University of Iowa

HOT WORK PERMIT

STOP!

Avoid hot work or seek an alternative/safer method, if possible.

This *Hot Work Permit* is required for any temporary operation involving open flames or producing heat and/or sparks. This includes, but is not limited to: brazing, cutting, grinding, soldering, torch-applied roofing and welding.

Instructions

1. **Firesafety Supervisor:**

A. Specify the precautions to take

B. Fill out and keep **Part 1** during the hot work process (**Part 1A** is for quality assurance documentation, if necessary).

C. Issue **Part 2** to the person doing the job.

D. Keep **Part 2** on file for future reference, including signed confirmation that the one-hour fire watch and three-hour monitoring have been completed.

HOT WORK BY
☐ Employee
☐ Contractor _____

DATE	JOB NUMBER

LOCATION/BUILDING AND FLOOR

IDENTIFY OBJECT/SPECIFIC LOCATION

NATURE OF JOB

NAME (PRINT) AND SIGNATURE OF PERSON PERFORMING HOT WORK

I verify the above location has been examined, the precautions checked on the Required Precautions Checklist have been taken to prevent fire, and permission is authorized for this work.

NAME (PRINT) AND SIGNATURE OF FIRESAFETY SUPERVISOR/OPERATIONS SUPERVISOR

TIME STARTED: a.m. p.m. TIME FINISHED: a.m. p.m.

Permit Expires	DATE	TIME a.m. p.m.

Note: Emergency notification on back of form.
Use as appropriate for your facility.

To order additional hot work permits or other FM Global resources, order online 24 hours a day, seven days a week, at www.fmglobalcatalog.com.

FM Global

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Part 1A

Required Precautions Checklist

Y	NA	
☐	☐	The fire pump is in operation and switched to automatic.
☐	☐	Control valves to water supply for sprinkler system are open.
☐	☐	Hose streams and extinguishers are in service/operable.
☐	☐	Hot work equipment in good working condition.
		Requirements within 35 ft. (11 m) of hot work
☐	☐	Ignitable liquid, dust, lint and oily deposits removed.
☐	☐	Explosive atmosphere in area eliminated.
☐	☐	Floors swept clean.
☐	☐	Combustible floors wet down, covered with damp sand or fire-resistive sheets.
☐	☐	Remove other combustible material where possible. Otherwise, protect with FM Approved welding pads, blankets and curtains, fire-resistive tarpaulins or metal shields.
☐	☐	All wall and floor openings covered.
☐	☐	FM Approved welding pads, blankets and curtains installed under and around work.
☐	☐	Protect or shut down ducts and conveyors that might carry sparks to distant combustible material.
		Hot work on walls, ceilings or roofs
☐	☐	Construction is noncombustible and without combustible covering or insulation.
☐	☐	Combustible material on other side of walls, ceilings or roofs is moved away.
		Hot work on enclosed equipment
☐	☐	Enclosed equipment cleaned of all combustible material.
☐	☐	Containers purged of ignitable liquid/vapor.
☐	☐	Pressurized vessels, piping and equipment removed from service, isolated and vented.
		Fire watch/hot work area monitoring
☐	☐	Fire watch will be provided during and for one (1) hour after work, including any break activity.
☐	☐	Fire watch is supplied with suitable extinguishers, and where practical, a charged small hose.
☐	☐	Fire watch is trained in use of equipment and in sounding alarm.
☐	☐	Fire watch may be required in adjoining areas, above and below.
☐	☐	Monitor hot work area for up to an additional three (3) hours after the one (1) hour fire watch.
☐	☐	**Other precautions taken:** _____

Facilities Management
The University of Iowa

WARNING

HOT WORK IN PROGRESS! Watch for fire!

Instructions

1. ***Person performing hot work:*** Indicate time started and post permit at hot work location. After hot work is completed, indicate time and leave permit posted for fire watch.
2. ***Fire Watch:*** Watch area during hot work and for one (1) hour after completion. Prior to leaving area, perform final inspection, sign, leave permit posted and notify firesafety supervisor.
3. ***Monitor:*** Monitor area for additional three (3) hours. Perform final inspection, sign and return to firesafety supervisor.

HOT WORK BY
☐ Employee
☐ Contractor _____

DATE	JOB NUMBER

LOCATION/BUILDING AND FLOOR

IDENTIFY OBJECT/SPECIFIC LOCATION

NATURE OF JOB

NAME (PRINT) AND SIGNATURE OF PERSON PERFORMING HOT WORK

I verify the above location has been examined, the precautions checked on the Required Precautions Checklist have been taken to prevent fire, and permission is authorized for this work.

NAME (PRINT) AND SIGNATURE OF FIRESAFETY SUPERVISOR/OPERATIONS SUPERVISOR

TIME STARTED: a.m. p.m. TIME FINISHED: a.m. p.m.

Permit Expires	DATE	TIME a.m. p.m.

Fire watch signoff: Work area and all adjacent areas to which sparks and heat might have spread were inspected during the watch period and were found firesafe.

Signed:

Final checkup: Work area was monitored for three (3) hours following completion of the one (1) hour fire watch and found firesafe.

Signed:

Part 2

Required Precautions Checklist

Y	NA	
☐	☐	The fire pump is in operation and switched to automatic.
☐	☐	Control valves to water supply for sprinkler system are open.
☐	☐	Hose streams and extinguishers are in service/operable.
☐	☐	Hot work equipment in good working condition.
		Requirements within 35 ft. (11 m) of hot work
☐	☐	Ignitable liquid, dust, lint and oily deposits removed.
☐	☐	Explosive atmosphere in area eliminated.
☐	☐	Floors swept clean.
☐	☐	Combustible floors wet down, covered with damp sand or fire-resistive sheets.
☐	☐	Remove other combustible material where possible. Otherwise, protect with FM Approved welding pads, blankets and curtains, fire-resistive tarpaulins or metal shields.
☐	☐	All wall and floor openings covered.
☐	☐	FM Approved welding pads, blankets and curtains installed under and around work.
☐	☐	Protect or shut down ducts and conveyors that might carry sparks to distant combustible material.
		Hot work on walls, ceilings or roofs
☐	☐	Construction is noncombustible and without combustible covering or insulation.
☐	☐	Combustible material on other side of walls, ceilings or roofs is moved away.
		Hot work on enclosed equipment
☐	☐	Enclosed equipment cleaned of all combustible material.
☐	☐	Containers purged of ignitable liquid/vapor.
☐	☐	Pressurized vessels, piping and equipment removed from service, isolated and vented.
		Fire watch/hot work area monitoring
☐	☐	Fire watch will be provided during and for one (1) hour after work, including any break activity.
☐	☐	Fire watch is supplied with suitable extinguishers, and where practical, a charged small hose.
☐	☐	Fire watch is trained in use of equipment and in sounding alarm.
☐	☐	Fire watch may be required in adjoining areas, above and below.
☐	☐	Monitor hot work area for up to an additional three (3) hours after the one (1) hour fire watch.
☐	☐	**Other precautions taken:**

WARNING!

HOT WORK IN PROGRESS
Watch for fire!

In case of emergency:

Call: _____

At: _____

_____

_____

WARNING!

HAWKEYE on Safety
Be safe, and if it looks unsafe...ACT!
Facilities Management
The University of Iowa

FM Global

SECTION 01330
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. Wherever submittals are required in the Contract Documents, submit them to the Engineer.

B. All submittals shall be submitted electronically through the District provided Web-Based Construction Management system. Electronic copies shall be in Microsoft Word, Excel, or Adobe PDF format unless otherwise specified. Electronic copies shall be submitted through a collaboration Internet web site (ProCore or other as identified). The Owner will provide access rights for the collaboration web site to Contractor personnel as necessary. The Contractor will be required to utilize the collaboration website, including providing and utilizing necessary computers, internet services, phone services, and other office, scheduling, and communication software programs.

C. Definitions:

1. **Action Submittal**: Written and graphic information submitted by the Contractor that requires the Engineer's approval. (In general, all submittals are to be considered Action Submittals unless specifically indicated as informational or deferred submittals in the Contract Documents.)
2. **Informational Submittals**: Information submitted by the Contractor that does not require the Engineer's approval.
3. **Deferred Submittal**: Information required for the review of Contractor-designed systems that will be submitted to the local authority having jurisdiction for permitting.

1.02 PRECONSTRUCTION CONFERENCE SUBMITTALS

A. At the preconstruction conference of Section 01110, Summary of Work, the Contractor shall submit the following items to the Engineer for review:

1. A preliminary list of Shop Drawings, Samples, and proposed Substitutes.
2. A preliminary schedule for submission of priority and major Shop Drawings (particularly for long-lead time equipment) and Samples.
3. A list of permits and licenses the Contractor shall obtain, indicating the agency required to grant the permit, the expected date of submittal for the permit, and required date for receipt of the permit.
4. A preliminary schedule of values in accordance with Section 01292, Schedule of Values.
5. A 60-Day Plan of Operation in accordance with Section 01324, Construction Schedule.

6. A Project Overview Gantt Chart in accordance with Section 01324, Construction Schedule.
7. Contractor's Health and Safety Plan in accordance with Section 1329.

1.03 SHOP DRAWINGS

A. Wherever called for in the Contract Documents or where required by the Engineer, the Contractor shall furnish to the Engineer for review.

B. Shop Drawings in Adobe PDF format shall be bookmarked.

C. Shop Drawings may include detail design calculations, Shop-prepared Drawings, fabrication and installation drawings, erection drawings, lists, graphs, catalog sheets, data sheets, and similar items. If a list, graph, catalog sheet, data sheet, etc., includes more than one item, clearly mark which item is the subject of the submittal and the actual product to be furnished.

D. Shop Drawings that require Contractor to submit design calculations as part of a submittal, such calculations shall bear the signature and seal of an engineer registered in the appropriate branch and in the State of Oregon.

E. Shop Drawings in hard copy shall be accompanied by the Engineer's standard submittal transmittal form, a reproducible copy of which is available from the Engineer. A submittal without the form or where applicable items on the form are not completed will be returned for resubmittal.

F. Shop Drawing Organization:

1. A single submittal transmittal form shall be used for each technical specification section or item or class of material or equipment for which a submittal is required. A single submittal covering multiple sections will not be acceptable, unless the primary specification references other sections for components. Example: if a pump section references other sections for the motor, shop-applied protective coating, anchor bolts, local control panel, and variable frequency drive, a single submittal would be acceptable. A single submittal covering vertical turbine pumps and horizontal split case pumps would not be acceptable.
2. On the transmittal form, index the components of the submittal and insert tabs in the submittal to match the components. Relate the submittal components to specification paragraph and subparagraph, Drawing number, detail number, schedule title, room number, or building name, as applicable.
3. Unless indicated otherwise, terminology and equipment names and numbers used in submittals shall match those used in the Contract Documents.

G. Format:

1. Minimum sheet size shall be 8.5 inches by 11 inches. Maximum sheet size shall be 22 inches by 34 inches. Every page in a submittal shall be numbered in sequence. Each copy of a submittal shall be collated and stapled or bound, as appropriate. The Engineer will not collate sheets or copies.
2. Where product data from a manufacturer is submitted, clearly mark which model is proposed, with complete pertinent data capacities, dimensions, clearances, diagrams, controls, connections, anchorage, and supports. Sufficient level of detail shall be presented for assessment of compliance with the Contract Documents.
3. Each submittal shall be assigned a unique number based on the most relevant specification section number. Submittals shall be numbered sequentially, and the submittal numbers shall be clearly noted on the transmittal. Original submittals shall be assigned a numeric submittal number (e.g., 15200-1). If submittal "15200-1" requires a resubmittal, the first resubmittal will bear the designation "15200-1.1" and the second resubmittal will bear the designation "15200-1.2" and so on.
4. If there is a followup submittal related to a previously submitted class of material or type of equipment (e.g., follow-up submittal to submittal "15200-1"), it shall be assigned the next sequential number "15200-2". If submittal "15200-2" requires a resubmittal, the first resubmittal will bear the designation "15200-2.1" and the second resubmittal will bear the designation "15200-2.1" and so on.

H. Shop Drawings that are unorganized, do not have a table of contents, do not clearly indicate what is submitted, and do not meet the requirements of the Contract Documents will be returned without review.

I. Except as may otherwise be indicated in Sections, the Engineer will return submittal to the Contractor with comments noted thereon, within 21 days. following receipt by the Engineer.

J. It is considered reasonable that the Contractor will make a complete and acceptable submittal to the Engineer by the third resubmittal on an item. Per General Conditions 7.16 E Resubmittal Procedures additional costs for the Engineer's review shall be the Contractors responsibility.

K. If a submittal is returned to the Contractor marked "NO EXCEPTIONS TAKEN," formal revision and resubmission will not be required.

L. If a submittal is returned marked "MAKE CORRECTIONS NOTED," Contractor shall make the corrections on the submittal, but formal revision and resubmission will not be required, but written acknowledgement that the corrections were made will be required and the final O&M manual will include both the written acknowledgment of the correction and the correction.

M. If a submittal is returned marked "AMEND-RESUBMIT," the Contractor shall revise it and shall resubmit the required number of copies to the Engineer for review. Resubmittal of portions of multi-page or multi-drawing submittals will not be allowed. For example, if a Shop Drawing submittal consisting of 10 drawings contains one drawing noted as "AMEND RESUBMIT," the submittal as a whole is deemed "AMEND RESUBMIT," and 10 drawings are required to be resubmitted.

N. If a submittal is returned marked "REJECTED-RESUBMIT," it shall mean either that the proposed material or product does not satisfy the specification, the submittal is so incomplete that it cannot be reviewed, or is a substitution request not submitted in accordance with the Contract Documents.

O. Resubmittal of rejected portions of a previous submittal will not be allowed. Every change from a submittal to a resubmittal or from a resubmittal to a subsequent resubmittal shall be identified and flagged on the resubmittal.

P. Fabrication of an item may commence only after the Engineer has reviewed the pertinent submittals and returned copies to the Contractor marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED". Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as changes to the Contract requirements.

Q. Submittals shall be carefully reviewed by an authorized representative of the Contractor prior to submission to the Engineer. Each submittal shall be dated and signed by the Contractor as being correct and in strict conformance with the Contract Documents. In the case of Shop Drawings, each sheet shall be so dated and signed. Any deviations from the Contract Documents shall be noted by the Contractor on the transmittal form and such deviation shall allowed if approved in writing by the Engineer and Owner. The Engineer will only review submittals that have been so verified by the Contractor. Nonverified submittals will be returned to the Contractor without action taken by the Engineer, and any delays caused thereby shall be the total responsibility of the Contractor.

R. Corrections or comments made on the Contractor's Shop Drawings during review do not relieve the Contractor from compliance with Contract Documents. Review is for conformance to the design concept and general compliance with the Contract Documents only. The Contractor is responsible for confirming and correlating quantities and dimensions, fabrication processes and techniques, coordinating Work with the trades, and satisfactory and safe performance of the Work.

1.04 SAMPLES

A. The Contractor shall submit the number of samples indicated by the Specification Section. If the number is not indicated, submit not less than three samples. Where the amount of each sample is not indicated, submit such amount as necessary for proper examination and testing by the methods indicated.

B. Samples shall be individually and indelibly labeled or tagged, indicating the salient physical characteristics and manufacturer's name. Upon acceptance by the Engineer, one set of the samples will be stamped and dated by the Engineer and returned to the Contractor, one set of samples will be retained by the Engineer, and one set shall remain at the Site in the Engineer's field office until completion of the Work.

C. Unless indicated otherwise in Specification Section, the Engineer will select colors and textures from the manufacturer's standard colors and standard materials, products, or equipment lines. If certain samples represent nonstandard colors, materials, products, or equipment lines that will require an increase in Contract Times or Price, the Contractor shall clearly state so on the transmittal page of the submittal.

D. The Contractor shall schedule sample submittals such that:

1. Sample submittals for color and texture selection are complete so the Engineer has 45 days to assemble color panels and select color and texture dependent products and materials without delay to the construction schedule.
2. After the Engineer selects colors and textures, the Contractor has sufficient time to provide the products or materials without delay to the construction schedule. The Contract Times will not be extended for the Contractor's failure to allow enough review and approval or selection time, failure to submit complete samples requiring color or texture selection, or failure to submit complete or approvable samples.

1.05 TECHNICAL OPERATION AND MAINTENANCE INFORMATION

A. The Contractor shall submit technical operation and maintenance (O&M) information for each item of mechanical, electrical, and instrumentation equipment in an organized manner as specified in Section 01782, Operation and Maintenance Data, and in the Specifications Sections of the Contract Documents. O&M information, instructions and data shall be provided for each maintainable material and piece of equipment. It shall be written so that it can be used and understood by the Owner's operation and maintenance staff.

B. O&M Submittal Schedule: Except where indicated otherwise, technical O&M information shall be submitted in initial draft form to the Engineer not later than 90 days prior to any startup, system testing or operator training.

1. Subsequent drafts shall be provided by the Contractor within 30 days from the date of Contractor's receipt of review comments from the Engineer.
2. The approved Operation and Maintenance Manual must be available prior to any startup, system testing, or operator training.
3. The Contractor's attention is drawn to Section 01770, Closeout Procedures, where the submission of the Operation and Maintenance Manual is related to payments.

1.06 RECORD DOCUMENTS

A. The Contractor shall maintain one set of Drawings at the Site for the preparation of record drawings. On these, it shall mark every project condition, location, configuration, and any other change or deviation which may differ from the Contract Drawings

B. Buried or concealed construction and utility features shall be surveyed and located with coordinates recording the horizontal and vertical location of buried utilities regardless if they that differ from the locations indicated, or that were not indicated on the Contract Drawings.

C. Record drawings shall be supplemented by any detailed sketches and pictures as necessary to fully indicate the Work as actually constructed.

D. These record drawings are the Contractor's representation of as-built conditions, and shall be maintained up-to-date during the progress of the Work.

E. Using erasable colored pencils (not ink or indelible pencil), indicate in green when showing information deleted from the Drawings, red when showing information added to the Drawings, and blue and circled in blue to show notes.

F. Notes shall identify relevant Change Orders by number and date. Preparation of record drawings shall conform to the following:

1. Date entries.
2. Call attention to entry by "cloud" drawn around area or areas affected.
3. Legibly mark to record actual changes made during construction, including, but not limited to:
    a. Depths of various elements of foundation in relation to finished first floor data if not shown or where depth differs from that shown.
    b. Horizontal and vertical locations of existing new underground facilities and appurtenances, and other underground structures, equipment, or Work. Reference to at least two measurements to permanent surface improvements.

c. Location of internal utilities and appurtenances concealed in the construction referenced to visible and accessible features of the structure.
d. Locate existing facilities, piping, equipment, and items critical to the interface between physical conditions or construction and new construction.
e. Changes made by Addenda and Field Orders, Work Change Directives, Change Orders, Written Amendments, and Engineer's written interpretations and clarifications using consistent symbols for each and showing appropriate document tracking number.

4. Dimensions of Schematic Layouts: Show record drawings, by dimension, the centerline of each run of items such as are described in previous subparagraph above.
   a. Clearly identify the item by accurate notation such as "cast iron drain," "galv. water," and the like.
   b. Show, by symbol or note, vertical location of item ("under slab," "in ceiling plenum," "exposed," and the like.
   c. Make identification so descriptive that it may be related reliably to Specifications.

G. The Contractor shall maintain one set of Specifications at the Site for the preparation of record specifications. On these shall be recorded every change or deviation during the course of the project resulting from Work Change Directives, Field Orders, Substitutions, Engineer's written interpretation, and other reason. Record specifications shall be marked with green, red and blue pencils in the same manner as record drawings, noting the document or other reason that caused the change.

H. Prior to submitting each Application for Payment, request Engineer's review and approval of current status of record documents. Failure to properly maintain, update, and submit record documents may result in a deferral by Engineer to recommend whole or any part of Contractor's Application for Payment, either partial or final.

I. In the case of those Drawings that depict the detail requirement for equipment to be assembled and wired in the factory, such as motor control centers and the like, the record drawings shall be updated by indicating those portions which are superseded by Change Order Drawings or final Shop Drawings, and by including appropriate reference information describing the change orders by number and the Shop Drawings by manufacturer, Drawing, and revision numbers.

J. Disorganized or incomplete record documents will not be accepted. The Contractor shall revise them and resubmit within 10 days.

K. Current as-built markups of record documents shall be accessible to the Engineer during the construction period and shall be provided to the Owner prior to requesting final payment. Current markups of electrical and instrumentation drawings shall be accessible to Owner during startup and until final record drawings are available.

L. The request for final payment will not be accepted until the record documents have been completed and delivered to the Engineer.

M. Information submitted by the Contractor will be assumed to be correct, and the Contractor shall be responsible for the accuracy of such information.

1.07 QUALITY CONTROL (QC) SUBMITTALS

A. Quality control submittals are defined as those required by the Specifications to present documentary evidence to the Engineer that the Contractor has satisfied requirements of the Contract Documents.

B. Unless otherwise indicated, QC submittals shall be submitted:

1. Before delivery and unloading, for the following types of submittals:
   a. Manufacturers' installation instructions.
   b. Manufacturers' and Installers' experience qualifications.
   c. Ready mix concrete delivery tickets.
   d. Design calculations.
   e. Affidavits and manufacturers' certification of compliance with indicated product requirements.
   f. Laboratory analysis results.
   g. Factory test reports.
2. For the following types of submittals, the manufacturer's field representative shall submit a draft certification prior to leaving the Project site and a final certification within 7 days of the event documented:
   a. Manufacturers' field representative certification of proper installation.
3. Within 30 days of the event documented for the following types of submittals:
   a. Field measurement.
   b. Field test reports.
   c. Receipt of permit.
   d. Receipt of regulatory approval.
4. Submittal and testing requirements as specified in Section 13400, Instrumentation and Control for Process Systems.

C. The Engineer will record the date that a QC submittal was received and review it for compliance with submittal requirements, but the review procedures above for Shop Drawings and samples will not apply.

1.08 INFORMATIONAL SUBMITTALS

A. Informational submittals formalize the flow of information between the Contractor and the Engineer.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01350
SPECIAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Special procedures for locating and verifying concealed existing facilities.

1.02 CONCEALED EXISTING FACILITIES

A. Verify locations of utilities and facilities which may exist by consulting with the Owner, utility companies, and Blue Stake or Underground Services Alert (USA) or other service available in area of Project.

1. Abide by easement and right-of-way restrictions.

B. Notify the Owner, owners of facilities when the Work will be in progress. Make arrangements for potential emergency repairs in accordance with requirements of owners of utility facilities, including individual or residential facilities.

C. Assume responsibility for repair of facilities damaged by performance of the Work.

D. Expose sanitary and storm sewers, water, gas, electric, telephone utility lines, and other underground facilities indicated to permit survey location prior to commencement of Work in affected area.

1. Expose in ample time to permit relocation of interfering utilities with minimum delaying effect on contract time.

E. Work required for raising, lowering, or relocating utilities not indicated will be performed by affected utility owners or as part of the Work at option of affected owners of utilities.

1. When part of the Work, perform work in accordance with standards of affected utility owner, and adjustment to Contract Price and Contract Times will be made as stipulated in conditions of contract.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01352
ALTERATION PROJECT PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Requirements and procedures for performing alterations to existing facilities.

1.02 SUBMITTALS

A. Alterations Schedule: Submit in accordance with requirements for Progress Schedules.

1.03 SEQUENCE AND SCHEDULES

A. Perform Work in sequences and within times specified in Section 01140, Work Restrictions.

B. Submit separate detailed sub-schedule for alterations, coordinated with construction schedules. Indicate:

1. Each stage of Work and dates of occupancy of areas.
2. Date of Substantial Completion for each area of alterations as appropriate.
3. Trades and Subcontractors employed in each stage.

1.04 WORK INVOLVED WITH EXISTING OPERATING FACILITIES

A. Perform the Work while existing facility is in operation.

B. Do not jeopardize operation or materially reduce efficiency of existing facility.

C. Coordinate the Work with operation of the facility.

1. Do not begin alterations of designated portions of the Work until specific permission has been granted in writing by Owner in each case.
2. Engineer and Owner’s Construction Coordinator will coordinate the planned procedure with Owner’s operations and maintenance staff.
3. Complete as quickly as possible and with as little delay as possible, connections to existing equipment and utilities, and other operations that interfere with the operation of existing facility.

D. Operational functions of the facility that are required to be performed to facilitate the Work will be performed by facility personnel only.

E. Owner staff will cooperate in every way practicable to assist in expediting the Work.

F. When necessary for the proper operation or maintenance of portions of the facility, reschedule Work operations so that the Work will not conflict with necessary operations or maintenance of the facility.

1.05 ALTERATIONS, CUTTING, AND PROTECTION

A. Assign relocation, removal, cutting, and patching to trades qualified to perform in manner which causes least damage and provide means of returning surfaces to appearance of new construction.

B. Provide weather protection, waterproofing, heat and humidity control as needed to prevent damage to remaining existing and new construction.

C. Provide temporary enclosures as specified in Section 01500, Temporary Facilities and Controls, to separate construction areas from existing building and from areas occupied by Owner, and to provide weather protection.

1.06 PREPARATION

A. Identify existing materials that shall be patched, extended, or matched.

B. In addition to demolition specified and Construction specifically indicated on the Drawings, cut, move or remove items as necessary to provide access or to allow alteration and new construction to proceed, including:

1. Repair or removal of hazardous or unsanitary conditions.
2. Removal of abandoned items and items serving no useful purpose, such as abandoned piping, conduit and wiring.
3. Removal of unsuitable or extraneous materials not marked for salvage, such as abandoned furnishings and equipment, and debris such as rotted wood, rusted metals, and deteriorated concrete.
4. Cleaning of surfaces and removal of surface finishes needed to install new construction and finishes.
5. Disposal of items removed and not salvaged.

C. Cut and remove minimum amount of existing construction in manner which avoids damage to adjacent work.

D. Cut finish surfaces such as masonry, tile, plaster, and metals by methods which terminate surfaces in straight line at natural points of division.

E. Perform cutting and patching as specified in Section 01732, Cutting and Patching.

1.07 TRANSITION FROM EXISTING TO NEW WORK

A. When new construction abuts or finishes flush with existing construction, make smooth transitions and match architecture of existing construction.

B. Where partitions are removed, patch floors, walls, and ceilings with finish materials which match existing materials.

C. Where removal of partitions results in adjacent spaces becoming one, rework floors, walls, and ceilings to provide smooth planes without breaks, steps, or bulkheads.

D. Where changes of plane exceed 2 inches, request instructions for making transition.

E. Trim and refinish existing doors as necessary to clear new floors.

F. Match patched construction with adjacent construction in texture and appearance so that patch or transition is invisible at 5-foot distance.

G. When finished surfaces are cut so that smooth transition is impossible, terminate existing surface in neat manner along straight line at natural line of division and provide appropriate trim.

1.08 DAMAGED SURFACES

A. Patch and replace portions of existing finished surfaces which are damaged, lifted and discolored with matching material.

B. Provide adequate support of substrate prior to patching finishes.

C. Refinish patched portion of painted or coated surfaces in manner which produces uniform color and texture to entire surface.

D. When existing surface finish cannot be matched, refinish entire surface to nearest change of plane exceeding 45 degrees.

1.09 CLEANING

A. Perform periodic and final cleaning as specified in Section 01500, Temporary Facilities and Controls, and Section 01770, Closeout Procedures.

B. Clean Owner-occupied areas daily.

C. Clean spillage, overspray and heavy collection of dust in Owner-occupied areas immediately.

D. At completion of each portion of Work, clean area and make surfaces ready for successive portions of Work.

E. At completion of alterations in each area, provide final cleaning and return space to condition suitable for use by Owner.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01410
PERMITS AND REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. The Contractor shall construct the Work in accordance with the Contract Documents and the referenced portions of those referenced codes, standards, and specifications.

B. References herein to "Building Code" or "Uniform Building Code" shall mean the International Building Code including State of Oregon Amendments. The latest edition of the code as adopted shall apply to the Work herein, including all addenda, modifications, amendments, or other lawful changes thereto.

C. In case of conflict between codes, reference standards, Drawings, and the other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the Engineer for clarification and directions prior to ordering or providing any materials or furnishing labor. The Contractor shall bid for the most stringent requirements.

D. References herein to "OSHA Regulations for Construction" shall mean Title 29, Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto.

E. References herein to "OSHA Standards" shall mean Title 29, Part 1910, Occupational Safety and Health Standards, Code of Federal Regulations (OSHA), including all changes and amendments thereto.

F. Applicable Standard Specifications: References in the Contract Documents to "Standard Specifications" or SSPWC shall mean the Standard Specifications for Public Works Construction, 1997 Edition.

1.02 PERMITS

A. The Contractor shall keep fully informed of all local ordinances, as well as state and federal laws, which in any manner affect the Work. At all times the Contractor shall comply with said ordinances, laws, and regulations, and protect and indemnify the Owner and its officers and agents against any claim or liability arising from or based on the violation of such laws, ordinances, or regulations.

B. The Contractor shall abide by the conditions of all permits and shall obtain proof of satisfaction of conditions from issuers of permits prior to acceptance of the Work by the Owner.

C. The Contractor shall comply with all conditions attached to applicable local, state and federal permits.

D. The Contractor is responsible for installation, maintenance, and discharge of all water from dewatering operations in accordance with all regulatory requirements.

E. The Owner has applied for, and has paid, or will pay for the required permits with the City of Tigard. The Contractor is responsible for obtaining the permits following completion of the Contractor's details within the appropriate sections of the permits. The Contractor shall abide by all regulations and conditions of the permits and shall obtain indications of acceptable satisfaction of conditions prior to acceptance of the Work by the Owner. Such regulations, conditions and requirements are made a part of these Specifications as fully and completely as though the same were fully set forth herein.

F. Contractor shall be responsible for acquiring and paying for any additional permits including a Right-of-Way (ROW) street closure permits.

G. Permits and Easements Obtained After Bid Submittal: If, after the Bid submittal date, the Owner obtains any permits or easements which require changes to the Work hereunder and thereby cause an increase or decrease in the cost of, or the time required for, the performance of the Work under this Contract, the Contractor shall submit information sufficient for the Owner's Representative to determine the extent of the effects on the cost and/or schedule. If the Owner's Representative agrees the cost and/or schedule will be affected by such changes, such effects will be handled in accordance with the General Conditions. The Owner's Representative will provide the Contractor with a copy of any such permits or easements. Comply with all applicable terms and conditions contained in such permits or easements.

H. Posting Permits and Easements: Post permits and easements, as required, at the site of the Work.

1.03 REGULATIONS RELATED TO HAZARDOUS MATERIALS

A. The Contractor shall be responsible that all Work included in the Contract Documents, regardless if shown or not, shall comply with all DEQ, EPA, OSHA, RCRA, NFPA, and any other Federal, State, and Local Regulations governing the storage and conveyance of hazardous materials, including petroleum products. Also see Section 01560, Temporary Environmental Controls.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01424
ABBREVIATIONS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Abbreviations and meanings.

1.02 INTERPRETATIONS

A. Interpret abbreviations by context in which abbreviations are used.

B. Wherever in these Specifications references are made to the standards, specifications, or other published data of the various international, national, regional, or local organizations, such organizations may be referred to by their acronym or abbreviation only. As a guide to the user of these Specifications, the following acronyms or abbreviations which may appear in these Specifications shall have the meanings indicated herein.

1.03 ABBREVIATIONS

A. Abbreviations used to identify Reference Standards:

AA	Aluminum Association
AAMA	Architectural Aluminum Manufacturers Association
AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Transportation Officials
ABC	Associated Air Balance Council
ABPA	Acoustical and Board Products Association
ACI	American Concrete Institute
ACIL	American Council of Independent Laboratories
ADC	Air Diffusion Council
ABMA	American Bearing Manufacturers' Association (formerly AFBMA, Anti-Friction Bearing Manufacturers' Association)
AFBMA	Ant-Friction Bearing Manufacturer’s Association, Inc.
AFPA	American Forest Products Association
AGA	American Gas Association
AGC	Associated General Contractors
AGMA	American Gear Manufacturers' Association
AHA	American Hardboard Association
AHAM	Association of Home Appliance Manufacturers
AI	Asphalt Institute
AIA	American Institute of Architects
AIMA	Acoustical and Insulating Materials Association

AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute
APA	American Plywood Association
API	American Petroleum Institute
APWA	American Public Works Association
ARI	Air Conditioning and Refrigeration Institute
ASAHC	American Society of Architectural Hardware Consultants
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	ASTM International (Former name American Society for Testing and Materials. Still used in specifications.)
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers Association
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWSC	American Welding Society Code
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Institute of America
BSI	Building Stone Institute
CLFMI	Chain Link Fence Manufacturers Institute
CPSC	U.S. Consumer Product Safety Commission
CRA	California Redwood Association
CRI	Carpet and Rug Institute
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standards
CSI	Construction Specifications Institute
CTI	Ceramic Tile Institute
DHI	Door and Hardware Institute
EIFS	Exterior Insulation and Finish System
EJCDC	Engineers Joint Contract Documents Committee
FGMA	Flat Glass Marketing Association
FIA	Factory Insurance Association
FM	Factory Mutual
FS	Federal Specifications
FTI	Facing Tile Institute
GA	Gypsum Association

IAPMO	International Association of Plumbing and Mechanical Officials
IBC	International Building Code
ICBO	International Conference of Building Officials
ICC	International Code Council
IEEE	Institute of Electrical and Electronics Engineers
MAG	Maricopa Association of Governments
MIA	Marble Institute of America
ML/SFA	Metal Lath/Steel Framing Association
MS	Military Specifications
NAAMM	National Association of Architectural Metal Manufacturers
NAPA	National Asphalt Pavement Association
NBHA	National Builders Hardware Association
NCMA	National Concrete Masonry Association
NEC	National Electrical Code
NECA	National Electrical Contractors Association
NETA	International Electrical Testing Association
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NIST	National Institute of Standards and Technology
NMWIA	National Mineral Wood Insulation Association
NPCA	National Paint and Coatings Association
NRCA	National Roofing Contractors Association
NTMA	National Terrazzo and Mosaic Association
NWMA	National Woodwork Manufacturer's Association
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PDCA	Paint and Decorating Contractors of America
PDI	Plumbing and Drainage Institute
PEI	Porcelain Enamel Institute
PS	Product Standard
RTI	Resilient Tile Institute
SAE	Society of Automotive Engineers
SCPA	Structural Clay Products Association
SDI	Steel Door Institute
SIGMA	Sealed Insulating Glass Manufacturers Association
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SSPC	Society for Protective Coatings-Steel Structures Painting Council
TCA	Tile Council of America

UBC	Uniform Building Code (ICBO)
UL	Underwriters Laboratories, Inc.
UNS	Unified Numbering System
USDA	United States Department of Agriculture
VA	Vermiculite Association
WCLA	West Coast Lumberman's Association
WCLIB	West Coast Lumber Inspection Bureau
WPA	Western Pine Association
WPOA	Western Plumbing Officials Association
WRC	Welding Research Council
WSCPA	Western States Clay Products Association
WWPA	Western Wood Products Association

B. Abbreviations used in Specifications:

a	year or years (metric unit)
A	ampere or amperes
am	ante meridian (before noon)
ac	alternating current
ac-ft	acre-foot or acre-feet
atm	atmosphere
AWG	American Wire Gauge
bbl	barrel or barrels
bd	board
bhp	brake horsepower
bil gal	billion gallons
BOD	biochemical oxygen demand
Btu	British thermal unit or units
Btuh	British thermal units per hour
bu	bushel or bushels
C	degrees Celsius
cal	calorie or calories
cap	capita
cd	candela or candelas
cfm	cubic feet per minute
Ci	curie or curies
cm	centimeter or centimeters
cmu	concrete masonry unit
CO	carbon monoxide
Co.	Company
CO_2	carbon dioxide
COD	chemical oxygen demand

Corp.	Corporation
counts/min	counts per minute
cu	cubic
cu cm	cubic centimeter or centimeters
cu ft	cubic foot or feet
cu ft/day	cubic feet per day
cu ft/hr	cubic feet per hour
cu ft/min	cubic feet per minute
cu ft/sec	cubic feet per second
cu in	cubic inch or inches
cu m	cubic meter or meters
cu yd	cubic yard or yards
d	day (metric units)
day	day (English units)
db	decibels
DB	dry bulb (temperature)
dc	direct current
diam	diameter
DO	dissolved oxygen
DS	dissolved solids
emf	electromotive force
fpm	feet per minute
F	degrees Fahrenheit
ft	feet or foot
fc	foot-candle or foot candles
ft/day	feet per day
ft/hr	feet per hour
ft/min	feet per minute
ft/sec	feet per second
g	gram or grams
G	gravitational force
gal	gallon or gallons
gal/day	gallons per day
gal/min	gallons per minutes
gal/sec	gallons per second
gfd	gallons per square foot per day
g/L	grams per liter
gpd	gallons per day
gpd/ac	gallons per day per acre
gpd/cap	gallons per day per capita
gpd/sq ft	gallons per day per square foot
gph	gallons per hour
gpm	gallons per minute

gps	gallons per second
h	hour or hours (metric units)
ha	hectare or hectares
hp	high point
hp	horsepower
hp-hr	horsepower-hour or horsepower-hours
hr	hour or hours (English units)
Hz	hertz
ID	inside diameter
ihp	indicated horsepower
Inc.	Incorporated
inch	inch
inches	inches
inches/sec	inches per second
J	joule or joules
JTU	Jackson turbidity unit or units
k	kips
K	kelvin
K	thermal conductivity
kcal	kilocalorie or kilocalories
kcmil	thousand circular mils
kg	kilogram or kilograms
km	kilometer or kilometers
kN	kilonewton or kilonewtons
kPa	kilopascal or kilopascals
ksi	kips per square inch
kV	kilovolt or kilovolts
kVA	kilovolt-ampere or kilovolt-amperes
kW	kilowatt or kilowatts
kWh	kilowatt hour
L	liter or liters
lb/1000 cu ft	pounds per thousand cubic foot
lb/acre-ft	pounds per acre-foot
lb/ac	pounds per acre
lb/cu ft	pounds per cubic foot
lb/day/cu ft	pounds per day per cubic foot
lb/day/acre	pounds per day per acre
lb/sq ft	pounds per square foot
lin	linear, lineal
lin ft	linear foot or feet
lm	lumen or lumens
log	logarithm (common)

ln	logarithm (natural)
lx	lux
m	meter or meters
M	molar (concentration)
mA	milliampere or milliamperes
max	maximum
mCi	millicurie or millicuries
meq	milliequivalent
µF	microfarad or microfarads
MFBM	thousand feet board measure
mfr	manufacturer
mg	milligram or milligrams
mgd/ac	million gallons per day per acre
mgd	million gallons per day
mg/L	milligrams per liter
µg/L	micrograms per liter
µm	micrometer or micrometers
mile	mile
mil. gal	million gallons
miles	miles
min	minimum
min	minute or minutes
MLSS	mixed liquor suspended solids
MLVSS	mixed liquor volatile suspended solids
mm	millimeter or millimeters
mol wt	molecular weight
mol	mole
Mpa	megapascal or megapascals
mph	miles per hour
MPN	most probable number
mR	milliroentgen or milliroentgens
Mrad	megarad or megarads
mV	millivolt or millivolts
MW	megawatt or megawatts
N	newton or newtons
N	normal (concentration)
No.	number
Nos	numbers
NRC	noise reduction coefficient
NTU or ntu	nephelometric turbidity unit
oc	on center
OD	outside diameter
ORP	oxidation-reduction potential
OT	ortho-tolidine

OTA	ortha-tolidine-arsenite
oz	ounce or ounces
oz/sq ft	ounces per square foot
Pa	pascal or pascals
pl	plate or property line
pm	post meridiem (afternoon)
ppb	parts per billion
ppm	parts per million
ppt	parts per thousand
pr	pair
psf/hr	pounds per square foot per hour
psf	pounds per square foot
psi	pounds per square inch
psia	pounds per square inch absolute
psig	pounds per square inch gauge
PVC	polyvinyl chloride
qt	quart or quarts
R	radius
R	roentgen or roentgens
rad	radiation absorbed dose
RH	relative humidity
rpm	revolutions per minute
rps	revolutions per second
s	second (metric units)
S	Siemens (mho)
SDI	sludge density index or silt density index
sec	second (English units)
SI	International System of Units
sp	static pressure
sp gr	specific gravity
sp ht	specific heat
sq	square
cm^2 or sq cm	square centimeter or centimeters
sq ft	square feet or foot
sq inch	square inch
sq inches	square inches
km^2 or sq km	square kilometer or kilometers
m^2 or sq m	square meter or meters
mm^2 or sq mm	square millimeter or millimeters
sq yd	square yard or yards
SS	suspended solids
STC	Sound Transmission Class
SVI	sludge volume index

TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
TLM	median tolerance limit
TOC	total organic carbon
TOD	total oxygen demand
TOW	top of weir
TS	total solids
TSS	total suspended solids
TVS	total volatile solids
U	U Factor/U Value
U	Coefficient of Heat Transfer
U	heat transfer coefficient
UNS	Uniform Numbering System
US	United States
V	volt or volts
VA	volt-ampere or volt-amperes
W	watt or watts
WB	wet bulb
wg	water gauge
wk	week or weeks
wt	weight
yd	yard or yards
yr	year or years (English unit)

C. Abbreviations used on Drawings: As listed on Drawings or in Specifications.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01450
QUALITY CONTROL

PART 1 GENERAL

1.01 SUMMARY

A. Specific quality control requirements for the Work are indicated throughout the Contract Documents. The requirements of this Section are primarily related to performance of the Work beyond furnishing of manufactured products. The term "Quality Control" includes inspection, sampling and testing, and associated requirements.

B. The requirements of this Section are in addition to those included as part of the Statement of Special Inspection Plan on the Drawings and Section 01455, Special Inspection, Observation, and Testing.

1.02 INSPECTION AT PLACE OF MANUFACTURE

A. The presence of the Engineer at the place of manufacture, however, shall not relieve the Contractor of the responsibility for providing products, materials, and equipment which comply with all requirements of the Contract Documents. Compliance is a duty of the Contractor, and said duty shall not be avoided by any act or omission on the part of the Engineer.

B. The Engineer and Owner, their assistants, inspectors, consultants and other employees of the Owner, shall at all times and for any purpose have access to the Work and the premises used by the Contractor, Subcontractors and Suppliers, and the Contractor, Subcontractors and Suppliers shall provide safe and proper facilities therefore. Furthermore, the Owner and the Engineer shall, at all times, have immediate access to all places of manufacture where machinery, equipment or materials are being manufactured, produced or fabricated for use under the Contract Documents, and shall have full facilities for determining that all such machinery, equipment or materials are being made strictly in accordance with the Contract Documents.

C. Contractor shall notify the Engineer and Owner in writing of testing to occur at the place of manufacture no less than 30 days before the test commence.

1.03 SAMPLING AND TESTING

A. Unless otherwise indicated, all sampling and testing will be in accordance with the methods prescribed in the current standards of the ASTM, as applicable to the class and nature of the article or materials considered; however, the Owner reserves the right to use any generally-accepted system of sampling and testing which, in the opinion of the Engineer will assure the Owner that the quality of the workmanship is in full accord with the Contract Documents.

B. Any waiver by the Owner of any specific testing or other quality assurance measures, whether or not such waiver is accompanied by a guarantee of substantial performance as a relief from the testing or other quality assurance requirements originally indicated, and whether or not such guarantee is accompanied by a performance bond to assure execution of any necessary corrective or remedial Work, shall not be construed as a waiver of any requirements of the Contract Documents.

C. Notwithstanding the existence of such waiver, the Engineer reserves the right to make independent investigations and tests, and failure of any portion of the Work to meet any of the requirements of the Contract Documents, shall be reasonable cause for the Engineer to require the removal or correction and reconstruction of any such Work in accordance with the General Conditions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 INSTALLATION

A. Inspection: The Contractor shall inspect materials or equipment upon the arrival on the Job Site and immediately prior to installation, and reject damaged and defective items.

B. Measurements: The Contractor shall verify measurements and dimensions of the Work, as an integral step of starting each installation.

C. Manufacturer's Instructions: Where installations include manufactured products, the Contractor shall comply with manufacturer's applicable instructions and recommendations for installation, to whatever extent these are more explicit or more stringent than applicable requirements indicated in Contract Documents.

END OF SECTION

SECTION 01455
SPECIAL INSPECTION, OBSERVATION, AND TESTING

PART 1 GENERAL

1.01 SUMMARY

A. This section covers requirements for Special Inspection, Observation, and Testing required in accordance with Chapter 17 of the 2012 International Building Code and is in addition to and supplements requirements included in Statement of Special Inspections (Plan) shown on Drawings.

1.02 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Society of Civil Engineers (ASCE): 7-10, Minimum Design Loads for Buildings and Other Structures.
2. International Code Council (ICC):
   a. 2012 International Building Code (IBC).
   b. Evaluation Service (ICC-ES) Reports and Legacy Reports.

1.03 DEFINITIONS

A. Agencies and Personnel:

1. Approved Agency: An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved.
2. Registered Design Professional in Responsible Charge: An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the Project is to be constructed.
3. Special Inspector: Qualified person employed by Owner who will demonstrate competence to the satisfaction of the building official for inspection of a particular type of construction or operation requiring Special Inspection.

B. Special Inspection:

1. Special Inspection: Inspection required of materials, installation, fabrication, erection, or placement of components and connections requiring special expertise to ensure compliance with approved Contract Documents and referenced standards.
2. Special Inspection, Continuous: Full-time observation of work requiring Special Inspection by an approved Special Inspector who is present in the area where the Work is being performed.

3. Special Inspection, Periodic: Part-time or intermittent observation of work requiring Special Inspection by an approved Special Inspector who is present in the area where the Work has been or is being performed, and at the completion of the Work.

C. Structural Systems and Components:

1. Diaphragm: Component of structural lateral load resisting system consisting of roof, floor, or other membrane or bracing system acting to transfer lateral forces to vertical resisting elements of structure.
2. Drag Strut or Collector: Component of structural lateral load resisting system consisting of a diaphragm or shear wall element that collects and transfers diaphragm shear forces to vertical force-resisting elements or distributes forces within diaphragm or shear wall.
3. Seismic-Force-Resisting System: That part of structural lateral load resisting system that has been considered in the design to provide required resistance to seismic forces identified on Drawings.
4. Shear Wall: Component of structural lateral load resisting system consisting of a wall designed to resist lateral forces parallel to the plane of the wall. Unless noted otherwise on Drawings, load-bearing walls with direct in-plane connections to roof and floors shall be considered to be shear walls.
5. Wind Force Resisting System: That part of the structural system that has been considered in the design to provide required resistance to wind forces identified on Drawings.

D. Nonstructural Components:

1. Architectural Component Supports: Structural members or assemblies of members which transmit loads and forces from architectural systems or components to the structure, including braces, frames, struts, and attachments.
2. Electrical Component Supports: Structural members or assemblies which transmit loads and forces from electrical equipment to the structure, including braces, frames, legs, pedestals, and tethers, as well as elements forged or cast as part of component for anchorage.
3. Mechanical Component Supports: Structural members or assemblies which transmit loads and forces from mechanical equipment to the structure, including braces, frames, skirts, legs, saddles, pedestals, snubbers, and tethers, as well as elements forged or cast as part of component for anchorage.

E. Professional Observation:

1. Does not include or waive responsibility for required Special Inspection or inspections by building official.
2. Requirements are indicated on Statement of Special Inspections (Plan) provided on Drawings.
3. Geotechnical Observation: Visual observation of selected subgrade bearing surfaces by a registered design professional for general conformance to Contract Documents.
4. Structural Observation: Visual observation of structural system(s) by a registered design professional for general conformance to Contract Documents.
5. Statement of Special Inspections (Plan): Detailed written procedure contained on Drawings establishing systems and components subject to Special Inspection, Observation, and Testing during construction, type and frequency of testing, extent and duration of Special Inspection, and reports to be completed and distributed by Special Inspector.

1.04 SUBMITTALS

A. Informational Submittals: Contractor's Statement of Responsibility: Form shall be completed by each contractor responsible for construction of a main seismic-force-resisting system. Refer to Article Supplement located at end of section.

1.05 STATEMENT OF SPECIAL INSPECTIONS (PLAN) REQUIREMENTS

A. Designated Systems for Inspection:

1. Seismic-force-resisting systems designated under IBC Section 1705 and subject to Special Inspection under Section 1707: See Drawings for basic lateral load resisting systems for each structure and other designated seismic systems.
2. Wind-force-resisting systems designated under IBC Section 1706 1705. None required.
3. Architectural, Mechanical, and Electrical Components subject to Special Inspection and testing under IBC Section 1707 for Seismic Resistance: None required.

B. Statement of Special Inspections (Plan): As included in Drawings and in support of the building permit application, the Project specific plan was prepared by the registered design professional in responsible charge. The following identifies elements of the inspection, observation, and testing program to be followed in construction of the Work:

1. Designated seismic systems and main seismic force resisting systems and components that are subject to Special Inspection and Structural Observation for lateral load resistance.

2. Special Inspection and testing required by IBC Section 1704 and Section 1708, and other applicable sections and referenced standards therein.
3. Type and frequency of Special Inspection required.
4. Type and frequency of testing required.
5. Required frequency and distribution of testing and Special Inspection reports to be distributed by Special Inspector to Engineer, Contractor, building official, and Owner.
6. Geotechnical Observation to be Performed: Required frequency and distribution of Geotechnical Observation reports by registered design professional to Contractor, building official, and Owner.
7. Structural Observations to be Performed: Required frequency and distribution of Structural Observation reports by registered design professional to Contractor, building official, and Owner.

C. Special Inspection and associated testing of shop fabrication and field construction will be performed by an approved accredited independent agency. Owner will secure and pay for the services of the agency to perform Special Inspection and associated testing.

D. Owner's plan for code required Special Inspection with associated testing and Professional Observation, as provided in Statement of Special Inspections (Plan) on Drawings and further provided in this section, is for the sole benefit of Owner and does not:

1. Relieve Contractor of responsibility for providing adequate quality control measures.
2. Relieve Contractor of responsibility for damage to or loss of material before acceptance.
3. Constitute or imply acceptance.
4. Affect continuing rights of Owner after acceptance of completed Work.

E. The presence or absence of code required Special Inspector and Professional Observer does not relieve Contractor from Contract requirements.

F. Contractor is responsible for additional costs associated with Special Inspection and Testing and Observation when Work is not ready at time identified by Contractor, and Special Inspectors and Professional Observer are on Site but not able to provide contracted services.

G. Contractor is responsible for associated costs for additional Special Inspection and Testing and Professional Observation by Special Inspectors and Professional Observers required due to rejection of materials of in place Work that cannot be made compliant to Contract Document without additional Site visits or testing.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

A. Provide access to Shop or Site for Special Inspection and Testing and Professional Observation.

B. Notify Engineer in advance of required Special Inspection and Professional Observation no later than 48 hours prior to date of Special Inspection and Professional Observation.

C. Materials and systems, inclusive, shall be inspected during placement where Continuous Special Inspection is required.

D. Materials and systems shall be inspected during or at completion of their placement where Periodic Special Inspection is allowed.

1. Periodic Special Inspection shall be performed so that Work inspected after, but not during, its placement can be corrected prior to other related Work proceeding and covering inspected Work.
2. Periodic Special Inspection does not allow sampling of a portion of the Work. All Work shall be inspected.

3.02 SUPPLEMENT

A. The supplement listed below, following "End of Section," is a part of this Specification:

1. Contractor's Statement of Responsibility.

END OF SECTION

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CONTRACTOR'S STATEMENT OF RESPONSIBILITY

_____
(Project)

_____
(Name of Contracting Company)

_____
(Business Address)

(_____)_____ (_____) _____
(Telephone) (Fax)

I, (We) hereby certify that I am (we are) aware of the Special Inspection and Testing and Professional Observation requirements contained in Contract Documents for this Project for seismic force-resisting systems as listed in Statement of Special Inspections (Plan) on Drawings, and that:

1. I, (We) are responsible for implementation of the Statement of Special Inspections (Plan) for the construction of the following systems:

Facility	Lateral Force-Resisting System

2. Control of this Work will be exercised to obtain conformance with the Contract Documents approved by the building official.

3. Procedures to be used for exercising control of the Work, the method and frequency of reporting, and distribution of reports required under the Statement of Special Inspections (Plan) for this Project are attached.

4. I, (We) will provide 48-hour notification to Engineer and approved agency as required for structural tests and Special Inspection for this Project.

5. The following person is hereby identified as exercising control over the requirements of this section for the Work designated above:

Name:_____

Qualifications:_____

_____

_____

(Print name and official title of person signing this form)

Signed by:_____

Date:_____

Project Name: _____

SECTION 01500
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Furnishing, maintaining, and removing construction facilities and temporary controls, including temporary utilities, construction aids, barriers and enclosures, security, access roads, temporary controls, project sign, field offices and sheds, and removal after construction.

1.02 GENERAL REQUIREMENTS

A. Types: The types of utility services which may be required for general temporary use at the Site include the following:

1. Water service (fire protection and potable for certain uses).
2. Storm drain.
3. Sanitary sewer.
4. Electric power and lighting service.
5. Internet service.
6. Gas service.

1.03 JOB CONDITIONS

A. Scheduled Uses: The Contractor shall, in conjunction with establishment of job progress schedule, establish a schedule for implementation and termination of service for each temporary utility at the earliest feasible time, and when acceptable to Owner and Engineer, change over from use of temporary utility service to permanent service.

PART 2 PRODUCTS

2.01 MATERIALS

A. The Contractor shall provide either new or used materials and equipment, which are in substantially undamaged condition and without significant deterioration and which are recognized in the construction industry, by compliance with appropriate standards, as being suitable for intended use in each case. Where a portion of temporary utility is provided by utility company, the Contractor shall provide the remaining portion with matching and compatible materials and equipment and shall comply with recommendations of utility company.

2.02 FIELD OFFICES AND SHEDS

A. Contractor's Field Office:

1. Maintain on Project site weathertight space in which to keep copies of Contract Documents, progress schedule, Shop Drawings, and other relevant documents.
2. Provide field office with adequate space to examine documents, and provide lighting and internet service in that space.

2.03 CONSTRUCTION AIDS

A. Provide railings, kick plates, enclosures, safety devices, and controls required by Laws and Regulations and as required for adequate protection of life and property.

B. Use construction hoists, elevators, scaffolds, stages, shoring, and similar temporary facilities of ample size and capacity to adequately support and move loads.

C. Design temporary supports with adequate safety factor to assure adequate load bearing capability.

1. When requested, submit design calculations by professional registered engineer prior to application of loads.
2. Submitted design calculations are for information and record purposes only.

D. Accident Prevention:

1. Exercise precautions throughout construction for protection of persons and property.
2. Observe safety provisions of applicable laws and regulations.
3. Guard machinery and equipment, and eliminate other hazards.
4. Make reports required Contract Documents, authorities having jurisdiction, and permit safety inspections of the Work.
5. Before commencing construction Work, take necessary action to comply with provisions for safety and accident prevention.

E. Barricades:

1. Place barriers at ends of excavations and along excavations to warn pedestrian and vehicular traffic of excavations.
2. Provide barriers with flashing lights after dark.
3. Keep barriers in place until excavations are entirely backfilled and compacted.
4. Barricade excavations to prevent persons from entering excavated areas in streets, roadways, parking lots, treatment plants, or other public or private areas.

F. Warning Devices and Barricades: Adequately identify and guard hazardous areas and conditions by visual warning devices and, where necessary, physical barriers.

1. Devices shall conform to minimum requirements of OSHA and state agency which administers OSHA regulations where Project is located.

G. Hazards in Public Right-of-Way:

1. Mark at reasonable intervals, trenches and other continuous excavations in public right-of-way, running parallel to general flow of traffic, with traffic cones, barricades, or other suitable visual markers during daylight hours.
   a. During hours of darkness, provide markers with torches, flashers, or other adequate lights.
2. At intersections or for pits and similar excavations, where traffic may reasonably be expected to approach head on, protect excavations by continuous barricades.
   a. During hours of darkness, provide warning lights at close intervals.

H. Hazards in Protected Areas: Mark or guard excavations in areas from which public is excluded, in manner appropriate for hazard.

I. Above Grade Protection: On multi-level structures, provide safety protection that meets requirements of OSHA and State agency which administers OSHA regulations where Project is located.

J. Protect existing structures, trees, shrubs, and other items to be preserved on Project site from injury, damage or destruction by vehicles, equipment, worker or other agents with substantial barricades or other devices commensurate with hazards.

K. Fences:

1. Enclose site of the Work with fence adequate to protect the Work against acts of theft, violence and vandalism.
2. Enclose temporary offices and storage areas with fence adequate to protect temporary facilities against acts of theft, violence and vandalism.
3. When entire or part of site is to be permanently fenced, permanent fence may be built to serve for both permanent and temporary protection of the Work site, provided that damaged or defaced fencing is replaced prior to Substantial Completion.
4. Protect temporary and permanent openings and close openings in existing fences to prevent intrusion by unauthorized persons. Bear responsibility for protection of plant and material on site of the work when openings in existing fences are not closed.
5. During night hours, weekends, holidays, and other times when no work is performed at site, provide temporary closures or enlist services of security guards to protect temporary openings.
6. Fence temporary openings when openings are no longer necessary.

2.04 SECURITY

A. Make adequate provision for protection of the Work area against fire, theft, and vandalism, and for protection of public against exposure to injury.

2.05 ACCESS ROADS

A. General:

1. Contractor may use existing plant roads. All roads must be kept in service and accessible by the Owner at all times.
2. Build and maintain dust free roads which are suitable for travel at 20 miles per hour.

B. Onsite Access Roads:

1. Protect buried vulnerable utilities under temporary roads with steel plates, wood planking, or bridges.
2. Maintain on-site access roads free of mud. Under no circumstances shall vehicles leaving the site track mud off the site onto the public right-of-way.

2.06 PROJECT CONSTRUCTION ENTRANCE SIGNS

A. Provide and maintain one Construction Entrance signs consisting of painted 8-foot wide by 4-foot high exterior grade plywood and minimum 10-foot long 4 by 4 lumber posts, set in ground at least 3 feet, with exhibit lettering by professional sign painter using no more than 5-sign colors.

1. Provide text as defined by the Engineer.
2. Erect sign where directed by Owner or Engineer.

B. Provide minimum of one additional sign to direct delivery and forces as required. Erect Project identification sign where directed by Owner or Engineer.

PART 3 EXECUTION

3.01 INSTALLATION OF TEMPORARY UTILITY SERVICES

A. General: Owner will provide Contractor temporary connection for the duration of the project. Contractor shall make and maintain temporary connection as required by the Owner.

B. Approval of Electrical Connections: Temporary connections for electricity shall be subject to approval of the Engineer and the Owner and shall be removed in like manner at the Contractor's expense prior to final acceptance of the Work.

C. Separation of Circuits: Unless otherwise permitted by the Engineer, circuits used for power purposes shall be separate from lighting circuits.

D. Construction Wiring: Wiring for temporary electric light and power shall be properly installed and maintained and shall be securely fastened in place. Electrical facilities shall conform to the requirements of Subpart K of the OSHA Safety and Health Standards for Construction.

3.02 INSTALLATION OF POWER DISTRIBUTION SYSTEM

A. Power: The Contractor shall provide and maintain all temporary power lines required to perform the Work in a safe and satisfactory manner. The Contractor shall pay for all costs for installation and removal of the temporary power service.

B. Temporary Power Distribution: Coordinate with Owner.

3.03 INSTALLATION OF LIGHTING

A. Construction Lighting: Work conducted at night or under conditions of deficient daylight shall be suitably lighted to ensure proper Work and to afford adequate facilities for inspection and safe working conditions.

B. Temporary Lighting: The Contractor shall provide a general, weatherproof, grounded temporary lighting system in every area of construction work, to provide sufficient illumination for safe work and traffic conditions. Run circuit wiring generally overhead, and rise vertically in locations where it will be least exposed to possible damage from construction operations on grade, floors, decks, or other areas of possible damage or abuse.

3.04 WATER SUPPLY

A. General: The Contractor shall provide an adequate supply of water of a quality suitable for all domestic and construction purposes.

B. The Contractor shall provide and operate all pumping facilities, pipelines, valves, hydrants, storage tanks, and all other equipment necessary for the adequate development and operation of the water supply system. Water used for domestic purposes shall be free of contamination and shall conform to the requirements of the State and local authorities for potable water. The Contractor shall be solely responsible for the adequate functioning of its water supply system and shall be solely liable for any claims arising from the use of same, including discharge or waste of water therefrom.

C. Water Connections: The Contractor shall not make connection to or draw water from any fire hydrant or pipeline without first obtaining permission of the authority having jurisdiction over the use of said fire hydrant or pipeline and from the agency owning the affected water system. For each such connection made, the Contractor shall first attach to the fire hydrant or pipeline a valve and a meter, if required by the said authority, of a size and type acceptable to said authority and agency. The Contractor shall pay all permit and water charges.

3.05 INSTALLATION OF SANITARY FACILITIES

A. Toilet Facilities: Fixed or portable chemical toilets shall be provided wherever needed for the use of Contractor's employees. Toilets at construction job sites shall conform to the requirements of Subpart D, Section 1926.51 of the OSHA Standards for Construction. All wastes and refuse from sanitary facilities provided by the Contractor or organic material wastes from any other source related to the Contractor's operations shall be disposed of away from the Site in a manner satisfactory to the Engineer and in accordance with all laws and regulations pertaining thereto. The Contractor shall provide and pay for all costs associated with any temporary sanitary service. Contractor shall not be permitted to utilize District sanitary facilities at the site.

3.06 INSTALLATION OF FIRE PROTECTION

A. Fire Protection: The construction plant and all other parts of the Work shall be connected with the Contractor's temporary water supply system and shall be adequately protected against damage by fire. Hose connections and hose, water casks, chemical equipment, or other sufficient means shall be provided for fighting fires in the temporary structures and other portions of the Work, and responsible persons shall be designated and instructed in the operation of such fire apparatus so as to prevent or minimize the hazard of fire. The Contractor's fire protection program shall conform to the requirements of Subpart F of the OSHA Standards for Construction.

3.07 INSTALLATION OF GAS SERVICE

A. Gas Service: If desired by Contractor for heating, the Contractor shall install gas service and distribution piping of size adequate for temporary heating of enclosed construction Work, construction offices, toilets, fabrication shops and similar temporary facilities requiring heat.

3.08 INSTALLATION OF COMMUNICATIONS

A. Internet Services: The Contractor shall provide and maintain at all times during the progress of the Work at its own field construction office on the Site.

3.09 OPERATIONS AND TERMINATIONS

A. Inspections: Prior to placing temporary utility services into use, the Contractor shall inspect and test each service and arrange for governing authorities' required inspection and tests, and obtain required certifications and permits for use thereof.

B. Protection: The Contractor shall maintain distinct markers for underground lines, and protect from damage during excavating operations.

C. Termination and Removal: When need for a temporary utility service or a substantial portion thereof has ended, or when its service has been replaced by use

of permanent services, or not later than time of substantial completion, the Contractor shall promptly remove installation unless requested by Engineer to retain it for a longer period. The Contractor shall complete and restore Work which may have been delayed or affected by installation and use of temporary utility, including repairs to construction and grades and restoration and cleaning of exposed surfaces.

D. Remove temporary buildings and furnishings before inspection for Final Completion or when directed.

E. Clean and repair damage caused by installation or use of temporary facilities.

F. Remove underground installations to minimum depth of 24 inches and grade to match surrounding conditions.

G. Restore existing facilities used during construction to specified or original condition.

END OF SECTION

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SECTION 01505
MOBILIZATION

PART 1 GENERAL

1.01 SUMMARY

A. Mobilization shall include the obtaining of all permits; moving onto the site of all plant and equipment; furnishing and erecting temporary buildings, and other construction facilities; and implementing security requirements; all as required for the proper performance and completion of the Work.

B. Mobilization shall include the following principal items:

1. Moving on to the site of all Contractor's equipment required for first month operations.
2. Installing temporary construction power, wiring, and lighting facilities.
3. Developing construction water supply.
4. Providing all onsite communication facilities.
5. Arranging for and erection of Contractor's work and storage yard.
6. Obtaining all required permits.
7. Having all OSHA required notices and establishment of safety programs as identified in Contractor Safety Plan in accordance with Section 01329, Safety Plan
8. Having the Contractor's superintendent at the job site full time.
9. Submitting Preconstruction Conference Submittals in accordance with Section 01330, Submittal Procedures.

1.02 PAYMENT FOR MOBILIZATION

A. The Contractor's attention is directed to the condition that 1 percent of the total Contract Price will be deducted from any money due the Contractor as progress payments until all mobilization items listed above have been completed as specified. The aforementioned amount will be retained by the Owner as the agreed, estimated value of completing all of the mobilization items listed. Any such retention of money for failure to complete all such mobilization items as a lump-sum item shall be in addition to the retention of any payments due to the Contractor as specified in Article 15 of the General Conditions of the Contract.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01530
PROTECTION OF EXISTING FACILITIES

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall protect all existing utilities and improvements not designated for removal and shall restore damaged or temporarily relocated utilities and improvements to a condition equal to or better than prior to such damage or temporary relocation, all in accordance with the Contract Documents.

B. Verify locations of utilities and facilities which may exist by consulting with the Contract Documents, Owner, Oregon811 (http://digsafelyoregon.com/) and locating service available in area of Project.

1.02 RESTORATION OF PAVEMENT, CURBS, SIDEWALKS, AND MOWSTRIPS

A. General: All paved areas including asphaltic concrete berms cut or damaged during construction shall be replaced with similar materials of equal thickness to match the existing adjacent undisturbed areas, except where specific resurfacing requirements have been called for in the Contract Documents or in the requirements of the agency issuing the permit. The pavement restoration requirement to match existing sections shall apply to all components of existing sections, including sub-base, base, and pavement. Temporary and permanent pavement shall conform to the requirements of the affected pavement owner. Pavements which are subject to partial removal shall be neatly saw cut in straight lines.

B. Temporary Resurfacing: Wherever required by the public authorities having jurisdiction, the Contractor shall place temporary surfacing promptly after backfilling and shall maintain such surfacing for the period of time fixed by said authorities before proceeding with the final restoration of improvements.

C. Permanent Resurfacing: In order to obtain a satisfactory junction with adjacent surfaces, the Contractor shall saw cut back and trim the edge so as to provide a clean, sound, vertical joint before permanent replacement of an excavated or damaged portion of pavement. Damaged edges of pavement along excavations and elsewhere shall be trimmed back by saw cutting in straight lines. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with adjacent undisturbed pavement.

D. Restoration of Curbs, Sidewalks, Mowstrips or Private Driveways: Wherever curbs, sidewalks, mowstrips or private roads have been removed for purposes of construction, the Contractor shall place suitable temporary curbs, sidewalks, mowstrips or private roads promptly after backfilling and shall maintain them in satisfactory condition for the period of time fixed by the authorities having jurisdiction over the affected portions. If no such period of time is so fixed, the Contractor shall maintain said temporary curbs, sidewalks, mowstrips or private roads until the final restoration thereof has been made.

1.03 EXISTING UTILITIES AND IMPROVEMENTS

A. General: The Contractor shall protect underground utilities and other improvements which may be impaired during construction operations, regardless of whether or not the utilities are indicated on the Drawings. The Contractor shall take all reasonable precautions for the protection of unforeseen utility lines to provide for uninterrupted service and to provide such special protection as may be necessary.

B. Except where the Drawings indicate utilities have been field located during design or certain utility locations shall be exposed as part of the Work, the Contractor shall perform exploratory excavations as it deems necessary to determine the exact locations and depths of utilities which may interfere with its work. All such exploratory excavations shall be performed as soon as practicable after Notice to Proceed and, in any event, a sufficient time in advance of construction to avoid possible delays to the Contractor's progress. When such exploratory excavations show the utility location as shown on the Drawings to be in error, the Contractor shall so notify the Engineer.

C. The number of exploratory excavations required shall be that number which is sufficient to determine the alignment and grade of the utility.

D. Utilities to be Moved: In case it shall be necessary to move the property of any public utility or franchise holder, such utility company or franchise holder will, upon request of the Contractor, be notified by the Owner to move such property within a specified reasonable time. When utility lines that are to be removed are encountered within the area of operations, the Contractor shall notify the Engineer a sufficient time in advance for the necessary measures to be taken to prevent interruption of service.

E. Utilities to be Removed: Where the proper completion of the Work requires the temporary or permanent removal and/or relocation of an existing utility which is not indicated to be removed and/or relocated by the owner of the utility or other improvement which is indicated, the Contractor shall remove and, without unnecessary delay, temporarily replace or relocate such utility or improvement in a manner satisfactory to the Engineer and the owner of the facility. In all cases of such temporary removal or relocation, restoration to the former location shall be accomplished by the Contractor in a manner that will restore or replace the utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal.

F. Owner's Right of Access: The right is reserved to the Owner and to the owners of public utilities and franchises to enter at any time upon any public street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the Work of this Contract.

G. Underground Utilities Indicated: Existing utility lines that are indicated or the locations of which are made known to the Contractor prior to excavation and that are to be retained, and all utility lines that are exposed or constructed during excavation operations shall be protected from damage during excavation and backfilling and, if damaged, shall be immediately repaired or replaced by the Contractor, unless otherwise repaired by the owner of the damaged utility. If the owner of the damaged facility performs its own repairs, the Contractor shall reimburse said owner for the costs of repair.

H. Costs of locating and repairing damage not due to failure of the Contractor to exercise reasonable care, and removing or relocating such utilities not indicated or not indicated with reasonable accuracy in the Contract Documents, and for equipment on the Project which was actually working on that portion of the Work which was interrupted or idled by removal or relocation of such utilities, and which was necessarily idled during such work will be paid for as extra Work in accordance with the provisions of the Contract Documents.

I. Approval of Repairs: All repairs to a damaged utility or improvement are subject to inspection and approval by an authorized representative of the utility or improvement owner before being concealed by backfill or other work.

J. Maintaining in Service: Unless indicated otherwise, oil and gasoline pipelines, power, and telephone or the communication cable ducts, gas and water mains, irrigation lines, sewer lines, storm drain lines, poles, and overhead power and communication wires and cables encountered along the line of the Work shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the Engineer are made with the owner of said pipelines, duct, main, irrigation line, sewer, storm drain, pole, or wire or cable. The Contractor shall be responsible for and shall repair all damage due to its operations, and the provisions of this Section shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling.

1.04 LAWN AREAS

A. Lawn and landscaped areas damaged during construction shall be repaired to match the pre-construction condition to the satisfaction of the Owner.

1.05 NOTIFICATION BY THE CONTRACTOR

A. Prior to any excavation in the vicinity of any existing underground facilities, including all water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way, the Contractor shall notify the respective authorities representing the owners or agencies responsible for such facilities not less than 2 days prior to excavation so that a representative of said owners or agencies can be present during such work if they so desire.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01532
SITE CONDITIONS SURVEYS

PART 1 GENERAL

1.01 THE REQUIREMENTS

A. The Contractor shall conduct thorough preconstruction and post-construction Site conditions surveys of the entire Project in the company of the Owner and Engineer. Site conditions surveys shall consist of the following:

1. Photographs (.jpeg format)
2. Video (.mp4 format)

1.02 CONTRACTOR SUBMITTALS

A. Photographs, video, and other data of the preconstruction conditions shall be submitted to the Engineer for record purposes prior to, but not more than 3 weeks before, commencement of any construction activities.

B. A complete set of all photographs and survey data of the post-construction conditions shall be completed and submitted prior to final completion.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PHOTOGRAPHS AND VIDEO RECORDINGS

A. Contractor, as a minimum, shall document pre- and post-construction conditions by preparing videotape surveys of the following:

1. Roadways used to access the Work or haul materials and equipment around the Site.
2. Work areas, including actual work sites, materials processing and stockpiling areas, access corridors, and staging areas.
3. Any work completed by other contractors at the Site that will be connected to or otherwise affected by the Work.
4. Roads, curbs, driveways, sidewalks, and structures which might be affected by the Work.

B. Photographs shall be digital .jpeg format.

C. Video records shall be digital .mp4 format.

END OF SECTION

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SECTION 01555
SITE ACCESS AND STORAGE

PART 1 GENERAL

1.01 HIGHWAY LIMITATIONS

A. The Contractor shall make its own investigation of the condition of available public and private roads and of clearances, restrictions, bridge load limits, and other limitations affecting transportation and ingress and egress to the Site of the Work. It shall be the Contractor's responsibility to construct and maintain any haul roads required for its construction operations.

1.02 TEMPORARY CROSSINGS

A. General: Continuous, unobstructed, safe, and adequate pedestrian and vehicular access shall be provided to fire hydrants, commercial and industrial establishments, churches, schools, parking lots, service stations, motels, fire and police stations, and hospitals. Safe and adequate public transportation stops and pedestrian crossings at intervals not exceeding 300 feet shall be provided. The Contractor shall cooperate with parties involved in the delivery of mail and removal of trash and garbage so as to maintain existing schedules for such services. Vehicular access to residential driveways shall be maintained to the property line except when necessary construction precludes such access for reasonable periods of time.

B. Temporary Bridges: Wherever necessary, to maintain vehicular crossings, the Contractor shall provide suitable temporary bridges or steel plates over unfilled excavations, except in such cases as the Contractor shall secure the written consent of the responsible individuals or authorities to omit such temporary bridges or steel plates, which written consent shall be delivered to the Engineer prior to excavation. All such bridges or steel plates shall be maintained in service until access is provided across the backfilled excavation. Temporary bridges or steel plates for street and highway crossing shall conform to the requirements of the authority having jurisdiction in each case, and the Contractor shall adopt designs furnished by said authority for such bridges or steel plates, or shall submit designs to said authority for approval, as may be required.

C. Street Use: Nothing herein shall be construed to entitle the Contractor to the exclusive use of any public street, alleyway, or parking area during the performance of the Work hereunder, and it shall conduct its operations to not interfere unnecessarily with the authorized work of utility companies or other agencies in such streets, alleyways, or parking areas. No street shall be closed to the public without first obtaining permission of the Engineer and proper governmental authority. Where excavation is being performed in primary streets or highways, one lane in each direction shall be kept open to traffic at all times unless otherwise indicated. Toe boards shall be provided to retain excavated

material if required by the Engineer or the agency having jurisdiction over the street or highway. Fire hydrants on or adjacent to the Work shall be kept accessible to fire-fighting equipment at all times. Temporary provisions shall be made by the Contractor to assure the use of sidewalks and the proper functioning of all gutters, storm drain inlets, and other drainage facilities.

D. Contractor shall maintain access for chemical delivery at all times.

E. Contractor shall maintain access to the Solids Building Truck Loading Facility at all times.

1.03 CONTRACTOR'S WORK AND STORAGE AREAS

A. The Owner will designate for the Contractor's use, portions of the Site for its exclusive use during the term of the Contract.

B. Lands to be furnished by the Owner for storage, staging, construction operation, roads and other purposes are indicated. Should the Contractor find it necessary to use any additional land for its operations or for other purposes during the construction of the Work, it shall arrange for the use of such lands at its own expense and convenience.

C. The Contractor shall construct and use a separate storage area for hazardous materials used in constructing the Work.

1. For the purpose of this paragraph, hazardous materials to be stored in the separate area are all products labeled with any of the following terms: Warning, Caution, Poisonous, Toxic, Flammable, Corrosive, Reactive, or Explosive. In addition, whether or not so labeled, the following materials shall be stored in the separate area: diesel fuel, gasoline, new and used motor oil, hydraulic fluid, cement, paints and paint thinners, two-part epoxy coatings, sealants, asphaltic products, glues, solvents, wood preservatives, sand blast materials, and spill absorbent.
2. Hazardous materials shall be stored in groupings according to the Material Safety Data Sheets.
3. The Contractor shall develop and submit to the Engineer a plan for storing and disposing of the materials above.
4. The Contractor shall obtain and submit to the Engineer a single EPA number for wastes generated at the Site. Also comply with Article Hazardous Waste Disposal in Section 01560, Temporary Environmental Controls.
5. The separate storage area shall meet all the requirements of all authorities having jurisdiction over the storage of hazardous materials.
6. All hazardous materials which are delivered in containers shall be stored in the original containers until use. Hazardous materials which are delivered in bulk shall be stored in containers which meet the requirements of authorities having jurisdiction.

D. The Contractor shall construct and use a separate areas or constructed areas to complete the Work. The Contractor shall keep and maintain construction trailers on-site until Final Completion of the Project.

1.04 PARKING

A. The Contractor shall maintain traffic and parking areas in a sound condition, free of excavated material, construction equipment, mud, and construction materials. The Contractor shall repair breaks, potholes, low areas which collect standing water, and other deficiencies.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01560
TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 GENERAL

1.01 DUST ABATEMENT

A. The Contractor shall prevent its operation from producing dust in amounts causing a nuisance to persons living in or occupying buildings in the vicinity onsite.

B. The Contractor shall provide its own source of water or other materials for dust abatement.

C. The Contractor shall not use waste oil or other similar materials that may cause damage to the environment for dust abatement.

D. The Contractor shall be responsible for any damage resulting from dust originating from its Work operations. This will include, but not limited to, the following:

1. Manufacture's authorized representative cleaning of Electrical MCCs, Swithgear, and Control Panels.
2. Manufacture's authorized representative cleaning VFD's, harmonic filters, and PLC control panels.
3. Manufacture's authorized representative cleaning turbo blower equipment and replacement of inlet filters.
4. Manufacture's authorized representative cleaning electrical motors
5. Manufacture's authorized representative replacement of HVAC filters

E. The dust abatement measures shall be continued until the Contractor is relieved of further responsibility by the Engineer.

1.02 RUBBISH CONTROL

A. During the progress of the Work, the Contractor shall keep the Site and other areas used by it in a neat and clean condition, and free from any accumulation of rubbish.

B. The Contractor shall dispose of all rubbish and waste materials of any nature occurring at the Site, and shall establish and maintain weekly intervals of collection and disposal of such materials and waste.

C. The Contractor shall also keep plant roads free from dirt, rubbish, and unnecessary obstructions resulting from its operations. Disposal of all rubbish and surplus materials shall be off the Site in accordance with local codes and ordinances governing locations and methods of disposal, and in conformance with

all applicable safety laws, and to the particular requirements of Part 1926 of the OSHA Safety and Health Standards for Construction.

D. Contractor shall not use Owner's dumpsters or other rubbish containers unless specifically authorized.

1.03 CHEMICALS

A. All chemicals used during project construction or furnished for project operation, whether defoliant, soil sterilant, herbicide, pesticide, disinfectant, polymer, reactant or of other classification, shall show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture. Use of all such chemicals and disposal of residues shall be in strict accordance with the printed instructions of the manufacturer.

1.04 HAZARDOUS WASTE DISPOSAL

A. It is the goal of the Owner to maintain category "Conditionally Exempt, Small Quantity Generator" regarding generation of Hazardous Waste. The pounds of waste generated by Contractor during construction activities shall be charged against the Contractor's EPA ID number and not against the local site EPA ID number. This will require the Contractor to remove materials that meet Oregon's definition of Hazardous Waste from Owner's property as frequently as practical. Removal shall be done before consolidation, manifesting, or shipping of the waste, preferably by each workday's end. Recycling or proper disposal of such waste shall be the responsibility of the Contractor or its agent.

1.05 EXPLOSIVES AND BLASTING

A. The use of explosives on the Work will not be permitted.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01570
EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 THE REQUIREMENTS

A. The purpose of erosion and sediment control is to improve water quality by reducing pollutants in stormwater discharges and soil erosion from the construction site. The Erosion and Sediment Control Plan (ESCP) has been prepared to meet requirements of the Department of Environmental Quality 1200-C Permit and is detailed in the Contract Drawings.

B. The Contractor shall provide erosion control barriers, complete and in place, in accordance with the Contract Documents, the 1200-C Permit requirements, and Chapter 6 of Clean Water Services' Design and Construction Standards (June 2007).

C. The Contractor shall provide erosion protection including fertilizing, seeding, and mulching for all disturbed areas, including stockpiled berms in accordance with the Contract Documents.

1.02 CONTRACT DOCUMENT SUBMITTALS

A. Contractor shall provide and identify an erosion control inspector and contact in an action plan to be submitted by the Owner.

B. Upon award of Contract, Contractor shall assume all responsibilities for all sediment control and 1200-C Permit requirements.

C. Submittals shall be in accordance with Section 01330, Submittal Procedures.

D. Contractor shall perform daily Erosion and Sediment Control inspections, per the 1200-C requirements, and document the inspections in the electronic document management system (ProCore).

PART 2 PRODUCTS

2.01 GENERAL

A. See Section 02370, Soil Stabilization.

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01600
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 DEFINITIONS

A. The word "Products," as used in the Contract Documents, is defined to include purchased items for incorporation into the Work, regardless of whether specifically purchased for the Project or taken from Contractor's stock of previously purchased products. The word "Materials" is defined as products which must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, installed, or applied to form Work. The word "Equipment" is defined as products with operational parts, regardless of whether motorized or manually operated, and particularly including products with service connections (wiring, piping, and other like items). Definitions in this paragraph are not intended to negate the meaning of other terms used in the Contract Documents, including "specialties," "systems," "structure," "finishes," "accessories," "furnishings," special construction," and similar terms, which are self-explanatory and have recognized meanings in the construction industry.

B. Neither "Products" nor "Materials" nor "Equipment" includes machinery and equipment used for preparation, fabrication, conveying, and erection of the Work.

1.02 ANCHORAGE AND BRACING

A. The design of nonstructural products, materials, and equipment to be incorporated into the Work shall comply with the design and performance requirements of Drawing S001 Structural Notes.

1.03 QUALITY ASSURANCE

A. Source Limitations: To the greatest extent possible for each unit of Work, the Contractor shall provide products, materials, and equipment of a singular generic kind from a single source.

B. Compatibility of Options: Where more than one choice is available as options for Contractor's selection of a product, material, or equipment, the Contractor shall select an option which is compatible with other products, materials, or equipment. Compatibility is a basic general requirement of product, material and equipment selections.

1.04 PRODUCT DELIVERY AND STORAGE

A. The Contractor shall deliver and store the Work in accordance with manufacturer's written recommendations and by methods and means which will prevent damage, deterioration, and loss including theft. Delivery schedules shall be controlled to minimize long-term storage of products at the Site and

overcrowding of construction spaces. In particular, the Contractor shall ensure coordination to ensure minimum holding or storage times for flammable, hazardous, easily damaged, or sensitive materials to deterioration, theft, and other sources of loss.

1.05 TRANSPORTATION AND HANDLING

A. Products shall be transported by methods to avoid damage and shall be delivered in undamaged condition in manufacturer's unopened containers and packaging.

B. The Contractor shall provide equipment and personnel to handle products, materials, and equipment by methods to prevent soiling and damage.

C. The Contractor shall provide additional protection during handling to prevent marring and otherwise damaging products, packaging, and surrounding surfaces.

1.06 STORAGE AND PROTECTION

A. Products shall be stored in accordance with manufacturer's written instructions and with seals and labels intact and legible. Sensitive products shall be stored in weather-tight climate controlled enclosures and temperature and humidity ranges shall be maintained within tolerances required by manufacturer's recommendations.

B. For exterior storage of fabricated products, products shall be placed on sloped supports above ground. Products subject to deterioration shall be covered with impervious sheet covering and ventilation shall be provided to avoid condensation.

C. Loose granular materials shall be stored on solid flat surfaces in a well-drained area and shall be prevented from mixing with foreign matter.

D. Storage shall be arranged to provide access for inspection. The Contractor shall periodically inspect to assure products are undamaged and are continuously maintained under required conditions.

E. Storage shall be arranged in a manner to provide access for maintenance of stored items and for inspection.

1.07 MAINTENANCE OF PRODUCTS IN STORAGE

A. Stored products shall be periodically inspected on a scheduled basis. The Contractor shall maintain a log of inspections and shall make the log available on request.

B. The Contractor shall comply with manufacturer's product storage requirements and recommendations.

C. The Contractor shall maintain manufacturer-required environmental conditions continuously. This may require energizing panel and motor heaters or periodic rotation of gear train or motors. Contractor shall comply with maintenance intervals and provide power and conductors as required.

D. The Contractor shall ensure that surfaces of products exposed to the elements are not adversely affected and that weathering of finishes does not occur.

E. For mechanical and electrical equipment, the Contractor shall provide a copy of the manufacturer's service instructions with each item and the exterior of the package shall contain notice that instructions are included.

F. Products shall be serviced on a regularly scheduled basis, and a log of services shall be maintained and submitted as a record document prior to final acceptance by the Owner in accordance with the Contract Documents.

1.08 PROPOSED SUBSTITUTIONS

A. The procedure for review by the Engineer will be as set forth in the General Conditions and will include the following:

1. If the Contractor wishes to provide a substitution item, the Contractor shall make written application to the Engineer on the "Substitution Request Form."
2. Unless otherwise provided by law or authorized in writing by the Engineer, the "Substitution Request Form(s)" shall be submitted within a 35-day period after Notice to Proceed.
3. Wherever a proposed substitution item has not been submitted within said 35-day period, or wherever the submission of a proposed substitution material or equipment has been judged to be unacceptable by the Engineer, the Contractor shall provide the material or equipment indicated in the Contract Documents.
4. The Contractor shall certify by signing the form that the list of paragraphs on the form are correct for the proposed substitution.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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Section 01610

GENERAL EQUIPMENT STIPULATIONS

1. SCOPE. When an equipment specification section in this Contract references this section, the equipment shall conform to the general stipulations set forth in this section, except as otherwise specified in other sections.

2. COORDINATION. Contractor shall coordinate all details of the equipment with other related parts of the Work, including verification that all structures, piping, wiring, and equipment components are compatible. Contractor shall be responsible for all structural and other alterations in the Work required to accommodate equipment differing in dimensions or other characteristics from that contemplated in the Drawings or Specifications.

3. MANUFACTURER'S EXPERIENCE. Unless specifically named in the Specifications, a manufacturer shall have furnished equipment of the type and size specified which has been in successful operation for not less than the past 5 years.

4. WORKMANSHIP AND MATERIALS. Contractor shall guarantee all equipment against faulty or inadequate design, improper assembly or erection, defective workmanship or materials, and leakage, breakage, or other failure. Materials shall be suitable for service conditions.

All equipment shall be designed, fabricated, and assembled in accordance with recognized and acceptable engineering and shop practice. Individual parts shall be manufactured to standard sizes and thicknesses so that repair parts, furnished at any time, can be installed in the field. Like parts of duplicate units shall be interchangeable. Equipment shall not have been in service at any time prior to delivery, except as required by tests.

Except where otherwise specified, structural and miscellaneous fabricated steel used in equipment shall conform to AISC standards. All structural members shall be designed for shock or vibratory loads. Unless otherwise specified, all steel which will be submerged, all or in part, during normal operation of the equipment shall be at least 1/4 inch thick. When dissimilar metal components are used, consideration shall be given to prevention of galvanic corrosion.

5. STRUCTURAL DESIGN REQUIREMENTS. All equipment, including non-structural components and non-building structures as defined in ASCE 7, and their anchorage, shall be designed and detailed in accordance with the Meteorological and Seismic Design Criteria section.

6. LUBRICATION. Equipment shall be adequately lubricated by systems which require attention no more frequently than weekly during continuous operation. Lubrication systems shall not require attention during startup or shutdown and shall not waste lubricants.

Lubricants of the types recommended by the equipment manufacturer shall be provided in sufficient quantities to fill all lubricant reservoirs and to replace all consumption during testing, startup, and operation prior to acceptance of equipment by Owner. Lubricants for equipment where the lubricants may come in contact with water before or during a potable water treatment process or with potable water, shall be food grade lubricants. This includes lubricants for equipment not normally in contact with water, but where accidental leakage of the lubricants may contaminate the water.

Lubrication facilities shall be convenient and accessible. Oil drains and fill openings shall be easily accessible from the normal operating area or platform. Drains shall allow for convenient collection of waste oil in containers from the normal operating area or platform without removing the unit from its normal installed position.

7. ELEVATION. The elevation of the site shall be as indicated in Drawings. All equipment furnished shall be designed to meet stipulated conditions and to operate satisfactorily at the specified elevation.

8. ELECTRIC MOTORS. Not Used.

9. DRIVE UNITS. The nominal input horsepower rating of each gear or speed reducer shall be at least equal to the nameplate horsepower of the drive motor. Drive units shall be designed for 24 hour continuous service.

9.01. Gearmotors. The use of gearmotors sharing an integral housing or cutgears into the motor output shaft, or that require removal of lubricant from the gear reducer to change out the motor will not be acceptable.

9.02. Gear Reducers. Each gear reducer shall be a totally enclosed unit with oil or grease lubricated, rolling element, antifriction bearings throughout.

Unless superseded by individual specification requirements each helical, spiral bevel, combination bevel-helical, and worm gear reducers shall have a service factor of at least 1.50 based on the nameplate horsepower of the drive motor. Cycloidal gear reducers shall have a service factor of at least 2.0 based on the nameplate horsepower of the drive motor. Shaft-mounted and flange-mounted gear reducers shall be rated AGMA Class III. Helical gear reducers shall have a gear strength rating to catalog rating of 1.5. Each gear reducer shall be designed and manufactured in compliance with applicable most current AGMA standards, except the L_{10} bearing life shall be 200,000 hours.

The thermal horsepower rating of each unit shall equal or exceed the nameplate horsepower of the drive motor. During continuous operation, the maximum sump oil temperature shall not rise more than 100°F above the ambient air temperature in the vicinity of the unit and shall not exceed 200°F.

Each grease lubricated bearing shall be installed in a bearing housing designed to facilitate periodic regreasing of the bearing by means of a manually operated grease gun. Each bearing housing shall be designed to evenly distribute new grease, to properly dispose of old grease, and to prevent overgreasing of the bearing. The use of permanently sealed, grease lubricated bearings will not be acceptable in large sized reducers. In small reducers, similar to basin equipment, permanently sealed grease lubricated bearings rated L_{10} 200,000 hour life may be provided at the manufacturer's option. An internal or external oil pump and appurtenances shall be provided if required to properly lubricate oil lubricated bearings. A dipstick or a sight glass arranged to permit visual inspection of lubricant level shall be provided on each unit.

Gear reducers which require the removal of parts or the periodic disassembly of the unit for cleaning and manual regreasing of bearings will not be acceptable.

Certification shall be furnished by the gear reducer manufacturer indicating that the intended application of each unit has been reviewed in detail by the manufacturer and that the unit provided is fully compatible with the conditions of installation and service.

9.03. Adjustable Speed Drives. Each mechanical adjustable speed drive shall have a service factor of at least 1.75 at maximum speed based on the nameplate horsepower of the drive motor. A spare belt shall be provided with each adjustable speed drive unit employing a belt for speed change. Unless specifically permitted by the detailed equipment specifications, bracket type mounting will not be acceptable for variable speed drives.

9.04. V-Belt Drives. Each V-belt drive shall include a sliding base or other suitable tension adjustment. V-belt drives shall have a service factor of at least 1.75 at maximum speed based on the nameplate horsepower of the drive motor.

10. SAFETY GUARDS. All belt or chain drives, fan blades, couplings, and other moving or rotating parts shall be covered on all sides by a safety guard. Safety guards shall be fabricated from 16 USS gage thick or thicker galvanized, aluminum-clad sheet steel, or stainless sheet steel or from 1/2 inch mesh galvanized expanded metal, or pultrusion molded UV resistant materials. Each safety guard shall be reinforced or shaped to provide suitable strength to prevent vibration and deflection and shall comply with OSHA. Each guard shall be designed for easy installation and removal. All necessary supports and accessories shall be provided for each guard. Supports and accessories,

including bolts, shall be galvanized. All safety guards in outdoor locations shall be designed to prevent the entrance of rain and dripping water.

11. ANCHOR BOLTS. Equipment suppliers shall furnish suitable anchor bolts for each item of equipment. Anchor bolts, together with templates or setting drawings, shall be delivered sufficiently early to permit setting the anchor bolts when the structural concrete is placed. Anchor bolt materials shall comply with the Section 05550 Anchorage in Concrete, and sleeves shall be provided as indicated on the drawings. Unless otherwise specified, anchor bolts shall be at least 3/4 inch in diameter.

Unless otherwise indicated or specified, anchor bolts for items of equipment mounted on baseplates shall be long enough to permit 1-1/2 inches of grout beneath the baseplate and to provide adequate anchorage into structural concrete.

12. EQUIPMENT BASES. Unless otherwise indicated or specified, all equipment shall be installed on concrete bases at least 6 inches high. Cast iron or welded steel baseplates shall be provided for pumps, compressors, and other equipment. Each unit and its drive assembly shall be supported on a single baseplate of neat design. Baseplates shall have pads for anchoring all components, and adequate grout holes. Baseplates for pumps shall have a means for collecting leakage and a threaded drain connection. Baseplates shall be anchored to the concrete base with suitable anchor bolts and the space beneath filled with grout as specified in the Grouting section.

13. SPECIAL TOOLS AND ACCESSORIES. Equipment requiring periodic repair and adjustment shall be furnished complete with all special tools, instruments, and accessories required for proper maintenance. Equipment requiring special devices for lifting or handling shall be furnished complete with those devices.

14. SHOP PAINTING. All iron and steel surfaces of the equipment shall be protected with suitable protective coatings applied in the shop. Surfaces of the equipment that will be inaccessible after assembly shall be protected for the life of the equipment. Coatings shall be suitable for the environment where the equipment is installed. Exposed surfaces shall be finished, thoroughly cleaned, and filled as necessary to provide a smooth, uniform base for painting. Electric motors, speed reducers, starters, and other self-contained or enclosed components shall be shop primed or finished with an epoxy or polyurethane enamel or universal type primer suitable for top coating in the field with a universal primer and aliphatic polyurethane system.

Surfaces to be coated after installation shall be prepared for painting as recommended by the paint manufacturer for the intended service, and then shop painted with one or more coats of a universal primer.

Machined, polished, and nonferrous surfaces which are not to be painted shall be coated with rust-preventive compound as recommended by the equipment manufacturer.

15. PREPARATION FOR SHIPMENT. Equipment shall be prepared for shipment as specified in the Product Requirements section.

16. STORAGE. Handling and storage of equipment shall be as specified in the Product Requirements section.

17. INSTALLATION AND OPERATION. Installation and operation shall be as specified in respective equipment sections.

18. OBSERVATION OF PERFORMANCE TESTS. Where the Specifications require the presence of Engineer, initial tests shall be observed or witnessed by Engineer. Owner shall be reimbursed by Contractor for all costs of subsequent visits by Engineer to witness or observe incomplete tests, retesting, or subsequent tests.

19. PROGRAMMING SOFTWARE. Programming software shall be provided for any equipment which includes a programmable logic controller (PLC) or other digital controller that is user-programmable. The software shall be suitable for loading and running on a laptop personal computer operating with a Windows-based operating system. A copy of the manufacturer's original operating logic program shall be provided for use in maintaining and troubleshooting the equipment. Where multiple pieces of equipment, from the same or different vendors, use the same programming software, only one copy of the software need be provided.

20. WARRANTY. Unless specified otherwise in the individual equipment specification sections, all equipment shall be furnished with the manufacturer's standard warranty.

End of Section

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SECTION 01656

PRESSURE PIPE TESTING AND DISINFECTION

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall test pressure pipelines and appurtenant piping, in accordance with the Contract Documents.

B. The CONTRACTOR shall be responsible for obtaining permits for discharging excess testing water if required to satisfy permitting agency requirements.

C. The CONTRACTOR shall disinfect all potable water pipelines. Pipelines for non-potable or sewerage service do not require disinfection.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01330 – Submittal Procedures.

B. Furnish:

1. A testing plan and schedule, including method for water conveyance, control and disposal, shall be submitted in writing for approval.

2. A disinfection plan and schedule shall be submitted in writing for approval.

PART 2 -- PRODUCTS

2.1 MATERIAL REQUIREMENTS

A. All test equipment, temporary valves, bulkheads, and other water control equipment, shall be as determined by the CONTRACTOR. No materials shall be used which would be injurious to the WORK.

PART 3 -- EXECUTION

3.1 GENERAL

A. Water for testing pipelines will be furnished by the CONTRACTOR.

B. All pressure pipelines shall be tested; those for potable water shall be disinfected. All testing operations shall be performed in the presence of the ENGINEER.

C. Flushing and testing water shall be discharged into a sanitary sewer at the Site.

3.2 PIGGING

A. The CONTRACTOR shall clean the system thoroughly by pigging to remove sand, grit, gravel, stones, fluids, construction waste, and all material which would not be found in a properly cleaned pipeline. Pigging shall obtain a smooth interior pipe surface free from any material or fluid not used in cleaning.

B. Pigging shall be defined as passage of a sufficient number of pigs through the pipeline to achieve the clean conditions above. Flushing will not be acceptable as a substitute for pigging.

C. Provision for pig access and egress points and disposal of water and materials shall be the CONTRACTOR's responsibility.

D. Pigs shall be individually marked and their location shall be controlled and monitored so that no pigs remain in the system after cleaning.

E. Pigging may be done in conjunction with initial filling for the hydrostatic test.

3.3 HYDROSTATIC TESTING OF PIPELINES

A. Prior to hydrostatic testing, pipelines shall be flushed or blown out as appropriate. The CONTRACTOR shall test pipelines either in sections or as a unit. No section of the pipeline shall be tested until all field-placed concrete or mortar has attained an age of 14 days. The test shall be made by closing valves when available or by placing temporary bulkheads in the pipe and filling the line slowly with water. The CONTRACTOR shall be responsible for ascertaining that all test bulkheads are suitably restrained to resist the thrust of the test pressure without damage to or movement of the adjacent pipe. Unharnessed sleeve-type couplings, expansion joints, or other sliding joints shall be restrained or suitably anchored prior to the test to avoid movement and damage to piping and equipment. Remove or protect any pipeline-mounted devices that may be damaged by the test pressure. The CONTRACTOR shall provide sufficient temporary tappings in the pipelines to allow for all entrapped air to exit. After completion of the tests, such taps shall be permanently plugged. Care shall be taken that all air relief valves are open during filling.

B. The pipeline shall be filled at a rate which will not cause any surges or exceed the rate at which the air can be released through the release valves at a reasonable velocity. All the air within the pipeline shall be allowed to escape. The differential pressure across the orifices in the air release valves shall not be allowed to exceed 5 psi at any time during filling. After the pipeline or section thereof has been filled, it shall be allowed to stand under a slight pressure for at least 24 hours to allow the concrete or mortar lining, as applicable, to absorb water and to allow the

escape of air from air pockets. During this period, bulkheads, valves, and connections shall be examined for leaks. If leaks are found, corrective measures satisfactory to the OWNER shall be taken.

C. The hydrostatic test shall consist of holding the test pressure on the pipeline for a period of 4 hours. The test pressure for pipelines shall be as indicated in Section 15020 Miscellaneous Piping and Accessories Installation. All visible leaks shall be repaired in a manner acceptable to the OWNER. Add water to restore the test pressure if the pressure decreases 5 psi below test pressure during the test period.

3.4 DISINFECTION

A. All potable water pipelines shall be disinfected in accordance with AWWA requirements and procedures.

B. The CONTRACTOR shall submit its disinfection plan to the OWNER for review and approval prior to performing disinfection work.

End of Section

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SECTION 01732
CUTTING AND PATCHING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Cutting and patching existing and new construction.

B. Related Sections:

1. Section 01330, Submittal Procedures.
2. Section 01600, Product Requirements.

1.02 SUBMITTALS

A. Submit in accordance with Section 01330, Submittal Procedures.

B. Cutting and Patching Plan:

1. Submit details of proposed construction before cutting and patching construction commences affecting:
   a. Work of Owner or of others.
   b. Structural integrity of element of Project.
2. Cutting and Patching Plan shall include the following:
   a. Identification of Work.
   b. Description of affected construction.
   c. Necessity for cutting, patching, alteration, or excavation.
   d. Description of proposed construction.
   e. Scope of cutting, core drilling, patching, alteration, or excavation.
   f. X-ray or ultrasonic investigation for identification and prevention of damage to unexposed electrical or control raceway and conductors

PART 2 PRODUCTS

2.01 MATERIALS

A. Comply with specifications and standards for products involved.

PART 3 EXECUTION

3.01 PREPARATION

A. Provide adequate temporary support as necessary to ensure structural integrity of affected portion of Work.

B. Provide devices and methods to protect other portions of Project from damage and persons from injury.

C. Provide protection from elements for that portion of Project, which may be exposed by cutting and patching, and maintain excavations free from water.

3.02 CUTTING AND PATCHING

A. Provide x-ray or ultrasonic investigation prior to cutting or core drilling masonry or concrete to prevent damage to unexposed electrical or control raceway and conductors.

B. Cut, Fit, and Patch when required to:

1. Make several parts fit together properly.
2. Remove and replace construction not conforming to Contract Documents.
3. Remove samples of installed construction as specified for testing.
4. Provide routine penetrations of structural surfaces for installation of piping and electrical conduit.

C. Execute cutting and demolition by methods which will prevent damage and will provide proper surfaces to receive installation of repairs.

D. Openings in Existing Concrete and Masonry:

1. Create openings by:
   a. Saw cutting completely through concrete or masonry, or
   b. Scoring edges of opening with saw to at least 1-inch depth on both surfaces (when accessible) and removing concrete or masonry by chipping.
2. Do not allow saw cuts to extend beyond limits of opening.
3. Make corners square and true by combination of core drilling and grinding or chipping.
4. Prevent debris from falling into adjacent tanks or channels in service or from damaging existing equipment and other facilities.

E. Sizing of Openings in Existing Concrete or Masonry:

1. Make openings sufficiently large to permit final alignment of pipe and fittings without deflections.
2. Allow adequate space for packing around pipes and conduit to ensure watertightness.

F. Grouting Pipes in Place:

1. Sandblast concrete surfaces and thoroughly clean sand and other foreign material from surfaces prior to placing grout.

2. Grout pipes, sleeves, castings, and conduits in place by pouring grout under a head of at least 4 inches. Vibrate grout into place. Completely fill the spaces occupied by pipes, sleeves, castings, and conduits.
3. Water cure the grout.

G. Connections to Existing Pipes:

1. Cut existing pipe square.
2. Properly prepare the ends for the connection indicated on the Drawings.
3. Repair any damage to existing lining and coating.

H. Rehabilitate all areas affected by removal of existing equipment, equipment pads and bases, piping, supports, electrical panels, electric devices, and conduits such that little or no evidence of the previous installation remains.

1. Fill areas in existing floors, walls, and ceilings from removed piping, conduit and fasteners with specified concrete repair materials and finish smooth to match surrounding surface.
2. Remove concrete bases for equipment and supports by:
   a. Saw cutting clean, straight lines with a depth equal to the concrete cover over reinforcement minus 1/2 inch below finished surface. Do not cut existing reinforcement on floors.
   b. Chip concrete within scored lines and cut exposed reinforcing steel and anchor bolts.
   c. Patch with specified concrete repair materials to match adjacent grade and finish.
3. Terminate abandoned piping and conduits with blind flanges, caps, or plugs.

I. Treat Existing Concrete Reinforcement as follows:

1. Where existing reinforcement is to remain, protect, clean, and extend into new concrete.
2. Where existing reinforcement is not to be retained, cut off as follows:
   a. Where new concrete joins existing concrete at the removal line, cut reinforcement flush with concrete surface at the removal line.
   b. Where concrete surface at the removal line is the finished surface, cut reinforcement 2 inches below the surface, paint ends with epoxy, and patch holes with dry pack nonshrink grout.

END OF SECTION

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SECTION 01738
SELECTIVE DEMOLITION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Demolition of portions of structures.

1.02 SUBMITTALS

A. Shop Drawings: Include:

1. Demolition methods of load bearing structures not indicated on the Drawings, signed and sealed by structural Professional Engineer registered in state where Project is located.
2. Method of removing embedded relics and antiques.

B. Submittals for Information Only:

1. Permits and notices authorizing demolition.
2. Certificates of severance of utility services.
3. Permit for transport and disposal of debris.
4. Demolition procedures and operational sequence.

C. Project Record Documents: Include locations of service lines and capped utilities.

1.03 REGULATORY REQUIREMENTS

A. Dispose of debris in accordance with governing regulatory agencies.

B. Comply with applicable air pollution control regulations.

C. Obtain permits for building demolition, transportation of debris to disposal site and dust control.

D. Refer to Section 01410, Regulatory Requirements, for Environmental Survey information.

1.04 ENVIRONMENTAL REQUIREMENTS

A. Do not interfere with use of adjacent buildings. Maintain free and safe passage to and from adjacent buildings.

B. Prevent movement, settlement or collapse of structures (adjacent services, sidewalks, driveways and trees). Provide and place bracing or shoring. Assume liability for movement, settlement or collapse. Promptly repair damage.

C. Cease operations and notify Engineer immediately when safety of structure appears to be endangered. Take precautions to properly support structure. Do not resume operations until safety is restored.

D. Provide, erect and maintain barricades, lighting, guard rails, and protective devices as required to protect building occupants, general public, workers, and adjoining property.

1.05 EXISTING SERVICES

A. Arrange and pay for capping and plugging utility services. Disconnect and stub off. Notify affected utility company in advance and obtain approval before starting demolition.

B. Place markers to indicate location of disconnected services.

1.06 MAINTAINING TRAFFIC

A. Do not close or obstruct roadways without permits.

B. Conduct operations with minimum interference to public or private roadways.

1.07 MATERIALS

A. Materials and equipment to be retained by Owner:

1. Embedded relics and antiques such as cornerstones, cornerstone contents, commemorative plaques and tablets.

B. Materials and equipment to be re-installed where indicated on Drawings.

C. Contractor shall furnish all materials, tools, equipment, devices, appurtenances, facilities and services required for performing selective demolition work.

D. Erect weatherproof closures for exterior openings. Maintain exit requirements.

E. Erect and maintain dustproof partitions as required to prevent spread of dust, fumes and smoke to other parts of building, including but not limited to all electrical gear. On completion, remove partitions and repair damaged surfaces to match adjacent surfaces.

F. Protect interior of building from rain and water damage.

G. Provide and maintain protective devices to prevent injury from falling objects.

H. Locate guard rails in stairwells and around open shafts to protect workers. Post clearly visible warning signs.

I. Cause as little inconvenience to adjacent occupied building areas as possible.

J. Protect landscaping, bench marks and existing construction to remain from damage or displacement.

K. Carefully remove designated materials and equipment to be retained by Owner or re-installed. Deliver materials and equipment when and where directed by Engineer. Store and protect materials and equipment to be re-installed.

1.08 DEMOLITION

A. Demolish designated portions of structures and appurtenances in orderly and careful manner.

B. Assume possession of demolished materials, unless specified otherwise. Remove demolished materials from site at least weekly.

C. Prevent airborne dust. Use water or dust palliative when necessary. Provide and maintain hoses and connections to water main or hydrant.

D. Do not burn materials on site.

E. Immediately upon discovery, remove, and dispose of contaminated, vermin infested, or dangerous materials by safe means so as not to endanger health of workers and public.

F. Remove trees and shrubs within marked areas, clear undergrowth and dead plant material.

G. Backfill open pits and holes caused by demolition as specified in Section 02202, Excavation and Fill for Structures.

H. Rough grade areas affected by demolition.

I. Remove demolished materials, tools, and equipment upon completion of demolition.

J. Use of demolished concrete, free of rebar, organics, and other miscellaneous materials, is acceptable for use as backfill only where indicated on Drawings. Concrete pieces shall be 6 inches or less in any dimension, and be placed and intermixed with granular material in such a manner as to eliminate voids.

1.09 REPAIR

A. Repair damage caused by demolition.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01770
CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 FINAL WALK THROUGH INSPECTION

A. When the Contractor has informed the Engineer that the Work has been completed, the Contractor shall participate in a final walkthrough inspection with the Owner and Engineer at which time the final punchlist will be prepared. The punchlist shall include all previously noted preliminary punchlist items and/or noncompliance or uncompleted work items. The Contractor shall complete and sign off all punchlist items with the Engineer.

1.02 FINAL CLEANUP

A. The Contractor shall promptly remove from the vicinity of the completed Work, all rubbish, unused materials, concrete forms, construction equipment, and temporary structures and facilities used during construction. Clean dust and debris from all new equipment, control cabinets, and electrical enclosures and components. In addition, clean dust and debris from existing equipment, control cabinets, and electrical enclosures and components affected by construction and in the following adjacent areas regardless of the source of contamination.

1. IPS Biofilter.

B. Final acceptance of the Work by the Owner will be withheld until the Contractor has satisfactorily performed the final cleanup of the Site.

1.03 CLOSEOUT TIMETABLE

A. The Contractor shall establish dates for equipment testing, acceptance periods, and onsite instructional periods (as required under the Contract). Such dates shall be established not less than 10 days prior to beginning any of the foregoing items, to allow the Owner, the Engineer, and their authorized representatives sufficient time to schedule attendance at such activities.

1.04 OPERATION AND MAINTENANCE MANUAL SUBMITTAL

A. The Contractor's attention is directed to the condition that 1 percent of the Contract Price will be retained from any monies due the Contractor as progress payments, if at the 75 percent construction completion point, the approved Operation and Maintenance Manuals complying with Section 01330, Submittal Procedures, has not been submitted. The aforementioned amount will be retained by the Owner as the agreed, estimated value of the approved Operation and Maintenance Manuals. Any such retention of money for failure to submit the approved Operation and Maintenance Manuals on or before the 75 percent construction completion point shall be in addition to the retention of any

payments due to the Contractor. In any event, the approved Operation and Maintenance Manuals must be available to the Engineer prior to any equipment start up and system testing.

1.05 FINAL SUBMITTALS

A. The Contractor, prior to requesting final payment, shall obtain and submit the following items to the Engineer for transmittal to the Owner:

1. Written guarantees, where required.
2. Operation and Maintenance Manuals and instructions.
3. Maintenance stock items; spare parts; special tools.
4. Completed record documents (Drawings and Specifications).
5. Preconstruction, construction and post construction videos and photos.
6. Bonds for roofing, maintenance, etc., as required.
7. Certificates of inspection and acceptance by local governing agencies having jurisdiction.
8. Correction period bonds.
9. Releases from all parties (including private property owner's whose properties were used for yard or staging areas or were damaged) who are entitled to claims against the subject project, property, or improvement pursuant to the provisions of law.

1.06 FINAL APPLICATION FOR PAYMENT

A. Prior to the acceptance of the Work and final payment, the Owner will require the Contractor to submit a certificate in form substantially as follows:

1. "I (We) hereby certify that all Work has been performed and materials supplied in accordance with the Contract Documents for the above Work, and that:
   a. Not less than the prevailing rates of wages has been paid to laborers, workers and mechanics employed on this Work;
   b. All claims for material and labor and other services performed in connection with these Specifications have been paid;
   c. All monies due the State Industrial Accident Fund, the State Unemployment Compensation Trust Fund (ORS 279.510), the State Tax Commission (ORS 315.575, 316.711 and 316.714), hospital associations and/or others, (ORS 279.320), have been paid;
   d. All permit final inspections and approvals are complete;
   e. Contractor releases and discharges Clean Water Services of and from all liabilities, claims, obligations and actions arising under the Contract; and
   f. Contractor and the surety for this Contract shall defend, indemnify and save Clean Water Services harmless from any liability or expense because of any claim on any Bond or any other claim related to the Contract or the Work."

1.07 CORRECTION OF DEFECTIVE WORK

A. The Contractor shall comply with the defective Work correction requirements contained in Article 15 of the General Conditions. The correction period shall begin upon the Substantial Completion of entire Project.

B. Replacement of earth fill or backfill, where it has settled below the required finish elevations, shall be considered as a part of such required corrective work, and any repair or resurfacing constructed by the Contractor which becomes necessary by reason of such settlement shall likewise be considered as a part of such required corrective work unless the Contractor shall have obtained a statement in writing from the affected private owner or public agency releasing the Owner from further responsibility in connection with such repair or resurfacing.

C. The Contractor shall make all repairs and replacements promptly upon receipt of written order from the Owner. If the Contractor fails to make such repairs or replacements promptly, the Owner reserves the right to do the Work and the Contractor and its surety shall be liable to the Owner for the cost thereof.

D. The Engineer will establish a Need for Warranty Service System with the Owner whereby the Owner will alert the Contractor of the need for warranty service during the 1 year Correction Period. The Contractor shall respond promptly to these requests. Should the Contractor fail to respond promptly, the Owner reserves the right to do the Work and the Contractor and its surety shall be liable to the Owner for the cost thereof.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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Section 02200

EXCAVATION AND FILL FOR STRUCTURES

PART 1 - GENERAL

1-1. SCOPE. This section covers earthwork and shall include the necessary clearing, grubbing, and preparation of the site; removal and disposal of all debris; excavation; handling, storage, transportation, and disposal of all excavated material; all necessary sheeting, shoring, and protection work; preparation of sub-grades; pumping and dewatering as necessary; protection of adjacent property; backfilling; construction of fills and embankments; grading; and other appurtenant work.

1-2. GENERAL. With reference to the terms and conditions of the construction standards for excavations set forth in OSHA "Safety and Health Regulations for Construction", Chapter XVII of Title 29, CFR, Part 1926, Contractor shall employ a competent person and, when necessary based on the regulations, a licensed or registered professional engineer in the state where the earthwork is located, to act upon all pertinent matters of the work of this section.

1.2.01 REFERENCES

American Society for Testing and Materials (ASTM).

Oregon Department of Transportation (ODOT) 2018 Oregon Standard Specifications for Construction Standard Specifications (OSSC).

1-3. SUBMITTALS. Drawings, specifications, and data covering the proposed materials shall be submitted in accordance with Section 01330, Submittal Procedures.

At least 30 days before starting construction on the sheeting and shoring and in accordance with OSHA requirements enumerated above, the Contractor shall ensure that the sheeting and shoring design engineer shall complete and submit to Engineer the Protective System Design Certificate - 1 and the Contractor shall use the sheeting and shoring design. If required by the OSHA requirements enumerated above or to protect existing facilities, then the Contractor is responsible for ensuring that a separate certificate shall be submitted for each unique design. If required for protection of existing facilities or as required by the enumerated OSHA regulations, the certificate shall be signed and sealed by the registered professional engineer that designed the protection system.

1-3.01. Filter Fabric Data. Complete descriptive and engineering data for the fabric shall be submitted in accordance with Section 01330, Submittal Procedures. Data submitted shall include:

A 12 inch square sample of fabric.

Manufacturer's descriptive product data.

Installation instructions.

1-3.02 Test Results for Preliminary Review of Materials. Complete test results by an independent commercial laboratory retained by the Contractor for preliminary review of materials proposed for use in fills and embankments, structure backfill, select fill, granular fill, gravel beneath slabs, and any other fill material specified herein.

1-3.03 CLSM Mix Design. Mix design by in independent commercial laboratory to be retained by the Contractor.

1-4. BASIS FOR PAYMENT.

1-4.01. Sheeting for Excavation of Structures. No additional payment above the Contract Price will be made for steel sheet piling left in place in excavations for structures.

1-5. INSURANCE. Professional Liability insurance shall be provided as specified in the Supplementary Conditions.

PART 2 - PRODUCTS

2-1. MATERIALS.

2-1.01. Filter Fabric. Filter fabric shall be provided in rolls wrapped with covering for protection from mud, dirt, dust, and debris.

2-1.01.01. Filter Fabric Type A. Filter fabric Type A shall be provided for installation at locations indicated on the Drawings and as specified herein. Filter fabric Type A shall be a non-woven fabric consisting of only continuous chains of polypropylene filaments or yarns of polyester formed into a stable network by needle punching. The fabric shall be inert to commonly encountered chemicals; shall be resistant to mildew, rot, ultraviolet light, insects, and rodents; and shall have the indicated properties:

Property	Test Method	Unit	Min Roll Value*
Fabric Weight	ASTM D3776	oz/yd^2 [g/m^2]	6.0 [203]
Grab Strength	ASTM D4632	lbs [N]	160 [711]
Grab Elongation	ASTM D4632	percent	50
CBR Puncture Strength	ASTM D6241	lbs [N]	410 [1,824]
Trapezoidal Tear	ASTM D4533	lbs [N]	60 [267]
UV Resistance at 500 hours	ASTM D4355	% Strength Retained	70

*Minimum average roll value in weakest principal direction.

The apparent opening size (diameter) for the filter fabric Type A shall be no larger than the U.S. Standard Sieve Size 70 [212 µm] per ASTM D4751.

2-1.02. Polyethylene Film. Polyethylene film beneath concrete slabs or slab base course material shall be Product Standard PS17, 6 mil minimum thickness.

2-1.03. General Fill and Embankment Materials. To the maximum extent available, excess suitable material obtained from structure and trench excavation shall be used for the construction of general fills and embankments. Additional material shall be provided from Contractor's off-site source. No borrow pits shall be opened on site. No soil bio-filter material is allowed.

All material placed in fills and embankments shall be free from rocks or stones larger than the required size in their greatest dimension, brush, stumps, logs, roots, debris, and other organic or deleterious materials. The maximum size of stone in fills and embankment shall be 4 inches. No rocks or stones shall be placed in the upper 18 inches of any fill or embankment. Rocks or stones within the allowable size limit may be incorporated in the remainder of fills and embankments, provided they are distributed so that they do not interfere with proper compaction.

2-1.04. Crushed Rock Working Mat and Drainage Layer Material. Material shall be clean, hard, durable crushed rock, free from foreign materials, and washed. Provide at least two mechanically fractured faces on 90 percent of the material

retained on a No. 4 sieve by weight, and shall meet gradation and other requirements in accordance with OSSC Section 02690, PCC Aggregate 1-inch to No.4 material.

Optional material shall meet gradation and other requirements in accordance with OSSC Section 02630.11 Open-Graded Aggregate.

2-1.04.01 Crushed Rock Leveling Course. This Crushed Rock Leveling Course Layer shall be placed over Crushed Rock Working Mat and Drainage Layer. Material shall be clean, hard, durable, well-graded crushed rock, free from foreign materials, and washed, meeting gradation and other requirements in accordance with OSSC Section 02630, Base Aggregate 3/4”-0 material. Sand equivalent as determined in accordance with ASTM 2419 shall be not less than 30.

2-1.05. Structure Backfill. Structure backfill shall be defined as the material placed around and outside of structures. For structures constructed in open excavations, structure backfill shall extend to the temporary excavation slope so that the entire excavation outside the structure shall be filled with structure backfill. For structures constructed in supported excavations, the structure backfill shall completely fill the space between structure and excavation support system, or between structure and excavation face, if these specifications permit removal of the excavation support system. Structure backfill shall be as indicated herein.

2-1.05.01. General Fill Structure Backfill. Structure backfill shall be defined as the material placed around and outside of structures. For structures constructed in open excavations, structure backfill shall extend to the temporary excavation slope so that the entire excavation outside the structure shall be filled with structure backfill. For structures constructed in supported excavations, the structure backfill shall completely fill the space between structure and temporary earth retention, or between structure and excavation face, if these specifications permit removal of the system. Structure backfill shall meet the requirements of the previous paragraph entitled "Fill and Embankment Materials", unless the Drawings indicate crushed rock or clean sand structure backfill is to be used.

2-1.06. Select Fill. Select fill shall be defined as the material placed beneath the structure foundations and slabs below any granular material layer or lean concrete slab indicated on the Drawings. Select fill shall be used to replace any unsuitable material below the structure foundations and slabs and to raise the site grades below and within 5 feet (unless a larger dimension is otherwise indicated on the Drawings or specified) of structural footprints and at locations indicated on the Drawings. Select fill shall be as indicated herein.

2-1.06.01. Crushed Rock Select Fill. Crushed rock for select fill shall meet the following gradation requirements:

Size	Percent Passing
1/2 inch [12.5 mm]	100
3/8 inch [9.5 mm]	90 – 100
No. 4 [4.75 mm]	30 - 60
No. 8 [2.36 mm]	0 - 10
No. 200 [75 µm]	0 - 3

2-1.07. Slope Protection Temporary Cut Slopes. On cut slopes above perched water or groundwater, immediately after completing the cut slope, cover with 10-mil minimum thickness plastic membrane. At joints, membrane shall be overlapped or continuously welded. Membrane shall be weighted down to protect from wind uplifting and damage. At or below perched water or groundwater levels, cover slope with Crushed Rock Mat and Drainage Layer Material.

2-2. MATERIAL TESTING.

2-2.01. Preliminary Review of Materials. As stipulated in Section 01450, Quality Control, all tests required for preliminary review of materials shall be made by an acceptable independent testing laboratory at the expense of Contractor. Two initial gradation tests shall be made for each type of general fill, select fill, structure backfill, granular fill, or other specified material, and one additional gradation test shall be made for each additional 500 tons of each material delivered (imported) to the jobsite or suitable onsite material incorporated in select fill or structure backfill. One additional gradation test shall be performed for each additional 2,000 tons of general fill material delivered to the jobsite or suitable onsite material incorporated in general fill. In addition, one set of initial Atterberg Limits test shall be made for each fill material containing more than 20 percent by weight pass the No. 200 sieve and for materials specified by Atterberg Limits. One additional Atterberg Limits test shall be made for each additional 500 tons of each material delivered to the job site or otherwise incorporated in select fill or structure backfill. One additional Atterberg Limits test shall be made for each additional 2,000 tons of general fill material delivered to the jobsite or suitable onsite material incorporated in general fill.

All material testing on CLSM shall be made by an independent testing laboratory at the expense of Contractor.

2-2.02. Field Testing Expense. All moisture-density (Proctor) tests and relative density tests on the materials, and all in-place field density tests, shall be made by an independent testing laboratory at the expense of Owner. Contractor shall

provide access to the materials and work area and shall assist the laboratory as needed in obtaining representative samples.

2-2.03. Required Field Tests. For planning purposes the following guidelines shall be used for frequency of field tests. Additional tests shall be performed as necessary for job conditions and number of failed tests.

Two moisture-density (Proctor) tests in accordance with ASTM D698 (or, when required, ASTM D1557), or two relative density tests in accordance with ASTM D4253 and D4254 for each type of general fill, select fill, structure backfill, granular fill, or other material proposed.

For area fills and embankments, one in-place in-place field density and moisture test for each 1000 cubic yards of material placed.

One in-place field density and moisture test for every 100 to 200 cubic yards of structure backfill or select fill.

One in-place density and moisture test whenever there is a suspicion of a change in the quality of moisture control or effectiveness of compaction.

At least one test for every full shift of compaction operations on mass earthwork.

Additional gradation, proctor, and relative density tests whenever the source or quality of materials changes.

Testing of CLSM shall be as follows.

Compressive Strength. For every 200 cubic yard of flowable fill placed, fill four 6 by 12 inch plastic cylinder molds to overflowing and then tap sides lightly. Cure cylinders in the molds covered until time of testing, at least 14 days. Strip the cylinders carefully using a knife to cut away the plastic mold. Cap the cylinders with high strength gypsum plaster or other capping process that will not break these low strength materials. Test cylinders in accordance with ASTM C39. Two cylinders shall be tested at 7 days and the other two cylinders shall be tested at 28 days.

Flow of Fill. Once each day that flowable fill is placed, test the fill material in accordance with ASTM C939 for the efflux time. Wet screening may be required to remove coarse particles.

Unit Weight and Yield. Once each day that flowable fill is placed, determine unit weight and yield in accordance with ASTM C138.

Air Content. Once each day that flowable fill is placed, determine air content in accordance with ASTM C231.

Contractor shall provide a sample of all proposed backfill material to owner for testing a minimum of 7 business days prior to use of any material. Sample shall meet minimum weight requirements to permit testing to be performed in accordance with all ASTM Standards.

PART 3 - EXECUTION

3-1. SITE PREPARATION. All sites to be occupied by permanent construction or embankments shall be cleared of all logs, trees, roots, brush, tree trimmings, and other objectionable materials and debris. All stumps shall be grubbed. Subgrades for fills and embankments and sites to be occupied by permanent construction shall be cleaned and stripped of all surface vegetation, sod, and organic topsoil. All waste materials shall be removed from the site and disposed of by and at the expense of Contractor.

3-2. EXCAVATION.

3-2.01. General. Excavations shall provide adequate working space and clearances for the work to be performed therein and for installation and removal of concrete forms. In no case shall excavation faces be undercut for extended footings.

Sub-grade surfaces shall be clean and free of loose material of any kind when concrete is placed thereon.

3-2.02. Classification of Excavated Materials. No classification of excavated materials will be made for payment purposes. Excavation and trenching work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the work, regardless of the type, character, composition, or condition thereof.

3-2.03. Unauthorized Excavation. Except where otherwise authorized, indicated, or specified, all materials excavated below the bottom of concrete walls, footings, slabs on grade, and foundations shall be replaced with concrete or lean concrete at the expense of Contractor. If structural concrete replacement is chosen, it shall be with concrete placed at the same time and monolithic with the concrete foundation.

3-2.04. Slope Protection - Temporary Cut Slopes. The temporary cut slope shall be protected with continuously covered plastic membrane above the perched water and groundwater levels. The plastic membrane at the top of the cut will be anchored within continuous trenches excavated to minimum 2 feet deep and 1

foot and backfilled with soil. The membrane surface will be held in place with surface anchors such as sand bags or rubber tires tied together at appropriate spacing. At or below the perched water and groundwater the cut slopes shall be cover with the crushed rock layer specified and shown on the Drawings and this layer connect to the perimeter dewatering system at the bottom of the cut slope as specified below. This crushed rock layer does not require compaction. Non-woven geotextile fabric should not be placed under this crushed rock layer.

3-2.05. Blasting. Blasting or other use of explosives for excavation will not be permitted.

3-2.06. Dewatering and Crushed Rock Mat and Drainage Layer. Dewatering equipment shall be provided to remove and dispose of all surface water and groundwater and all water, regardless of the source, entering excavations, trenches, or other parts of the work. Once the excavation sub-grade is reached, and inspected and accepted by the Engineer as described below, the non-woven geotextile fabric shall be place on the subgrade with minimum 2 feet of overlay at joints. The Crushed Rock Mat and Drainage Layer shall be placed/spread in the direction of the geotextile fabric overlapping joint, and placed in single lift. Excavation and hauling and spreading equipment shall operate on the previously place crushed rock layer surface without operating directly on the geotextile fabric. Along hauling access routes, and prior to hauling, the thickness of this crushed rock layer should be temporarily increased by minimum 12-inch thickness to protect the sub-grade from wheel loads that could damage sub-grade.

After placement of crushed rock layer, sump pumping from within the layer and deeper sump pits as needed should begin immediately. Install a perimeter perforated pipe at toe of cut slope to aid in conveyance of water to sumps. Where the crushed rock layer is under structure foundations, if additional perforated pipes are needed to convey water to sumps, first compact this crushed rock layer, then excavate narrow trench to install perforated pipes, and backfill trench over placed pipe with loose, uncompacted crushed rock. Supplement control of water by sump pumping on perimeter of excavation outside of crushed rock layer as necessary until sump pumping system within crushed rock controls the water. Sump pumping without placement of the crushed rock layer shall not be done

All excavations for concrete structures or trenches which extend down to or below groundwater shall be dewatered by lowering and keeping the groundwater level within the Crushed Rock Working Mat and Drainage Layer. Perimeter perforated pipes along the toe of the cut slopes and pipes within the interior of the excavation shall be installed as necessary to covey water to appropriately spaced sump pumps, to maintain water levels as described above. The specified dewatering depth shall be maintained at these levels at all times, including nights, weekends, and holidays.

The CONTRACTOR shall provide a completely separate power circuit for the dewatering system(s)' electric service which shall be dedicated solely for the dewatering system(s) and separate from all other electric services. The CONTRACTOR shall not allow the dewatering system(s)' electrical service to be used for any other construction power supply.

The CONTRACTOR shall provide, install, remove, operate and maintain a water treatment system and associated pump(s) and conveyance piping to provide for settling of Suspended Solids of the discharge from the pump station dewatering system(s) and disposal of dewatering discharge to a discharge point within the Plant as location determined by the Owner.

The treatment system shall include holding tanks with sufficiently capacity and any other facilities and controls settling, filtering, and other mechanical methods needed to treat all dewatering system(s) discharge water from exceeding 400 ppm, suspended solids. Chemical flocculation and filtration is assumed to be not needed.

The Contractor shall coordinate and obtain written approval from the Engineer or Owner for any potential alternative on-site disposal of dewatering system(s) discharge.

The Contractor shall dispose of water from the site in a suitable manner without interference with Plant activities. If discharge conveyance pipes cross Plant roadways or operation access, provide over ramps or other means and methods acceptable to Plant personnel to maintain their access.

Surface water shall be diverted or otherwise prevented from entering excavations or trenches to the greatest extent possible without causing damage to adjacent property.

Contractor shall be responsible for the condition of any pipe or conduit used for drainage purposes, and all such pipe or conduit shall be left clean and free of sediment.

3-2.07. Sheeting and Shoring. Except where banks are cut back on a stable slope, excavations for structures and trenches shall be supported as necessary to prevent caving or sliding.

For excavations and other construction activities that need to protect adjacent existing facilities, furnish, design, install, and maintain "top down" support systems also known as positive restraint, proprietary shoring systems to limit lateral deformation, such as Slide Rail, Shore-Trak. Sheet piles with vibratory installation of sheets shall not be used. Non-vibratory shoring systems such as pushed in interlocked sheet piles or tubular interlocking pressed in steel piles may be used except as noted herein. Contractor shall assume complete

responsibility for designing and installing adequate protection systems for prevention of damage to existing facilities.

Excavation support systems and sheeting and shoring shall be all removed after completion of work. The design of the excavation support system shall be such as to permit complete removal while maintaining safety and stability in the excavation at all times.

Sheeting, shoring and excavation support systems shall be designed by a professional engineer registered in the State of Oregon.

3-2.08. Stabilization. Sub-grades for concrete structures shall be firm, dense, and thoroughly compacted and consolidated; shall be free from mud and muck; and shall be sufficiently stable to remain firm and intact under the feet of the workers.

Sub-grades for concrete structures which are otherwise solid, but which become disturbed and softened on top due to construction operations, shall be reinforced with crushed rock or gravel as specified for granular fills. The stabilizing material shall be placed in such a manner that no voids remain in the granular fill. All excess granular fill with unfilled void space shall be removed. The finished elevation of stabilized sub-grades shall not be above sub-grade elevations indicated on the Drawings.

3-3. GENERAL FILLS AND EMBANKMENTS. Fills and embankments not required or indicated to be designated fills shall be constructed as general fills and embankments. All fills and embankments shall be constructed to the lines and grades indicated on the Drawings. Construction of fills and embankments shall begin from the lowest elevation in a given excavation or area and progress upward. Materials shall be deposited in approximately horizontal layers not to exceed 8 inches in uncompacted thickness, unless otherwise specified herein. Unless otherwise specified herein, the following governing standards apply:

Test method to determine maximum density and moisture.	ASTM D1557.
Relative compaction.	92% .
Moisture content relative to the optimum.	-2% to +2%.

Backfilling of excavations and construction of fills and embankments during freezing weather shall not be done. No backfill, fill, or embankment materials shall be installed on frozen surfaces; nor shall frozen materials, snow, or ice be placed in any backfill, fill, or embankment.

3-3.01. Sub-grade Preparation. After preparation of the fill or embankment site, the sub-grades above the perched water or groundwater levels shall be scarified and moisture conditioned to a minimum depth of 6 inches, leveled and rolled so

that surface materials of the sub-grade will be at a moisture content and as compact and well bonded with the first layer of the fill or embankment as specified for subsequent layers. Unless otherwise directed by Engineer, the sub-grade shall be proof-rolled by a rubber-tired roller operating in non-vibratory mode, a loaded dump truck, or other suitable rubber-tired equipment acceptable to Engineer. A minimum of four passes of the proof-rolling equipment shall be provided such that the last two passes are made perpendicular to the first two passes.

Unless otherwise directed by Engineer, sub-grades below the groundwater level shall be inspected and accepted by the Engineer using probing and/or other methods. Once excavation sub-grades are inspected approved by the Engineer, the non-woven geotextile fabric shall immediately be placed on the subgrade surface and crushed rock materials placed as described above.

All soft, yielding, or otherwise unsuitable material as determined by the Engineer shall be removed and replaced with compacted fill materials specified above sub-grade surface.

3-3.02. Placement and Compaction. All fill and embankment materials shall be placed in approximately horizontal layers not to exceed 8 inches in un-compacted thickness, unless otherwise specified herein. Material deposited in piles or windrows by excavating and hauling equipment shall be spread and leveled before compaction.

Each layer of material shall have the best practicable moisture content for satisfactory compaction. The material in each layer shall be wetted or dried to achieve the moisture content relative to optimum as specified above, and shall be thoroughly mixed to ensure uniform moisture content and adequate compaction. Each layer shall be thoroughly compacted to the required degree of compaction at the required moisture content. If the material fails to meet the density specified, compaction methods shall be altered. The changes in compaction methods shall include, but not be limited to, changes in compaction equipment, reduction in uncompacted lift thickness, increase in number of passes, and better moisture control.

Wherever a pipe is to installed within a fill or embankment, the fill or embankment material shall be placed and compacted to an elevation not less than 12 inches above the top of pipe elevation before the trench for pipe installation is excavated.

3-3.03. Borrow Pits. Borrow pits are not permitted.

3-4. DESIGNATED FILLS. Designated fills are all fills designated by a name and included as subparagraph under this heading. Fills required or indicated to be designated fills shall be constructed using the specific materials and placement requirements as specified. In addition to the specific requirements

specified herein, all requirements for general fills and embankments shall apply. These requirements include, but are not limited to organic or deleterious materials, subgrade preparation, lift thickness, and moisture conditioning requirements. All designated fills shall be constructed to the lines and grades indicated on the Drawings. Backfilling and construction of fills during freezing weather shall not be done except by permission of Engineer. No backfill, fill, or embankment materials shall be installed on frozen surfaces, nor shall frozen materials, snow, or ice be placed in any backfill, fill, or embankment.

3-4.01. Granular and Crushed Fills. Granular and crushed rock fills shall be provided where indicated on the Drawings. Fills shall be placed on suitably prepared sub-grades in uncompacted lift thickness of 6 inches or less, unless otherwise specified. Compacted shall be as specified for the various materials. If the thickness of the granular fill is less than 6 inches, the compaction shall be by a minimum four passes (round trips) of a self-propelled or walk-behind type vibratory roller operating in full vibration mode in accordance with manufacturer's instructions.

3-4.01.01 Crushed Rock Working Mat and Drainage Layer. The Crushed Rock Working Mat and Drainage Layer should be placed in a single, full layer thickness and compacted with procedural methods acceptable to the Engineer and with non-vibratory compaction equipment. Compaction equipment should be self-propelled, steel drum rollers with minimum static weight of 8 tons and be operated in non-vibratory mode. A minimum of four passes (round trips) shall be applied to the surface of this layer, unless modified by the Engineer.

3-4.02. Structure Backfill. Backfill materials shall be deposited in approximately horizontal layers not to exceed 8 inches in uncompacted thickness and shall meet the following requirements:

Test method to determine maximum density and moisture.	ASTM D1557.
Relative compaction.	92%
Moisture content relative to the optimum.	-2% to +2%.

Compaction of structure backfill shall be performed in such a manner that damage to the structure is prevented. The compaction equipment used within 8 feet of the walls and for the top 8 feet of backfill shall be the static type for native materials or shall be the vibrating type for granular materials. Limit of equipment weight shall be 1 ton. Compaction of structure backfill by inundation with water will not be permitted.

No backfill shall be deposited or compacted in water.

Particular care shall be taken to compact structure backfill which will be beneath pipes, drives, roads, parking areas, walks, curbs, gutters, or other surface construction or structures. In addition, wherever a pipe is to be installed within structure backfill, the structure backfill shall be placed and compacted to an elevation not less than 12 inches above the top of pipe before the trench for pipe installation is excavated. Compacted areas, in each case, shall be adequate to support the item to be constructed or placed thereon.

3-4.03 Select Fill. Select fill shall be placed in approximately horizontal layers in uncompacted lift thickness of 8 inches or less and shall meet the following requirements:

Test method to determine maximum density and moisture.	ASTM D1557.
Relative compaction.	92 %.
Moisture content relative to the optimum.	-2% to +2%.

3-4.03.01 Select Wall Backfill. Select wall backfill shall be placed in approximately horizontal layers in uncompacted lift thickness of 8 inches or less and shall meet the following requirements:

Test method to determine maximum density and moisture.	ASTM D1557.
Relative compaction.	90 %.
Moisture content relative to the optimum.	-2% to +2%.

Care shall be taken not damage walls. The compaction equipment used within 8 feet of the walls for entire height of wall shall be the static type for native materials or shall be the vibrating type for granular materials. Limit of equipment weight shall be 1 ton. Compaction of structure backfill by inundation with water will not be permitted.

3-4.04. Gravel Base Beneath Slabs. The gravel base beneath slabs shall be placed in uncompacted lift thickness of 6 inches or less and compacted with a minimum of four passes (round trips) of a self-propelled or walk-behind type vibrating roller. The roller shall be operated in the full vibrating mode and in accordance with the manufacturer's instructions.

3-4.05. Controlled Low Strength Material (CLSM) Fill. CLSM shall not be placed on frozen ground. Batching, mixing, and placing of CLSM may be started when weather conditions are favorable and when the temperature is at least 34°F [1.1°C] and rising. At time of placement of CLSM the temperature shall be at least 40°F [4.4°C]. Mixing and placing shall stop when the temperature is 38°F

[3.3°C] and falling. Each filling stage shall be as continuous an operation as is practicable.

CLSM shall be discharged from the mixer by an acceptable procedure into the area to be filled. CLSM shall be placed to limits indicated on the Drawings. Mixing CLSM with in-situ soil shall be avoided.

When CLSM is placed as backfill against structures, the fill shall be placed in lifts of 2 to 3 feet and the next lift shall not be placed until the previous lift can support the weight of workers without indenting the surface and at least 16 hours have elapsed from the end of placement. Lift thickness shall be reduced as necessary to prevent floatation of the structure.

When CLSM is placed over culverts or pipelines, they shall be anchored to prevent flotation during the placement of CLSM. Unless otherwise required, CLSM shall be placed to one foot below the finished grade elevation if the finished grade elevation is not more than 5 feet over the top of the culvert or pipe. If the finished grade is more than 5 feet over the top of the culvert or pipe, CLSM shall be placed to an elevation 2 feet over the top of the culvert or pipe, and the remainder shall be backfilled with the specified backfill or as indicated on the Drawings.

3-5. FILTER FABRIC INSTALLATION. Filter fabric shall be placed as specified herein and at the locations specified or otherwise indicated on the Drawings.

Filter fabric shall be protected at all times during construction from contamination by foreign material and damage. Any contaminated or damaged filter fabric shall be replaced with new filter fabric at no additional cost to the Owner. The work shall be scheduled so that covering of the filter fabric is accomplished within 7 calendar days after placement of the filter fabric.

The subgrade for placement of filter fabric shall be smooth and free of irregularities and undulations. Filter fabric shall be laid smooth and free of tension, stress, folds, wrinkles, or creases. Type A and B filter fabric shall be overlapped a minimum of 2 feet between adjacent roll ends and adjacent strips.

The joints of Type C filter fabric shall be sewn. All seams shall be formed by mating the edges of the filter fabric panels and sewing them together with continuous stitches located a minimum of three inches from the edges. The thread shall be ultraviolet light resistant and manufactured from the same material as the filter fabric. A two-thread, type 401 double-lock stitch shall be used for all sewn work. Sewing methods shall conform to the latest procedures recommended by the filter fabric manufacturer. The Contractor shall demonstrate that the seam efficiency meets the requirements of the specified tabulated properties for the filter fabric as applicable.

All filter fabric placed shall be fixed to the subgrade to prevent filter fabric slippage or movement during placement of subsequent materials. Pins or staples shall not be used to fix the filter fabric to the subgrade when a geomembrane is to be placed on top of the filter fabric.

The Contractor shall exercise extreme care during filter fabric installation to prevent damage to the prepared supporting subgrade surface. The Contractor shall exercise care to prevent the entrapment of rocks, clods of earth or other material which could damage the filter fabric, clog the filter fabric or hamper seaming. Any filter fabric surface showing damage from penetration or distress caused by foreign objects shall be repaired or replaced.

No foot traffic will be allowed on the filter fabric except with approved smooth-sole shoes. The Contractor shall not use the filter fabric surface as a work area or storage area for tools and supplies.

Tracked or rubber tired construction equipment shall not be operated directly upon the filter fabric until a minimum thickness of 6 inches of the cover material is placed over the filter fabric; the exception area areas where Crushed Rock Working Mat and Drainage Layer material is used; see requirements above. Turning of construction vehicles shall be minimized to avoid distorting or damaging the filter fabric. All damaged filter fabric shall be replaced at Contractor's expense.

3-6. NOT USED.

3-7. FINAL GRADING AND PLACEMENT OF TOPSOIL. After other outside work has been finished, and backfilling and embankments completed and settled, all areas which are to be graded shall be brought to grade at the indicated elevations, slopes, and contours. All cuts, fills, embankments, and other areas which have been disturbed or damaged by construction operations shall be surfaced in accordance with Section 02930 Soil Amendment Materials.

Use of graders or other power equipment will be permitted for final grading and dressing of slopes, provided the result is uniform and equivalent to manual methods. All surfaces shall be graded to secure effective drainage. Unless otherwise indicated, a slope of at least 1 percent shall be provided.

Final grades and surfaces shall be smooth, even, and free from clods and stones, weeds, brush, and other debris.

3-8. DISPOSAL OF EXCAVATED MATERIALS. Suitable excavated materials may be used in fills and embankments as needed. All excess excavated material shall be disposed of at an off-site location at the expense of Contractor.

All trees, brush, debris, stones, logs, stumps, roots, and other unsuitable materials shall be removed from the site and disposed of by, and at the expense of Contractor.

3-9. SETTLEMENT. Contractor shall be responsible for all settlement of backfill, fills, and embankments which may occur within the correction period stipulated in the General Conditions.

Contractor shall make, or cause to be made, all repairs or replacements made necessary by settlement within 30 days after notice from Engineer or Owner.

End of Section

Section 02202

TRENCHING AND BACKFILLING

PART 1 - GENERAL

1-1. SCOPE. This section covers clearing, grubbing, and preparation of the site; removal and disposal of all debris; excavation and trenching; tunneled (trenchless construction) crossings; the handling, storage, transportation, and disposal of all excavated material; all necessary sheeting, shoring, and protection work; preparation of subgrades; pumping and dewatering as necessary; protection of adjacent property; backfilling; pipe embedment; surfacing and grading; and other appurtenant work.

1-2. GENERAL. With reference to the terms and conditions of the construction standards for excavations set forth in OSHA "Safety and Health Regulations for Construction", Chapter XVII of Title 29, CFR, Part 1926, Contractor shall employ a competent person and, when necessary based on the regulations, a licensed or registered professional engineer, to act upon all pertinent matters of the work of this section.

1-3. SUBMITTALS. Drawings, specifications, and data covering the proposed materials shall be submitted in accordance with Section 01330, Submittal Procedures.

If in accordance with the OSHA requirements identified above the sheeting and shoring design requires the use of a licensed or registered professional engineer, at least 30 days before starting construction on the sheeting and shoring, the Contractor shall ensure the sheeting and shoring design engineer provides a signed and sealed certification stating the protection system for the trench location was designed by the engineer, is appropriate for the location and is incompliance with the Contract Documents. Individual certification is required for all separate locations.

1-3.01. Filter Fabric Data. Complete descriptive and engineering data for the fabric shall be submitted. Data submitted shall include:

A 12 inch square sample of fabric.

Manufacturer's descriptive product data.

Installation instructions.

1-3.02 Embedment and Backfill Materials. Complete test results covering tests performed by an independent commercial testing laboratory retained by the Contractor for all materials described in the Materials Testing section below shall be submitted.

1-4. BASIS FOR PAYMENT.

1-4.01. Trench Sheeting. No additional payment above the Contract Price will be made for trench sheeting left in place.

1-5. INSURANCE. Professional liability insurance shall be provided as specified in Section 00800, Supplementary Conditions.

PART 2 - PRODUCTS

2-1. MATERIALS.

2-1.01. Filter Fabric. The fabric shall be provided in rolls wrapped with covering for protection from mud, dirt, dust, and debris.

2-1.01.01. Filter Fabric Type A.

2-1.02. Filter Fabric. Filter fabric shall be provided in rolls wrapped with covering for protection from mud, dirt, dust, and debris.

2-1.02.01. Filter Fabric Type A. Filter fabric Type A shall be provided for installation at locations indicated on the Drawings and as specified herein. Filter fabric Type A shall be a non-woven fabric consisting of only continuous chains of polypropylene filaments or yarns of polyester formed into a stable network by needle punching. The fabric shall be inert to commonly encountered chemicals; shall be resistant to mildew, rot, ultraviolet light, insects, and rodents; and shall have the indicated properties:

Property	Test Method	Unit	Min Roll Value*
Fabric Weight	ASTM D3776	oz/yd^2 [g/m^2]	6.0 [203]
Grab Strength	ASTM D4632	lbs [N]	160 [711]
Grab Elongation	ASTM D4632	percent	50
CBR Puncture Strength	ASTM D6241	lbs [N]	410 [1,824]
Trapezoidal Tear	ASTM D4533	lbs [N]	60 [267]
UV Resistance at 500 hours	ASTM D4355	% Strength Retained	70

*Minimum average roll value in weakest principal direction.

The apparent opening size (diameter) for the filter fabric Type A shall be no larger than the U.S. Standard Sieve Size 70 [212 µm] per ASTM D4751.

2-1.03. Crushed Rock Working Mat and Drainage Layer Material. Shall be as specified in Section 02200, Excavation and Fill for Structures.

2-1.04. Backfill Materials.

2-1.04.01. Job Excavated Material. Job excavated material may be used for either trench backfill in landscape areas not supporting pavements, sidewalks or structures when the job excavated material is finely divided and free from debris, organic material, cinders, corrosive material, and stones larger than 3 inches in greatest dimension. Masses of moist, stiff clay shall not be used. Soil biofilter material is not allowed.

2-1.04.02. Imported Crushed Rock. Imported material shall be crushed rock. Imported crushed rock shall be free from dust, clay, and trash; shall be hard, durable, and non-friable; and shall be graded 3/4 inch to No. 4 as defined in ASTM C33 for No. 67 coarse aggregate and shall contain less than 5 percent passing the No. 200 sieve. Imported crushed rock fill shall meet the quality requirements for ASTM C33 coarse aggregate. Imported crushed rock shall be used in as trench backfill in all trenches beneath pavements, concrete, or in settlement sensitive areas.

2-1.05. Controlled Low Strength Material (CLSM) Fill. CLSM shall consist of a mixture of Portland cement, fly ash, sand, and water and shall be placed at locations indicated on the Drawings or as directed by Engineer. The class of CLSM shall be as specified below.

The type of cement in CLSM shall be ASTM C150 Type I or II. The class of fly ash in CLSM shall be ASTM C618 Class C or F, except loss on ignition shall not exceed 4 percent. Fine aggregate in CLSM shall be clean natural sand, ASTM C33, except that clay particles shall not exceed one percent. Water in CLSM shall be potable.

Contractor shall design and test the CLSM and submit the mix design and test results to Engineer for review and acceptance. Initial set time shall be 8 hours plus or minus one hour as determined by ASTM C403. CLSM shall have an efflux time of 10 to 26 seconds through a special flow cone with a 1/2 inch discharge tube.

The batch proportions accepted by Engineer shall apply only for materials from the same source and having the same characteristics as the materials used in the mix design. Materials from any other source shall be used only with the acceptance of Engineer. If a change in sources of materials is proposed, a new mix design shall be developed by Contractor before the new material is used. When unsatisfactory results or other conditions make it necessary, Contractor shall develop a new mix design to obtain the desired results.

During the progress of the work, no change shall be made in the batch proportions of the ingredients without the acceptance of Engineer.

2-1.05,01. Class B CLSM. initial trial mixture for Class B CLSM shall consist of the following minimum proportions per cubic yard:

Cement	100 lb [45 kg]
Fly Ash	100 lb [45 kg]
Sand (SSD)	2760 lb [1252 kg]
Water	386 lb [175 kg]
Air Entraining Agent	5 percent
Compressive strength Range at 56 days	125-250 psi [862-1724 kPa]

2-1.06. Pipe Embedment Material. Pipe embedment material shall be placed as indicated in Figure 1.

2-1.06.01. Imported Crushed Rock Embedment. Imported crushed rock embedment shall consist of crushed, meeting the quality and gradation requirements of coarse aggregate size number 7 [13 to 4.75 mm] of ASTM C33.

2-2. MATERIALS TESTING.

2-2.01. Preliminary Review of Materials. As stipulated in Section 01450, Quality Control, all tests required for preliminary review of materials shall be made by an acceptable independent testing laboratory at the expense of Contractor. Two initial gradation tests shall be made for each type of embedment, fill, backfill, or other material, and one additional gradation test shall be made for each additional 500 tons of each material delivered to the site. In addition, one set of initial Atterberg Limits test shall be made for each fill materials containing more than 20 percent by weight passing the No. 200 sieve. One additional Atterberg Limits test shall be made for each additional 500 tons of each material delivered to the site.

All material testing on CLSM shall be made by an independent testing laboratory at the expense of Contractor.

2-2.02. Field Testing Expense. All moisture-density (Proctor) tests and relative density tests on the materials, and all in-place field density tests, shall be made by an independent testing laboratory at the expense of the Owner. Contractor shall provide access to the materials and work area and shall assist the laboratory as needed in obtaining representative samples.

2-2.03. Required Tests. For planning purposes, the following guidelines shall be used for frequency of field tests. Additional tests shall be performed as necessary for job conditions and number of failed tests.

a. Two moisture density (Proctor) tests in accordance with ASTM D1557.,
b. In-place field density and moisture tests (ASTM D6938) at intervals of 1000 feet maximum along the trench.
c. One in-place field density and moisture test (ASTM D6938) for every 200 cubic yards of backfill.
d. One in-place density and moisture test (ASTM D6938) whenever there is a suspicion of a change in the quality of moisture control or effectiveness of compaction.
e. Additional gradation, Proctor, and relative density tests whenever the source or quality of material changes.
f. Testing of CLSM shall be as follows:
   Compressive Strength. For every 200 cubic yards of CLSM placed, fill four 6 by 12 inch plastic cylinder molds to overflowing and then tap sides lightly. Cure cylinders in the molds covered until time of testing, at least 14 days. Strip the cylinders carefully using a knife to cut away the plastic mold. Cap the cylinders with high strength gypsum plaster or other capping process that will not break these low strength materials. Test cylinders in accordance with ASTM C39. Two cylinders shall be tested at 7 days and the other two cylinders shall be tested at 56 days.
   Flow of Fill. Once each day that CLSM is placed, test the fill material in accordance with ASTM C939 for the efflux time. Wet screening may be required to remove coarse particles.
   Unit Weight and Yield. Once each day that CLSM is placed, determine unit weight and yield in accordance with ASTM C138.
   Air Content. Once each day that CLSM is placed, determine air content in accordance with ASTM C231.
   Penetration Resistance. Once each day that CLSM is placed, determine early bearing strength in accordance with ASTM C403 penetration procedure.

Contractor shall provide a sample of all proposed backfill material to owner for testing a minimum of 7 business days prior to use of any material. Sample shall meet minimum weight requirements to permit testing to be performed in accordance with all ASTM Standards.

PART 3 - EXECUTION

3-1. CLEARING. All clearing shall be performed as necessary for access, stringing of pipeline materials, and construction of the pipeline and appurtenant structures.

All top soil shall be removed prior to excavation and stored separately on-site from other materials for use in berm construction.

3-2. EXCAVATION. Excavations shall provide adequate working space and clearances for the work to be performed therein and for installation and removal of concrete forms. In no case shall excavation faces be undercut for extended footings.

Subgrade surfaces shall be clean and free of loose material of any kind when concrete is placed thereon.

Except where exterior surfaces are specified to be damp-proofed, monolithic concrete manholes and other concrete structures or parts thereof, which do not have footings that extend beyond the outside face of exterior walls, may be placed directly against excavation faces without the use of outer forms, provided that such faces are stable.

3-2.01. Classification of Excavated Materials. No classification of excavated materials will be made for payment purposes. Excavation and trenching work shall include the removal and subsequent handling of all materials excavated or otherwise removed in performance of the work, regardless of the type, character, composition, or condition thereof.

3-2.02. Preservation of Trees. No trees shall be removed outside excavated or filled areas, unless their removal is authorized by Owner. Trees left standing shall be adequately protected from permanent damage by construction operations.

3-2.03. Blasting. Blasting or other use of explosives for excavation will not be permitted.

3-2.04. Dewatering. Dewatering equipment shall be provided to remove and dispose of all surface water and groundwater entering excavations, trenches, or other parts of the work. Perched water and groundwater shall be controlled in excavations during sub-grade preparation and continually thereafter until the structure or tunnel to be built, or the pipe to be installed therein, is completed to the extent that no damage from hydrostatic pressure, flotation, or other cause will result.

All excavations below perched water or groundwater shall be dewatered during excavations with sump pumping within the trench. Lower the subgrade elevation below the bedding layer to allow placement of minimum 12-inch thick Crushed Rock Working Mat and Drainage Layer material. Once this excavation level is reached, and inspected and approved by the Engineer, immediately place non-woven geotextile fabric on the sub-grade surface and up the sides of the excavation to the height of the pipe zone backfill inside the shoring followed by

placement of this crushed rock drainage layer. This crushed rock layer does not require compaction. Sump pumping shall located and operated at spacings to maintain the water level within this crushed rock drainage layer. The specified dewatering depth shall be maintained with this crushed rock drainage layer or below at all times, 24 hours per day, 7 days a week, including holidays until work is above water levels.

Refer to Section 02200, Excavation and Fill for Structures for additional requirements for dewatering.

Surface water shall be diverted or otherwise prevented from entering excavations or trenches to the greatest extent possible without causing damage to adjacent property.

Contractor shall be responsible for the condition of any pipe or conduit which he may use for drainage purposes, and all such pipe or conduit shall be left clean and free of sediment.

For treatment and disposal of collected water, refer to Section 02200, Excavation and Fill for Structures.

3-2.05. Sheeting and Shoring. Except where banks are cut back on a stable slope, excavations for structures and trenches shall be supported with steel sheet piling and shoring as necessary to prevent caving or sliding.

Contractor shall assume complete responsibility for, and shall install adequate protection systems for prevention of damage to existing facilities.

Trench sheeting shall be removed unless, in the opinion of Engineer, removal of the sheeting will cause damage to the facility it is protecting or loss of necessary piping support from the piping embedment. If left in place, the sheeting shall cut off 12 inches below finished grade. The design of the support system shall be such as to permit complete removal while maintaining safety and stability at all times.

Positive restraint shoring, such as Shore Track and Slide Rail, shall be used when existing adjacent structures and buried utilities are located within a zone 1 Horizontal to 1 Vertical (1H:1V) up from the base of the trench excavation and for any excavations below perched water or groundwater. A movable trench support (such as trench shields or trench boxes) may be used where pipelines are located away from structures and above the water table, provided care is exercised in placing and moving the trench shields or support bracing to prevent movement of the pipe and bedding and backfill material meets the required compaction without voids.

3-2.06. Stabilization. Sub-grades for concrete structures and trench bottoms shall be firm, dense, and thoroughly compacted and consolidated; shall be free from mud and muck; and shall be sufficiently stable to remain firm and intact under the feet of the workers.

Sub-grades for concrete structures or trench bottoms which are otherwise solid, but which become mucky on top due to construction operations, shall be reinforced with crushed rock or gravel as specified for granular fills. The stabilizing material shall be placed in a manner that no voids remain in the granular fill. All excess granular fill with unfilled void space shall be removed. The finished elevation of stabilized sub-grades shall not be above sub-grade elevations indicated on the Drawings.

3-3. TRENCH EXCAVATION. No more trench shall be opened in advance of pipe laying than is necessary to expedite the work. One block or 400 feet [120 m], whichever is the shorter, shall be the maximum length of open trench on any line under construction.

Except where tunneling is indicated on the Drawings, is specified, or is permitted by Engineer, all trench excavation shall be open cut from the surface.

Prior to excavation, Contractor shall contact local underground alert hotlines, “Oregon Utility Notification Center” and/or individual utility owners for marking underground utilities.

3-3.01. Alignment, Grade, and Minimum Cover. The alignment and grade or elevation of each pipeline shall be fixed and determined from offset stakes. Vertical and horizontal alignment of pipes, and the maximum joint deflection used in connection therewith, shall be in conformity with requirements of the section covering installation of pipe.

Where pipe grades or elevations are not definitely fixed by the Drawings, trenches shall be excavated to a depth sufficient to provide a minimum depth of backfill cover over the top of the pipe of 36 inches over pipes below paved and graded streets and, of 36 inches over pipes in other locations. Greater pipe cover depths may be necessary on vertical curves or to provide adequate clearance beneath existing pipes, conduits, drains, drainage structures, or other obstructions encountered at normal pipe grades. Measurement of pipe cover depth shall be made vertically from the outside top of pipe to finished ground or pavement surface elevation, except where future surface elevations are indicated on the Drawings.

3-3.02. Minimum Trench Widths. Except when maximum trench width is required for certain conduits, trenches shall be excavated to the minimum trench widths indicated in the following table. Trenches shall be excavated to a width

which will provide adequate working space and sidewall clearances for proper pipe installation, jointing, and embedment.

Nominal Pipe Size	Minimum Trench Width	Clearance
Less than 27 in	Pipe OD plus 24 in	12 in
27 in through 60 in	Pipe OD plus nominal pipe size	ID/2
Greater than 60 in	Pipe OD plus 70 in	30 in

Clearance = Minimum sidewall clearance
OD = Outside diameter (or span) of conduit
ID = Inside diameter (or span) of conduit.

Specified minimum sidewall clearances are not minimum average clearances but are minimum clear distances which will be required to the trench excavation or the trench protective system.

Cutting trench banks on slopes to reduce earth load to prevent sliding and caving shall be used only in areas where the increased trench width will not interfere with surface features or encroach on right-of-way limits.

3-3.03. Mechanical Excavation. The use of mechanical equipment will not be permitted in locations where its operation would cause damage to trees, buildings, culverts, or other existing property, utilities, or structures above or below ground. In all such locations, hand excavating methods shall be used.

Mechanical equipment used for trench excavation shall be of a type, design, and construction, and shall be so operated, that the rough trench excavation bottom elevation can be controlled, and that trench alignment is such that pipe, when accurately laid to specified alignment, will be centered in the trench with adequate sidewall clearance. Undercutting the trench sidewall to obtain sidewall clearance will not be permitted.

3-3.04. Cutting Concrete Surface Construction. Cuts in concrete pavement and concrete base pavements shall be no larger than necessary to provide adequate working space for proper installation of pipe and appurtenances. Cutting shall be started with a concrete saw in a manner which will provide a clean groove at least 1-1/2 inches deep along each side of the trench and along the perimeter of cuts for structures.

Concrete pavement and concrete base pavement over trenches excavated for pipelines shall be removed so that a shoulder not less than 6 inches in width at any point is left between the cut edge of the pavement and the top edge of the trench. Trench width at the bottom shall not be greater than at the top and no undercutting will be permitted. Pavement cuts shall be made to and between

straight or accurately marked curved lines which, unless otherwise required, shall be parallel to the center line of the trench.

Pavement removal for connections to existing lines or structures shall not exceed the extent necessary for the installation.

Where the trench parallels the length of concrete walks, and the trench location is all or partially under the walk, the entire walk shall be removed and replaced. Where the trench crosses drives, walks, curbs, or other surface construction, the surface construction shall be removed and subsequently replaced between existing joints or between saw cuts as specified for pavement.

3-3.05. Excavation Below Pipe Sub-grade. Except where otherwise required, pipe trenches shall be excavated below the underside of the pipe, as indicated on Figure 1 02202, to provide for the installation of granular embedment.

Bell holes shall provide adequate clearance for tools and methods used for installing pipe. No part of any bell or coupling shall be in contact with the trench bottom, trench walls, or granular embedment when the pipe is jointed.

3-3.06. Artificial Foundations in Trenches. Whenever unsuitable or unstable soil conditions are encountered, Contractor shall notify Engineer immediately. When authorized by the Engineer, trenches shall be excavated below grade and the trench bottom shall be brought to grade with suitable material. In such cases, adjustments will be made in the Contract Price in accordance with the provisions of the General Conditions.

3-3.07. Over-Excavation. Over-excavation carried below the grade, unless authorized by the Engineer, shall be backfilled to the required grade with material acceptable to the Engineer and compacted to the satisfaction of the Engineer, at no additional cost to the Owner.

3-4. PIPE EMBEDMENT. Embedment materials both below and above the bottom of the pipe, classes of embedment to be used, and placement and compaction of embedment materials shall conform to the requirements indicated on Figure 1 02202 and to the following supplementary requirements.

Embedment material shall contain no cinders, clay lumps, or other material which may cause pipe corrosion.

3-4.01. Embedment Classes.

a. Class A Arch Encasement. When arch encasement is indicated on the Drawings, Class A arch encasement shall be used at all locations so indicated.
When arch encasement is not indicated on the Drawings, Class A arch encasement is not required unless improper trenching or unexpected trench conditions require its use as determined by Engineer.
Concrete and reinforcing steel for Class A arch encasement shall conform to the requirements of Section 03300, Cast-in-Place Concrete and Section 03200, Concrete Reinforcement.

b. Class B Embedment. Class B bedding shall be used for all steel, ductile iron, bar-wrapped concrete, and vitrified clay pipelines, and for all other pipelines not otherwise specified.

c. Class B Special Embedment. Class B special embedment shall be used for HDPE, PVC, ABS, FRP, GRP, steel or stainless steel pipe where the process fluid design maximum temperature is 140° F [60° C] or higher such as for pressurized air service, and when recommended by the pipe manufacturer.

d. Class C Embedment. Class C embedment shall be used for all reinforced concrete and prestressed concrete pipelines.

3-4.02. Embedment for Ductile Iron, Steel, FRP, and PVC Pipelines. Granular embedment for polyethlene tube protected ductile iron, coal tar or tape coated steel, FRP, and PVC pipelines shall be crushed rock or crushed gravel with rounded or subrounded particles. Crushed rock or gravel with sharp edges which could cause significant scratching or abrasion of the pipe or damage to the coating or polyethylene tube protection shall not be used unless otherwise approved by Engineer and all damage is repaired to the satisfaction of Engineer.

3-4.03. Placement and Compaction.

3-4.03.01. Granular Embedment. Granular embedment material shall be spread and the surface graded to provide a uniform and continuous support beneath the pipe at all points between bell holes or pipe joints. It will be permissible to slightly disturb the finished subgrade surface by withdrawal of pipe slings or other lifting tackle.

After each pipe has been graded, aligned, and placed in final position on the bedding material, and shoved home, sufficient pipe embedment material shall be deposited and compacted under and around each side of the pipe and back of the bell or end thereof by shovel slicing or other suitable methods to hold the pipe in proper position and alignment during subsequent pipe jointing and embedment operations.

Placing and compaction of embedment material shall not damage the pipe coating or polyethylene encasement. Embedment material shall not be dumped directly on the pipe or polyethylene encasement unless a suitable temporary isolation layer such as a 60 mil HDPE sheeting, is used to cover the pipe and polyethylene encasement.

Embedment material shall be deposited and compacted uniformly and simultaneously on each side of the pipe to prevent lateral displacement. Granular embedment shall be placed in layers not more than 6 inches deep and compacted as specified.

Each lift of granular embedment material shall be vibrated with a mechanical probe type vibrator or shovel sliced during placement to ensure that all spaces beneath the pipe are filled. Granular embedment shall be placed in maximum lift thickness of 6 inches and compacted. Each lift of embedment material shall be compacted with three passes (round trip) of a vibrating compactor and to at least 90 percent relative density as determined by ASTM D1557.

Filter fabric shall be placed on the trench surfaces so that it completely surrounds the embedment material. Joints shall be lapped 12 inches.

Unless otherwise indicated on the Drawings, where pipes pass through water-containing embankments, granular embedment material shall be omitted and the trench bottom shall be graded to provide uniform and continuous support for the pipe. The pipe shall be embedded in embankment material containing no rocks or stones. The embedment material shall be compacted to the same density as the existing embankment or to at least 95 percent relative compaction in accordance with ASTM D698, whichever is higher.

Insert other requirements for locally available embedment materials

3-4.03.02. Compaction - Trench Box Support Systems. Where trench box support systems are used embedment compaction shall be performed outside the limits of the trench box so that relocating the trench box will not disturb the compacted embedment. Where necessary to protect workers, the compaction may be performed by compaction rollers or other compaction systems that are operated from above the trench and achieve the required compaction.

Trench boxes for earth trenches shall be positioned such that the bottom of the trench box is no lower than approximately two feet above the bottom of pipe invert elevation so that initial compaction of the haunch area of the pipe, from within the trench box, extends the full width of trench. Trenches shall be shaped to support the trench box above the bottom of trench.

When in rock and where it is not practicable to shape the trench to provide the trench box support above the bottom of the trench, initial compaction of the haunch area may be performed within the trench box.

Final compaction of the haunch area and all other compaction shall be performed outside the limits of the trench box after the trench box has advanced into the next section of trench.

3-4.04. Groundwater Barrier. Continuity of embedment material shall be interrupted by low permeability groundwater barriers to impede passage of water through the embedment. Groundwater barriers for sewer lines that contain manholes with cast-in-place bases shall be compacted soil around each manhole, extending through any granular material beneath the manhole, and meeting ASTM D2487 soil classification GC, SC, CL, or ML-CL and shall be compacted to at least 95 percent of maximum density with moisture content within 2 percent of the optimum moisture content (ASTM D698). Material may be finely divided, suitable job excavated material, free from stones, organic matter, and debris.

Groundwater barriers for sewer lines that contain manholes with precast (developed) bases and for all other pipelines shall be soil plugs of 3 feet in width, extending the full depth and width of granular material, and spaced not more than 400 feet apart. The soil plugs shall be constructed from soil meeting ASTM D2487 classification GC, SC, CL, or ML, and compacted to 95 percent of maximum density at near the optimum moisture content (ASTM D698).

3-5. TRENCH BACKFILL. All trench backfill above pipe embedment shall conform to the following requirements.

A layer of backfill material not more than 8 inches deep may be placed over concrete arch encasement or concrete thrust blocking after the concrete has reached its initial set, to aid curing. No additional backfill shall be placed over arch encasement or blocking until the concrete has been in place for at least 3 days.

3-5.01. Compacted Backfill. Compacted backfill will be required for the full depth of the trench above the embedment in all locations.

The top portion of backfill beneath landscape or lawn areas shall be finished in accordance with Section 02930 Soil Amendment Materials.

Trench backfill material shall be suitable job excavated material in landscaped, lawn or unimproved areas and gravel in all other areas and shall be as specified herein.

3-5.01.01. Job Excavated Material. Job excavated materials shall be placed in uniform layers not exceeding 8 inches in uncompacted thickness. Each layer of material shall have the best possible moisture content for satisfactory compaction. The material in each layer shall be wetted or dried as needed and thoroughly mixed to ensure uniform moisture content and adequate compaction. Increased layer thickness may be permitted for noncohesive material if Contractor demonstrates to the satisfaction of Engineer that the specified compacted density will be obtained. The method of compaction and the equipment used shall be appropriate for the material to be compacted and shall not transmit damaging shocks to the pipe. Job excavated material shall be compacted to 85 percent of maximum density at a moisture content within 5 percent of the optimum moisture content as determined by ASTM D1557 when that test is appropriate,. Job excavated material to be placed above embedments shall be free of brush, roots, debris, cinders, and any corrosive material, rubble and detritus, stones larger than 4 inches in dimension, and boulders. No rocks shall be placed in the upper 18 inches of any trench backfill. Job excavated material shall not be used in trenches under pavements, concrete, or in settlement sensitive areas.

3-5.01.02. Imported Crushed Rock. Gravel backfill shall be deposited in uniform layers not exceeding 8 inches in uncompacted thickness. The backfill shall be compacted with a suitable vibratory roller or platform vibrator to at least 92 percent relative density as determined by ASTM D1557
Groundwater barriers specified under pipe embedment shall extend to the top of the graded gravel backfill.

3-5.02. Water-Settled Earth Backfill. Settlement or consolidation of trench backfill using water jetting or ponding shall not be performed.

3-5.03. Structure Backfill. Backfill around manholes and small concrete vaults shall meet the requirements specified for structure backfill specified in Section 02200, Excavation and Fill for Structures.

3-5.04. Controlled Low Strength Material (CLSM). shall not be placed on frozen ground. Batching, mixing, and placing of CLSM may be started when weather conditions are favorable and when the temperature is at least 34°F [1°C] and rising. At time of placement, CLSM shall have a temperature of at least 40°F [4°C]. Mixing and placing shall stop when the temperature is 38°F [3°C] and falling. Each filling stage shall be as continuous an operation as is practicable.

CLSM shall be discharged from the mixer by an acceptable procedure into the area to be filled. CLSM shall be placed to limits indicated on the Drawings. Mixing CLSM with in-situ soil shall be avoided.

When CLSM is placed as backfill against structures, the fill shall be placed in lifts of 2 to 3 feet and the next lift shall not be placed until the previous lift has taken

initial set and at least 16 hours have elapsed from the end of placement. Lift thickness shall be reduced as necessary to prevent floatation of the structure.

When CLSM is placed over culverts or pipelines, they shall be anchored to prevent flotation during the placement of CLSM. Unless otherwise required, CLSM shall be placed to one foot below subgrade elevation if the subgrade elevation is not more than 5 feet over the top of the culvert or pipe. If the subgrade is more than 5 feet over the top of the culvert or pipe, CLSM shall be placed to an elevation 2 feet over the top of the culvert or pipe, and the remainder shall be backfilled with soil designated by Engineer.

3-6. DRAINAGE MAINTENANCE. Trenches across roadways, driveways, walks, or other trafficways adjacent to drainage ditches shall not be backfilled prior to completion of backfilling the trench on the upstream side of the trafficway, to prevent impounding water after the pipe has been laid. Bridges and other temporary structures required to maintain traffic across such unfilled trenches shall be constructed and maintained by Contractor. Backfilling shall be done so that water will not accumulate in unfilled or partially filled trenches. All material deposited in roadway ditches crossed by the line of trench shall be removed immediately after backfilling is completed, and the original section, grades, and contours of ditches shall be restored. Surface drainage shall not be obstructed longer than necessary.

3-7. FINAL GRADING AND PLACEMENT OF TOPSOIL. After other outside work has been finished, and backfilling and embankments completed and settled, all areas which are to be graded shall be brought to grade at the indicated elevations, slopes, and contours. All cuts, fills, embankments, and other areas which have been disturbed or damaged by construction operations shall be surfaced in accordance with Section 02930 Soil Amendment Materials.

Use of graders or other power equipment will be permitted for final grading and dressing of slopes, provided the result is uniform and equivalent to manual methods. All surfaces shall be graded to secure effective drainage. Unless otherwise indicated, a slope of at least 1 percent shall be provided.

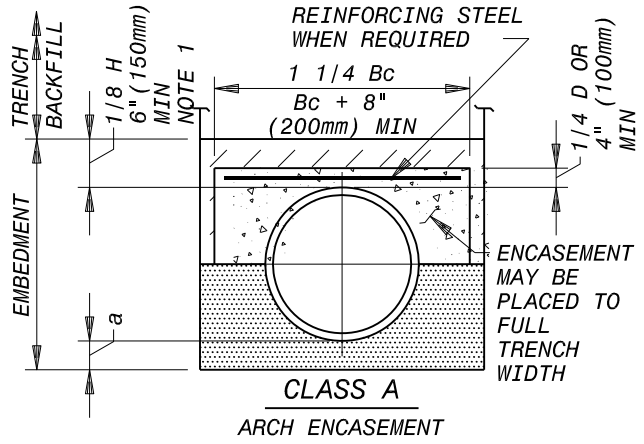
Final grades and surfaces shall be smooth, even, and free from clods and stones, weeds, brush, and other debris.

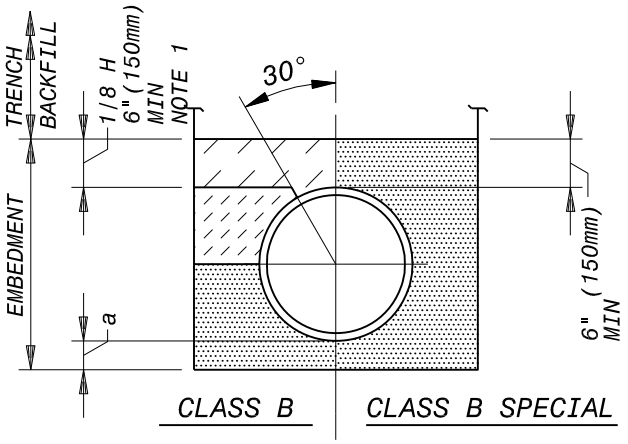
3-8. DISPOSAL OF EXCESS EXCAVATED MATERIALS. Disposal of excess material from trench excavations shall be accomplished as specified in Section 02200, Excavation and Fill for Structures.

3-9. SETTLEMENT. Contractor shall be responsible for all settlement of trench backfill which may occur within the correction period stipulated in the General Conditions.

Contractor shall make, or cause to be made, all repairs or replacements made necessary by settlement within 30 days after notice from Engineer or Owner.

End of Section





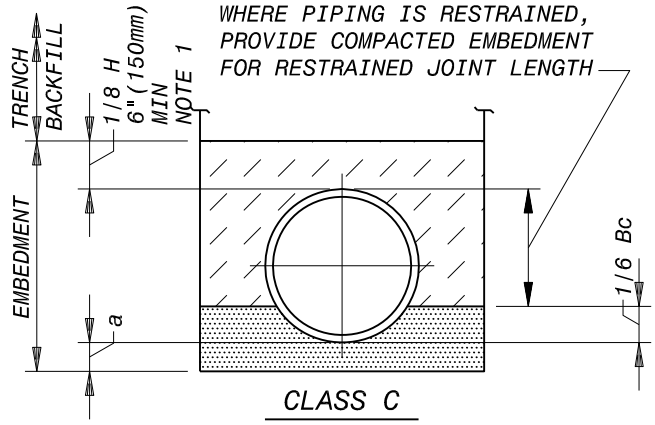


TABLE OF EMBEDMENT DEPTHS BELOW PIPE

D	a MIN SOIL		a MIN ROCK	
	in	mm	in	mm
27"(675 mm) & SMALLER	3	75	6	150
30"(750 mm) TO 60"(1500 mm)	4	100	9	225
66"(1650 mm) & LARGER	6	150	12	300

NOTES:

1. EMBEDMENT ABOVE THE TOP OF THE PIPE SHALL BE AN UNCOMPACTED LAYER FOR ALL INSTALLATIONS.
2. REFER TO SPECIFICATIONS FOR GEOTECHNICAL FABRIC OR SPECIAL EMBEDMENT REQUIREMENTS FOR TRENCHES IN FINE SOILS EXTENDING BELOW GROUNDWATER LEVEL.
3. TRENCH OUTLINES DO NOT INDICATE ACTUAL TRENCH EXCAVATION SHAPE, SOIL CONDITIONS, OR PRESENCE OF SHEETING LEFT IN PLACE. EMBEDMENT MATERIAL SHALL EXTEND THE FULL WIDTH OF THE ACTUAL TRENCH EXCAVATION.
4. FOR RESTRAINED JOINT PIPE LENGTH WITH CLASS C EMBEDMENT THE BACKFILL ABOVE THE GRANULAR EMBEDMENT AND BELOW THE TOP OF THE PIPE SHALL BE COMPACTED EMBEDMENT.

LEGEND

Bc OUTSIDE DIAMETER OF PIPE
H COVER ABOVE TOP OF PIPE
D NOMINAL PIPE SIZE
a EMBEDMENT BELOW PIPE (SEE TABLE)

HAND PLACED EMBEDMENT *

COMPACTED EMBEDMENT *

GRANULAR EMBEDMENT

CONCRETE

* OR GRANULAR EMBEDMENT

EMBEDMENTS FOR CONDUITS

BLACK & VEATCH	TRENCHING AND BACKFILLING	FIG 1-02202

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Section 02370

SOIL STABILIZATION

PART 1 GENERAL

1.01 THE REQUIREMENT

A. The Contractor shall provide erosion control barriers, complete and in place, in accordance with the Contract Documents, the 1200-C permit requirements, and Chapter 6 of Clean Water Services' Design and Construction Standards (June 2007).

B. The Contractor shall provide erosion protection including all disturbed areas, including stockpiled berms in accordance with the Contract Documents.

1.02 CONTRACT DOCUMENT SUBMITTALS

A. At the Preconstruction Conference, the Contractor shall submit a completed 1200-C Name Change and Permit Transfer Application to DEQ Northwest Region, 2020 S.W. 4th Avenue, Suite 400, Portland, Oregon 97201-4987.

B. Upon completion of all excavation, backfill, structural fill, site improvements, drainage, and landscaping work, the Contractor shall submit Notice of Termination Application for NPDES General Permit to Discharge Storm Water Associated with Construction Activity to DEQ Northwest Region, 2020 S.W. 4th Avenue, Suite 400, Portland, Oregon 97201-4987.

C. Submittals shall be in accordance with Section 01330, Submittal Procedures.

PART 2 PRODUCTS

2.01 EROSION CONTROL MATTING

A. Excelsior mat or straw blanket; staples as recommended by matting manufacturer.

B. Manufacturer and Product: North American Green, Evansville, IN; SC150BN blanket.

2.02 REINFORCED PLASTIC COVERING

A. Physical Requirement (Minimum Average Roll Values)

1. Tear Strength: 130 pounds.
2. Elongation: 620 percent.
3. Minimum Thickness: 6-mil.

B. Manufacturers

1. Reed Industries, Inc., Houston, TX.
2. Griffolyn Co., Houston, TX.

2.03 SOIL TACKIFIER

A. Soil tackifier shall be Cliffhanger Tack (Quattro Environmental, Inc.), EcoFibre & Tac (Canfor), or approved equal.

2.04 SEDIMENT FENCE

A. Support Posts: As recommended by manufacturer of geotextile.

B. Fasteners: Heavy-duty wire staples at least 1-inch long, tie wires, or hog rings, as recommended by manufacturer of geotextile.

C. Filter Fabric: Polyester, polypropylene, or nylon filaments, woven into a uniform pattern, distinct and measurable openings.

1. Filaments: Resistant to damage from exposure to ultraviolet rays and heat.
2. Material Edges: Finish so that filaments retain their relative positions under stress.

D. In accordance with requirement of Table No. 1:

Table No. 1 Filter Fabric		
Physical Property	Required Value	Test Method
Apparent Opening Size, max.	30	U.S. Standard Sieve
Grab Tensile Strength, lb., min. ARV	90	ASTM D4632
Elongation, % max.	25	ASTM D4632
Ultraviolet Stability Retained Strength, %	70	ASTM D4355
Permittivity, min, ARV	0.05	ASTM D4491

E. Manufacturers

1. Polyfelt, Evergreen, AL.
2. Dupont Co., Wilmington, DE.
3. Mirafi, Inc., Charlotte, NC.

2.05 DUST CONTROLLER

A. Nontoxic materials that do not have an adverse effect on soil structure or establishment and growth of vegetation.

2.06 CONSTRUCTION FENCE

A. Ultraviolet stabilized polyethylene or polypropylene safety fence, 3 feet in height, and yellow or orange in color.

2.07 BIOFILTER BAGS

A. Bags: Made of burlap, jute, geotextile or other pervious material capable of holding contents while allowing water to pass through bag. Bags shall have minimum dimensions of 2 feet long by 1 foot high by 1 foot wide.

B. Contents: Wood chips, bark, straw or other approved material.

PART 3 EXECUTION

3.01 APPLICATION

A. Erosion control measures are required during all construction and site disturbance activity and shall remain and be maintained until permanent site ground covers are in place.

B. The implementation of the erosion control plan and the construction maintenance, replacement, and upgrading the erosion control devices are the responsibility of the Contractor until all construction is completed. During the construction period, the erosion control devices shall be upgraded for unexpected storm events and to ensure that sediment and sediment-laden water do not leave the Site.

C. Maintain existing buffer zones adjacent to project limits. Keep all construction equipment, debris, and soils out of the natural buffer zone.

3.02 CONSTRUCTION ENTRANCE

A. Provide graveled construction accesses at locations shown on Drawings.

B. Construction entrance shall comply with CWS Standard Drawing No. 855.

C. Contractor shall maintain construction entrance to ensure proper function.

3.03 EROSION CONTROL MATTING

A. Disturbed Slopes: 4H:1V and steeper; on ground surfaces and stock piles exposed during wet weather season (October 15 through April 30).

3.04 REINFORCED PLASTIC COVERING

A. Place on areas where erosion control matting have not controlled erosion, and over all temporary stockpiles.

B. Install per CWS Standard Drawing No. 810.

3.05 SEDIMENT FENCE

A. Install prior to starting earth disturbing activities.

B. One-piece filter fabric or continuously sewn to make one-piece filter fabric for full height of fence, including portion buried in the toe trench.

C. Remove silt fence after area has been permanently stabilized.

D. Sediment fence shall comply with CWS Standard Drawing No. 875.

3.06 TEMPORARY SOIL STOCKPILES

A. Cover temporary soil stock pile as required to prevent erosion per CWS Standard Drawing No. 810.

3.07 DUST CONTROL

A. Apply appropriate dust control measures on a continuous basis until permanent stabilization measures are in place.

B. Apply on construction routes and other disturbed areas subject to surface dust movement and where offsite damage may occur if dust is not controlled.

C. Avoid creating erosion when using water as a dust controller.

3.08 TEMPORARY CATCH BASIN PROTECTION

A. Install biofilter bags at all catch basins shown on Drawings.

END OF SECTION

Section 02634

HIGH DENSITY POLYETHYLENE (HDPE) PRESSURE PIPE

PART 1 - GENERAL

1-1. SCOPE. This section covers furnishing and installation of 30 inch buried solid wall high density polyethylene (HDPE) pressure pipe for foul air service. HDPE pressure pipe shall be furnished and installed complete with all fittings, jointing materials, anchors, blocking, encasement, and other necessary appurtenances.

Pressure and leakage tests, disinfection , and cleaning are covered in other sections. Pipe trenching, bedding, and backfill are covered in the Trenching and Backfilling section.

1-2. GOVERNING STANDARDS. Except as modified or supplemented herein, all HDPE pressure pipe shall conform to the applicable requirements of ANSI/AWWA C906, latest edition.

The supplementary information required in the foreword of the governing standard is as follows:

Affidavit of Compliance (Sec. 6.3)	Required.
Plant Inspection by Purchaser (Sec. 5.8)	Not required.
Markings (Sec. 6.1)	Required.
Shipping (Sec. 6.2)	Required.
Verification (Sec. 5)	Required.

1-3. SUBMITTALS. Drawings and data shall be submitted in accordance with the Submittals Procedures section. Drawings and data shall include, but shall not be limited to, the following:

Details of joints and connections.
Pipe section length.
Pipe Dimension Ratio.
Affidavit of Compliance (ANSI/AWWA C906, Sec. 6.3).
Verification, including Quality Assurance Testing (ANSI/AWWA C906, Sec. 5).

1-4. QUALITY ASSURANCE.

1-4.01. Qualifications. The pipe manufacturer shall provide the services of an experienced, competent, and authorized representative to visit the site of the work to advise and consult with Contractor during joining and installation of the

pipe. The manufacturer's representative shall not directly supervise Contractor's personnel, and Contractor shall remain responsible for the pipeline work.

1-4.02. Fusion. Fusion joints shall be made by qualified fusion technicians who shall demonstrate fusion experience on projects completed within a year of the Bid date which included similar or larger installation lengths, similar pipe sizes (+/- 2 pipe sizes) and similar DRs (+/- 2 DRs).

1-5. STORAGE AND HANDLING. Storage and handling shall meet the requirements of Product Requirements section, and shall be in accordance with Chapter 7, Transportation, Handling and Storage of Pipe and Fittings of AWWA Manual M55, to ensure installation in sound, undamaged conditions. Pipe shall not be stored uncovered in direct sunlight.

PART 2 - PRODUCTS

2-1. PERFORMANCE AND DESIGN REQUIREMENTS.

2-1.01. Dimensions. Dimensions shall be as specified in the materials paragraph.

2-2. MATERIALS.

Pipe	ANSI/ AWWA C906; material designation (ASTM D3350) PE3608 or PE4710, minimum cell classification 344464C, 30” diameter as indicated on Drawings. Pressure class and wall thickness of DR 11. Thermal butt fusion joints, ASTM D3261.
Joints	Butt fusion joints, ASTM D3261; manufactured by injection molding; pressure class of the pipe or greater.
Fittings	
Electrofusion Type	ASTM F1055 having pressure class equivalent to the pipe or greater as required.
Molded or Fabricated Type	Meet applicable AWWA C906 requirements; pressure class and cell class equivalent to the pipe or greater as required.
Other Types	Subject to review by the Engineer.

PART 3 - EXECUTION

3-1. INSPECTION. Pipe and fittings shall be carefully examined for cracks and other defects immediately before installation, with special attention to pipe ends. All defective pipe and fittings shall be removed from the site of the work.

3-2. INSTALLATION.

3-2.01. Laying Pipe. Pipe shall be protected from lateral displacement by pipe embedment material installed as specified in the Trenching and Backfilling section. Pipe shall not be laid in water or under unsuitable weather or trench conditions, and shall be protected against entry of foreign matter.

During freezing weather, particular care shall be taken in handling and laying pipe to prevent damage by impact.

Whenever pipe laying is stopped, the open end of the line shall be closed with a tight-fitting end board to keep out sand and earth. The end board shall have several perforations near its center to admit water into the pipe, to prevent flotation in the event the trench is flooded. Any standing water shall be removed from the trench before the end board is removed.

Pipe shall be protected from extended exposure to sunlight, shall be kept as cool as possible during installation, and shall be covered with backfill immediately after installation only during the cooler morning hours of the day.

3-2.02. Cleaning. The interior of all pipe and fittings shall be thoroughly cleaned before installation and shall be kept clean until the work has been accepted.

3-2.03. Alignment. Piping shall be laid to the lines and grades indicated on the drawings. Pipelines or runs intended to be straight shall be laid straight. Deflections from a straight line or grade shall not exceed the maximum deflection specified by the manufacturer. Piping shall be laid in a manner that will not allow excessive amounts of condensate to collect at low points within the pipe.

Unless otherwise specified or indicated on the drawings, and subject to acceptance of the Engineer, either shorter pipe sections or fittings shall be installed as required to maintain the indicated pipeline alignment or grade.

3-2.04. Cutting Pipe. Cutting shall be in accordance with the pipe manufacturer's recommendations. Cuts shall be smooth, straight, and at right angle to the pipe axis. After cutting, the end of the pipe shall be dressed to remove all roughness and sharp corners and shall be beveled in accordance with the manufacturer's instructions.

3-2.05. Jointing. Jointing of pipe and fittings shall be performed in accordance with the instructions and recommendations of the pipe manufacturer and in accordance with ASTM F2620 and PPI TR 33. Sections of HDPE pipe shall be joined above ground into continuous lengths by the thermal butt fusion method.

Saddle fusion shall be performed in accordance with ASTM F2620 or PPI TR-41 and the fitting manufacturer's recommendations.

Where required, electrofusion shall be performed in accordance with ASTM F1290, PPI TN-34, and the manufacturer recommended procedure.

Socket fusion and extrusion welding or hot gas welding will not be acceptable.

All joining procedures shall be acceptable to Engineer.

3-2.06. Connections with Existing Piping. Connections between new work and existing piping shall be made using suitable fittings. Each connection with an existing pipe shall be made at a time and under conditions which will least interfere with service to customers, and as authorized by Owner. Facilities shall be provided for proper dewatering and for disposal of all water removed from the dewatered lines and excavations without damage to adjacent property.

3-2.07. Reaction Anchorage and Blocking. All tees and plugs installed in piping subject to internal hydrostatic head in excess of 30 feet shall be provided with suitable reaction blocking, anchors, joint harnesses, or other acceptable means of preventing movement of the pipe caused by internal pressure.

Concrete blocking shall extend from the fitting to solid undisturbed earth and shall be installed so that all joints are accessible for repair. The dimensions of concrete reaction blocking shall be as indicated on the drawings or as directed by Engineer.

Reaction blocking, anchorages, or other supports for fittings installed in fill or in other unstable ground shall be provided as indicated on the drawings or as directed by Engineer.

3-3. FIELD QUALITY CONTROL.

3-3.01. Hydrostatic Tests. After installation, HDPE piping shall be hydrostatically tested for defective workmanship and materials as specified in Sections 15020 Miscellaneous Plastic Piping and Accessories Installation and Section 01656 Pressure Pipe Testing and Disinfection section.

3-3.02. Leakage. All HDPE piping shall be watertight and free from leaks. Each leak that is discovered within the correction period stipulated in the General Conditions shall be repaired by and at the expense of Contractor.

3-4. CLEANING. After installation, HDPE piping shall be cleaned as specified in the Cleaning and Disinfection of Water Pipelines section.

End of Section

Section 02930

SOIL AMENDMENT MATERIALS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Comply with governing regulations applicable to landscape materials and standards of grading conforming to the requirements of Clean Water Services.

B. Do not make substitutions without the written approval of the Owner. If any of the specified soil amendment material is not obtainable, submit to the Engineer for proof of non-availability and material proposed for use as equivalent material as described in the General Conditions.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated as Product Review.

B. Submit within 30 days from Award of Contract the following:
   1. Compost material test report and samples as seen below
   2. Imported Topsoil material test report and samples as seen below

C. Samples for Verification: For the following for Product Review:
   1. 1/2 cubic foot compost.
   2. 1/2 cubic foot of each imported top soil. Furnish one sample from each site from which soil is to be furnished.

D. Material Test Reports for Product Review:
   1. Soil Fertility and Agricultural Suitability Analyses and Recommendations Reports for the following:
      a. Imported Topsoil: Minimum 30 days prior to beginning soil preparation work.
   2. Compost Analysis: Provide analysis for one representative sample of compost minimum 30 days prior to compost being delivered to Project Site and an analysis for one representative sample of compost delivered to the Project Site.

E. Delivery Slips for Product Information: Provide delivery slips as proof of shipment of specified materials.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Bulk Materials:
   1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
   2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

PART 2 - PRODUCTS

2.1 IMPORTED TOPSOIL

A. Imported Topsoil: ASTM D 5268; natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles, conforming to USDA classification for Loam or Sandy Loam; friable, pervious, and black or a darker shade of brown,100% passing through a 1/2 inch screen, containing no weeds, roots or deleterious material, and containing not more than 2% foreign materials on a dry weight basis; and complying with the following physical properties:
   1. Texture: a loam.
   2. Organic Matter: 2 percent minimum, 5% maximum on a dry weight basis.
   3. Sodium Adsorption Ratio (SAR): less than 6.0.
   4. Saturation Extract concentration for Boron: less than 1.0
   5. pH range of from 5.0 to 7.5.
   6. Maximum estimated saturated paste electrical conductivity: <3m.mhos/cm (dS/m).
   7. Non-soil components: less than 2 percent by dry weight basis.
   8. Markers for hazardous materials: none/pass.
   9. Minimal weed seed
      a. If regenerative noxious weeds (including, but not limited to, quack grass, nutsedge grass, and horsetail) are present in the soil, all resultant growth including roots shall be removed throughout one-year period after acceptance of work at no additional cost to Owner.

2.2 ORGANIC SOIL AMENDMENTS

A. Compost: Shall be pure plant material that has been composted to a maturity index of Mature or Very Mature, and is derived from the aerobic decomposition of only plant materials and/or engineered biodegradable products which as derived entirely from plant materials

(cellulose or starch) and manufactured with the intention of recycling by composting. Feedstock characteristics of compost shall:

1. Contain no deleterious materials.
2. Contain no more than 2% soil (sand, silt, clay) plus any foreign materials on a dry weight basis.
3. Be free of viable seeds or other propagules (except airborne seeds).
4. Contain no medical wastes or medical dunnage from either human or veterinary sources.
5. Contain no sewage from human sources.
6. Contain no vertebrate animal parts.

B. Before delivery of the compost, the results of compost analysis shall be provided submitted for favorable review. The results shall include, but not be limited to:

1. Feedstock percentages in the final compost product.
2. A statement that compost meets federal and state health and safety regulations.
3. A copy of laboratory analysis, less than 30 days old, performed by a registered, certified testing laboratory, reporting nitrogen, phosphorous and potassium levels as percent of dry weight, and verifying the compost meets or exceeds physical, biological and chemical requirements, as follows:

Physical, Biological and Chemical Requirements for Compost	
Test[1]	**Acceptable limits**[2]
pH	5.0 – 7.5
EC (Max.Est.Sat.Paste)	≤4m.mhos/cm (dS/m).
Moisture	not more than 50% by weight
Carbon to Nitrogen ratio	≤30:1
Size:	
1/2 inch screen	100% passing
1/4 inch screen	≤25% passing
Maturity Index:	Mature – Very Mature
Respiration (O_2,CO_2, temp)	per method
or Nitrogen Ratios or VOA	per method
Foreign Material	<2% by dry weight
Heavy Metals:	
Arsenic	<20 ppm
Cadmium	<10 ppm
Copper	<500 ppm

Physical, Biological and Chemical Requirements for Compost	
Test[1]	**Acceptable limits**[2]
Lead	<150 ppm
Mercury	<8 ppm
Molybdenum	<9 ppm
Nickel	<210 ppm
Selenium	<18 ppm
Zinc	<1,400 ppm

NOTES:

1. Composting testing and sampling procedures shall be in accordance with the U.S. Composting Council's publication "Test Methods for the Examination of Composting and Compost (TMECC) or EPA certified methodologies.
2. "<" Means "less than…" "≤" Means "less than or equal to…"

4. Biological Contaminants: Exceeds current edition of US EPA Class-A Standards in accordance with 40CFR 503.32(a):

Pathogen	Less Than
Fecal Coliform	1,000 Most Probable Number per gram dry weight of total solids (MPN/g)
Salmonella	2 MPN/4 grams

PART 3 - EXECUTION

3.1 GENERAL

A. Soil Amended Section shall be 12 inches imported top soil to finish grade, covered by 2 inches organic soil amendments.

B. For all disturbed areas remove native soil as necessary to build the Soil Amended Sections. After native soil removal, rip the subsoil to a minimum depth of 6-inches. Dispose removed native soil off-site.

C. Backfill Soil Amended Sections and compact backfill to 85% density.

D. Promptly remove soil and debris, created by amended soil work, from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

End of Section

Section 03301

MISCELLANEOUS CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1-1. SCOPE. This section covers all cast-in-place concrete, including reinforcing steel, forms, finishing, curing, and appurtenant work.

Both inch-pound (English) and SI (metric) units of measurement are specified herein; the values expressed in inch-pound units shall govern.

1-2. GENERAL. All cast-in-place concrete shall be accurately formed and properly placed and finished as indicated on the drawings and as specified herein.

1-3. SUBMITTALS. All submittals of drawings and data shall be in accordance with the Submittal Procedures section.

The following items shall be submitted for review:

Aggregate reports (ASTM C33)	
	Source and type
	Gradation
	Deleterious materials
	Alkali-aggregate reactivity
Cement mill report	
Fly ash or slag cement test report	
Admixture data sheets	
Proposed mixture proportions	
Concrete compressive strength at 28 days	

1-4. STORAGE AND HANDLING. Cement shall be stored in suitable moistureproof enclosures. Cement which has become caked or lumpy shall not be used.

Aggregates shall be stored so that segregation and the inclusion of foreign materials are prevented. The bottom 6 inches [150 mm] of aggregate piles in contact with the ground shall not be used.

Reinforcing steel shall be carefully handled and shall be stored on supports that will prevent the steel from touching the ground.

PART 2 - PRODUCTS

2-1. LIMITING REQUIREMENTS. Unless otherwise specified, concrete shall be controlled within the following limiting requirements.

2-1.01. Cement Content. The quantity of Portland cement, plus any substituted fly ash or slag cement, in the concrete shall be not less than that indicated in the following table:

Quantity of Cement (lb/yd^3)			
Coarse Aggregate Size from No. 4 Sieve to			
3/8 in.	1/2 in.	3/4 in.	1 in.
600	580	560	535

2-1.02. Maximum Water-Cementitious Ratio. The maximum water-cementitious ratio shall be 0.42 on a weight basis. If fly ash is used, the combined mass of cement plus fly ash shall be used to determine the water-cementitious materials ratio.

2-1.03. Fly Ash and Slag Cement Content. At the option of Contractor, fly ash or slag cement may be substituted for portland cement, on the basis of 1.0 lb added for each 1.0 lb of cement reduction. Fly ash replacement shall be within a range of 15 to 25 percent. Slag cement replacement shall be within a range of 25 to 50 percent.

2-1.04. Coarse Aggregate. The maximum nominal coarse aggregate size shall be 1 inch [25 mm].

2-1.05. Slump. Concrete slump shall be kept as low as possible consistent with proper handling and thorough compaction. Unless otherwise authorized by Engineer, slump of concrete without a superplasticizer shall not exceed 4 inches [100 mm]. Slump of concrete with a high-range water reducer (superplasticizer), or a midrange water reducer, shall not exceed 8 inches [200 mm].

2-1.06. Total Air Content. The total volumetric air content of concrete after placement shall be 6 percent ±1.5 percent. Air-entraining admixture shall be omitted from concrete for interior slabs which are to be trowel finished.

2-1.07. Admixtures. The admixture content, batching method, and time of introduction to the mix shall be in accordance with the manufacturer's recommendations and acceptable to Engineer. A water-reducing admixture and an air-entraining admixture shall be included in all concrete. A midrange water

reducer or a high-range water reducer (superplasticizer) may be used at Contractor's option. No calcium chloride or admixture containing chloride from sources other than impurities in admixture ingredients will be acceptable.

2-1.08. Strength. The minimum acceptable compressive strengths, as determined by ASTM C39, shall be:

Age	Minimum Compressive Strength
7 days	3,375 psi [23.5 MPa]
28 days	4,500 psi [31.5 MPa]

Cylinders shall be 6 inches [150 mm] diameter by 12 inches [300 mm] high for concrete mixes using a maximum nominal aggregate size of 1 inch [25 mm] or larger. Cylinders may be either 6 inches [150 mm] diameter by 12 inches [300 mm] high, or 4 inches [100 mm] diameter by 8 inches [200 mm] high for concrete mixes using a maximum nominal aggregate size of less than 1 inch [25 mm]. The average compressive strength shall be determined from the results of at least three cylinders when using 4 inch [100 mm] diameter cylinders, and at least two cylinders when using 6 inch [150 mm] diameter cylinders. All tests shall be performed using the same sized cylinders for the duration of the work.

2-2. MATERIALS.

Cement	ASTM C150, Type II or I/II , low alkali.
Fly Ash	ASTM C618, Class F, except loss on ignition shall not exceed 4 percent.
Slag Cement	ASTM C989, Grade 100 or Grade 120.
Fine Aggregate	Non-reactive, clean natural sand, ASTM C33. Artificial or manufactured sand will not be acceptable.
Coarse Aggregate	Non-reactive crushed rock, washed gravel, or other inert granular material conforming to ASTM C33, class 4S, except that clay and shale particles shall not exceed 1 percent.
Water	Potable. Water from concrete production operations shall not be used.
Admixtures	
Water-Reducing	ASTM C494, Type A or D.

Air-Entraining	ASTM C260.
Superplasticizing	ASTM C494, Type F or G.
Reinforcing Steel	
Bars	ASTM A615, Grade 60, deformed.
Welded Wire Fabric	ASTM A185 or A497.
Bar Supports	CRSI Class 1, plastic protected; or Class 2, stainless steel protected.
Mechanical Connectors	Splicing system meeting Type 2 tensile requirements of ACI 318. Products shall have a current evaluation report verifying testing per ICC-ES AC 133. Use only where indicated on the drawings.
Expansion joint materials	
Filler	Preformed sponge rubber. ASTM D1752, Type I.
Filler Adhesive	As recommended by manufacturer.
Sealant	As specified in the Joint Sealants section.
Forms	
Plywood Product	Standard PS1, waterproof, resin-bonded, exterior type, Douglas fir.
Lumber	Straight, uniform width and thickness, and free from knots, offsets, holes, dents, and other surface defects.
Form Coating	Nonstaining and nontoxic after 30 days. Product shall not exceed VOC limits established by the federal, state, or local regulatory agency having jurisdiction over the project site.
Evaporation Reducer	Dayton Superior "AquaFilm Concentrate J74", Euclid "Eucbar", L&M Chemical "E-Con", BASF "MasterKure ER50", or Sika "SikaFilm".

Polyethylene Film	Product Standard PS17 or ASTM D4397, 6 mils [150 µm] or thicker.
Vapor retarder and seam tape	Polyolefin membrane, 15 mil [0.38 mm] min, ASTM E1745, Class A, with maximum water vapor permeance of 0.02 perms. Stego Industries “Stego Wrap 15 Mil”, Raven Industries “Vaporblock 15”, Reef Industries “Griffolyn 15 Mil Green”, W.R. Meadows “Perminator 15”, Insulation Solutions “Viper VaporCheck II”. Manufacturer recommended seam tape and pipe boots.
Membrane Curing Compound and Floor Sealer	ASTM C1315, Type I, Class A, minimum 25 percent solids, acrylic, non-yellowing, unit moisture loss 0.40 kg/m^2 maximum in 72 hours. Product shall not exceed VOC limits established by the federal, state, or local regulatory agency having jurisdiction over the project site.
Epoxy Bonding Agent	ASTM C881, Type V, moisture insensitive, 100 percent solids; Dayton Superior “Sure Bond J58”, Euclid "Dural 452 MV", Prime Resins “Prime Bond 3900 High Mod LPL”, or SpecChem “SpecPoxy 2000”.

2-3. MIXTURE DESIGN AND TESTING. All reports and tests required for Engineer acceptance of materials and concrete mixtures shall be made at the expense of Contractor. Mixtures shall be adjusted in the field as necessary, within the limits specified, to meet the requirements of these specifications. If the source of any concrete materials is changed during the contract, concrete work shall pause until the new materials and the new mixture design are acceptable to Engineer.

2-3.01. Review of Materials. The source and quality of concrete materials shall be submitted to Engineer for review before concrete is placed.

2-3.02. Proposed Mixture Proportions. Proposed proportions of concrete shall meet the limiting requirements indicated herein.

2-3.03. Mixture Testing. Test results shall be submitted for review and shall be acceptable to Engineer before concrete work is started.

2-3.03.01. Field Test Record Data. Concrete mixtures may be qualified based on field test record performance data. Field test data records shall be from the production facility being used on the current Project and shall have been

performed in the past 24 months. Field test records shall represent a single group of at least 10 consecutive strength tests for one mixture, using the same materials, under the same conditions, and encompassing a period of not less than 45 days.

2-3.03.02. Laboratory Trial Mixture Testing. If field test record data is not available, or does not meet the specified criteria, laboratory trial mixtures shall be performed to confirm concrete strength requirements. Laboratory trial mixtures shall meet a minimum compressive strength of f'_c + 1200 psi.

2-4. FORMS. Forms shall be designed to produce hardened concrete having the shape, lines, and dimensions indicated on the drawings. Forms shall be substantial and sufficiently tight to prevent leakage of mortar and shall be maintained in proper position and accurate alignment.

Forms for pavement, curbs, or gutters shall be made of steel and shall be supported on thoroughly compacted earth. The top face of pavement forms shall not vary from a true plane more than 1/4 inch in 10 feet [2 mm/m].

Forms shall be thoroughly cleaned and coated before concrete is placed.

Form-facing materials shall be selected in accordance with ACI 347.3R, based upon the applicable formed concrete surface category. Formed concrete surface categories vary by structure and application, and shall be as indicated in the Finishing Formed Surfaces paragraph.

2-4.01. Form Ties. Form ties shall be of the removable end, permanently embedded body type, and shall have sufficient strength and rigidity to support and maintain the form in proper position and alignment without the use of auxiliary spreaders. Form ties for walls with waterstops at joints shall be provided with waterstop washers located on the permanently embedded portions of the ties at the approximate center of the wall. Through-wall tapered removable ties will not be acceptable for liquid-containing walls.

2-4.02. Edges and Corners. Chamfer strips shall be placed in forms to bevel all salient edges and corners, except the top edges of walls and slabs which are to be tooled and edges which are to be buried. Unless otherwise noted, bevels shall be 3/4 inch [19 mm] wide.

2-4.03. Form Removal. Forms shall not be removed or disturbed until the concrete has attained sufficient strength to safely support all dead, live, and construction loads. Care shall be taken in form removal to avoid surface gouging, corner or edge breakage, and other damage to the concrete.

2-5. REINFORCEMENT. Reinforcement shall be accurately formed and positioned and shall be maintained in proper position while the concrete is being placed and compacted. Unless otherwise indicated on the drawings, the details

of fabrication shall conform to ACI 315 and 318. In case of conflict, ACI 318 shall govern. Reinforcement shall be free from dirt, loose rust, scale, and contaminants. Mechanical connections shall be used only as indicated on the drawings.

PART 3 - EXECUTION

3-1. BATCHING, MIXING, AND DELIVERY. Concrete shall be furnished by an acceptable ready-mixed concrete supplier, and shall conform to ASTM C94 except as indicated otherwise in this specification.

3-1.01. Delivery Tickets. A delivery ticket shall be prepared for each load of ready-mixed concrete and a copy of the ticket shall be handed to Engineer by the truck operator at the time of delivery. Tickets shall indicate the name and location of Contractor, the project name, the mixture identification, the quantity of concrete delivered, the quantity of each material in the batch, the outdoor temperature in the shade, the time at which the cementitious materials were added, and the numerical sequence of the delivery.

3-1.02. Mixing Water. Mixing water shall not be added in transit. Any amount of water withheld from the truck mixer shall be clearly indicated on the delivery ticket. Water added at the site shall not exceed the amount withheld, and shall not be added without oversight by Owner's on site inspector.

3-1.03. Consistency. The consistency of concrete shall be suitable for the placement conditions. Aggregates shall flow uniformly throughout the mass, and the concrete shall flow sluggishly when vibrated or spaded. The slump shall be kept uniform.

3-2. PLACEMENT. Contractor shall inform Engineer at least 24 hours in advance of the times and places at which he intends to place concrete.

Methods of conveying concrete to the point of final deposit and of placing shall prevent segregation or loss of ingredients. During and immediately after placement, concrete shall be thoroughly compacted and worked around all reinforcement and embedments and into the corners of the forms. Concrete shall be compacted by immersion-type vibrators, vibrating screeds, or other suitable mechanical compaction equipment. The use of "jitterbug" tampers to compact concrete flatwork will not be permitted.

3-2.01. Polyethylene Film. Where concrete is placed against gravel or crushed rock which does not contain at least 25 percent material passing a No. 4 [4.75 mm] sieve, such surfaces shall be covered with polyethylene film. Joints in the film shall be lapped at least 6 inches [150 mm] and taped.

3-2.02. Vapor Retarder. Vapor retarder shall be installed at the locations indicated on the Drawings. Installation shall be in accordance with ASTM E1643 and the manufacturer's recommendations. Joints in the retarder shall be sealed with waterproof sealing tape. Care shall be exercised to avoid tearing or puncturing the retarder. Any damage shall be promptly repaired, and the retarder shall be inspected for damage immediately before the concrete is placed.

3-2.03. Cold Weather Concreting. Except as modified herein, cold weather concreting shall comply with ACI 306.1.

When placed, heated concrete shall not be warmer than 80°F [26°C].

3-2.04. Hot Weather Concreting. Except as modified herein, hot weather concreting shall comply with ACI 305.1.

At air temperatures of 90°F [32°C] or above, concrete shall be kept as cool as practicable during placement. The temperature of the concrete when placed in the work shall not exceed 90°F [32°C].

Plastic shrinkage cracking due to rapid evaporation of moisture shall be prevented. Concrete shall not be placed when the evaporation rate (actual or anticipated) equals or exceeds 0.2 lb per square foot per hour [1 kg/m^2/h], as determined using the nomograph in Appendix A of ACI 305.1.

3-3. TOLERANCES. Tolerances for cast-in-place concrete work shall be as indicated in ACI 117, and ACI 347.3R based upon the relevant formed concrete surface category.

Formed concrete surfaces that are to have a face-mounted flat steel or FRP member attached, including but not limited to items such as weir plates or shelf angles, shall have more stringent flatness requirements. The surface profile shall permit the installation of the flat member without grinding the concrete surface (except for removal of fins), deforming the flat member, or requiring usage of backer rods or shims.

3-4. FINISHING.

3-4.01. Finishing Formed Surfaces. Formed concrete surfaces shall meet all criteria of the relevant formed concrete surface category (CSC), as defined in ACI 347.3R, except as indicated otherwise herein. Surfaces shall be assigned to CSC's as indicated.

Formed Concrete Surface Category	Applicable Surfaces	Mockup Required
CSC1	Formed concrete surfaces that will be in permanent contact with earth backfill.	No
CSC2	All other formed concrete surfaces not designated otherwise.	No

3-4.01.01. Fins. Fins, form seams, and construction joints shall be ground flush on all surfaces in formed concrete surface categories CSC2, CSC3, and CSC4, and in CSC1 surfaces that are required to be dampproofed.

3-4.01.02. Tie Holes. All tie holes in formed surfaces, regardless of the relevant CSC, shall be cleaned, wetted, and filled with patching mortar. The patches shall be finished flush and cured and shall match the texture and color of the adjacent concrete.

3-4.01.03. Dampproofed Surfaces. Concrete surfaces to be dampproofed shall have fins removed and tie holes filled, but no additional finishing will be required.

3-4.02. Finishing Unformed Surfaces. Unless otherwise specified, unformed surfaces shall be screeded and given an initial float finish as soon as the concrete has stiffened sufficiently for proper working. Any piece of coarse aggregate which is disturbed by the float or which causes a surface irregularity shall be removed and replaced with mortar. Initial floating shall produce a surface of uniform texture and appearance, with no unnecessary working of the surface.

Initial floating shall be followed by a second floating at the time of initial set. The second floating shall produce a finish of uniform texture and color and the completed finish for unformed surfaces unless indicated otherwise.

3-4.03. Troweling. Interior floor surfaces which will be exposed after construction is completed; exposed top surfaces of equipment bases and interior curbs; and other surfaces designated on the drawings shall be steel trowel finished. Troweling shall be performed after the second floating when the surface has hardened sufficiently to prevent an excess of fines being drawn to the surface. Troweling shall produce a dense, smooth, uniform surface free from blemishes and trowel marks.

3-4.04. Application of Evaporation Reducer. Concrete flatwork subject to rapid evaporation due to hot weather, drying winds, and sunlight shall be protected with an evaporation reducer. The evaporation reducer shall form a continuous film on the surface of fresh, plastic concrete to reduce evaporation.

Immediately following screeding, evaporation reducer shall be sprayed over the entire surface of fresh, plastic concrete flatwork at a rate of not less than 200 square feet per gallon [4 m^2/L], in accordance with the manufacturer's recommendations. The spray equipment shall have sufficient capacity to continuously spray the product at approximately 40 psi [275 kPa] with a suitable nozzle as recommended by the manufacturer.

The sprayable solution shall be prepared as recommended by the manufacturer.

Under severe drying conditions, additional applications of evaporation reducer may be required following each floating or troweling, except the last finishing operation.

3-5. CURING. Concrete shall be protected from loss of moisture for at least 7 days after placement unless indicated otherwise. Curing of concrete shall be done by methods which will keep the concrete surfaces adequately wet for the specified curing period.

3-5.01. Water Curing. Water curing shall be performed for concrete in liquid-containing structures and for all concrete containing slag cement. Other forms of curing will not be acceptable in these applications. Water curing shall be in accordance with ACI 308.1 except as modified herein.

Water saturation of concrete surfaces shall begin as soon as possible after initial set. The rate of water application shall be regulated to provide complete surface coverage with a minimum of runoff.

Water curing shall continue for 14 days for concrete containing slag cement, and for 7 days for other types of concrete. However, when concrete is being protected from low temperatures, the duration of water curing may be shortened to 1 day less than the duration of cold weather protection.

When forms are removed before the specified curing duration is completed, measures shall be taken to immediately continue water curing and to provide adequate thermal protection for the concrete.

3-5.02. Membrane Curing. Unless otherwise specified, membrane curing compound may be used instead of water curing on concrete in non-liquid-containing structures which will not be stained or etched, covered with chemical resistant linings, covered with additional concrete, or indicated in the Architectural drawings to be covered with a finish flooring material.

Membrane curing compound shall be evenly sprayed at a coverage rate of not more than 300 square feet per gallon [7.3 m^2/L]. The spray equipment shall have sufficient capacity to continuously spray curing compound at approximately 40 psi [275 kPa] with a suitable nozzle as recommended by the manufacturer. Unformed surfaces shall be covered with the first coat of curing compound within 30 minutes after final finishing. A second coat of curing compound shall be applied when the first coat has become tacky to the touch and shall be applied at right angles to the first coat.

Curing compound shall be suitably protected against abrasion during the curing period.

3-6. REPAIRING DEFECTIVE CONCRETE. Defective concrete shall be defined as any surface with undesirable visible effects in excess of that permitted by the relevant formed concrete surface category (CSC), except as indicated otherwise herein.

Defects in formed concrete surfaces shall be repaired to the satisfaction of Engineer within 24 hours of form removal. Surface repair work shall conform to Article 5.3.7 of ACI 301 and shall be performed in a manner that will not interfere with thorough curing of the surrounding concrete. Surface repair material shall be adequately cured.

Defects in concrete that are more than 3 inches [75 mm] deep shall be brought to the attention of Engineer prior to any repair work. Contractor shall submit a proposed repair material and procedure for review by Engineer. The repair material and procedure required by Engineer may be more extensive than the process described in Article 5.3.7 of ACI 301.

3-7. OWNER'S FIELD CONTROL TESTING. Field control tests shall be performed by Engineer or Owner's testing laboratory personnel, at the expense of Owner. Contractor shall provide access to all facilities and the services of one or more employees as necessary to assist with the field control testing.

3-7.01. Air Content. An air content test shall be made on concrete from each batch of concrete from which concrete compression test cylinders are made. Air content shall be determined in accordance with ASTM C231.

3-7.02. Slump. A slump test shall be made on concrete from each batch of concrete from which concrete compression test cylinders are made. Slump shall be determined in accordance with ASTM C143.

3-7.03. Test Cylinders. Compression test specimens shall be made, cured, stored, and delivered to the laboratory in accordance with ASTM C31 and C39. Compressive strength tests will be evaluated in accordance with ACI 318 and as specified herein.

One set of concrete test cylinders shall be cast for each concrete pour. A set of test cylinders shall consist of four or six cylinders depending on the cylinder size selected. Half of the cylinders shall be tested at 7 days, and the remaining half shall be tested at 28 days. All concrete required for testing shall be furnished by, and at the expense of, Contractor.

End of Section

Section 03600

GROUTING

PART 1 - GENERAL

1-1. SCOPE. This section covers procurement and installation of grout. Unless otherwise specified, only nonshrink grout shall be furnished.

Epoxy grouting and adhesive anchoring of anchor bolts, threaded rod anchors, and reinforcing bars is covered in the Anchorage in Concrete Section 05550.

1-2. SUBMITTALS. A letter of certification indicating the types of grout to be supplied and the intended use of each type shall be submitted in accordance with the Submittals Procedures section.

1-3. DELIVERY, STORAGE, AND HANDLING. Materials shall be handled, transported, and delivered in a manner which will prevent damage of any kind. Materials shall be protected from moisture.

PART 2 - PRODUCTS

2-1. MATERIALS.

Nonshrink Grout	Precision cementitious grout with demonstrated non-shrinking properties, minimum 28 day compressive strength of 9000 psi; L&M "Crystex", BASF "Masterflow 928", Sika "SikaGrout 328", Euclid "Hi-Flow Grout", Dayton Superior "Sure-Grip High Performance Grout", or SpecChem "SC Precision Grout".
Water	Clean and free from deleterious substances.

2-2. CEMENTITIOUS GROUT. Cementitious grout shall be furnished factory premixed so that only water is added at the jobsite.

2-3. EPOXY GROUT. Epoxy grout shall be used in lieu of cementitious grout when required by the equipment manufacturer for performance or warranty requirements. Epoxy grout shall be a three component system consisting of a Part A (resin), Part B (hardener) and Part C (aggregate). All three components shall be products of the same manufacturer and be compatible. Epoxy grout products and installation procedures shall be submitted to Engineer for approval.

PART 3 - EXECUTION

3-1. CEMENTITIOUS GROUT INSTALLATION.

3-1.01. Preparation. The concrete foundation to receive cementitious grout shall be saturated with water for at least 12 hours preceding grouting unless additional time is required by the grout manufacturer.

3-1.02. Mixing. Grout shall be mixed in a mechanical mixer. No more water shall be used than is necessary to produce a flowable grout, nor shall water content exceed the amount recommended by the manufacturer.

3-1.03. Temperature Restrictions. Grout shall be placed in accordance with the manufacturer's published temperature restrictions. Ambient temperature and grout temperature shall be a minimum of 40 degrees F and rising at time of placement. Grout shall not be placed on frost covered surfaces. Grout shall be protected from freezing until it has reached a minimum strength of 4,000 psi. Grout shall not be placed when the ambient or grout temperature exceeds 90 degrees F.

3-1.04. Placement. Unless otherwise specified or indicated on the Drawings, grout under baseplates shall be 1-1/2 inches [38 mm] thick. Grout shall be placed in strict accordance with the directions of the manufacturer so that all spaces and cavities below the baseplates are completely filled without voids. Forms shall be provided where structural components of baseplates will not confine the grout.

3-1.05. Edge Finishing. In all locations where the edge of the grout will be exposed to view, the grout shall be finished smooth after it has reached its initial set. Except where shown to be finished on a slope, the edges of grout shall be cut off flush at the baseplate.

3-1.06. Curing. Grout shall be protected against rapid loss of moisture by covering with wet cloths or polyethylene sheets. After edge finishing is completed, the grout shall be wet cured for at least 3 days and then an acceptable membrane curing compound shall be applied.

3-2. EPOXY GROUT INSTALLATION. Epoxy grout shall be installed in accordance with ACI 351.5.

End of Section

Section 05550

ANCHORAGE IN CONCRETE

PART 1 - GENERAL

1-1. SCOPE. This section covers the design and installation of anchors in concrete and masonry. It includes cast-in-place anchor bolts and anchor rods, adhesive anchors for both threaded rods and reinforcing bars, expansion anchors, and undercut anchors.

1-2. GENERAL.

1-2.01. Anchors Designed by Engineer. Cast-in-place and post-installed anchors that are fully detailed on the Drawings have been designed by Engineer and may not be changed to a different type without written approval of Engineer.

1-2.02. Anchors Designed by Contractor's Suppliers. Contractor's material suppliers shall be responsible for design of anchors for railings, ladders, equipment, pre-engineered structures, and other manufactured items, as indicated in the Drawings and Specifications. Cast-in-place anchors shall be used unless post-installed types are indicated on the Drawings or accepted by Engineer.

Adhesive anchors used in vibrating applications, such as for pumps, shall only be used if the anchor manufacturer submits documentation indicating that the product is suitable for the anticipated service conditions.

1-2.03. Materials. Unless otherwise indicated, anchors of structural steel members connected to concrete shall have a diameter of at least 3/4 inch, and structural members connected to masonry shall have a diameter of at least 5/8 inch. Anchors for ladders and equipment shall have a diameter of at least 1/2 inch. Anchors for pedestrian railing systems shall have a diameter of at least 3/8 inch.

Unless otherwise indicated on the Drawings, anchors used in the following locations and applications shall be of the indicated materials.

> Anchor Bolt Material: All cast-in-place and post installed anchor bolts shall be stainless steel.

Adhesive, expansion, and undercut anchors may be used instead of cast-in-place anchors only where specifically indicated or permitted on the Drawings or with the specific acceptance by Engineer.

1-3. SUBMITTALS. Data, catalog cuts, and manufacturer's research reports (from independent organizations such as ICC-ES or IAPMO UES) indicating the

manufacturer and types of adhesive anchors, expansion anchors, and undercut anchors to be supplied shall be submitted in accordance with the Submittals Procedures section.

If Contractor requests use of products other than those indicated herein, calculations may be required as part of the submittal package. Calculations shall be prepared by a professional engineer licensed in the state of the project, using methods and procedures required by the building code. Contractor shall demonstrate that the proposed substitute anchors are equivalent in all necessary criteria, including strength, spacing and edge distance limitations, embedment depth limitations, temperature limitations, and any other criteria required by Engineer.

1-4. DELIVERY, STORAGE, AND HANDLING. Materials shall be handled, transported, and delivered in a manner which will prevent damage or corrosion. Damaged materials shall be promptly replaced. Materials shall be shipped and stored in original manufacturer's packaging.

PART 2 - PRODUCTS

2-1. MATERIALS. Unless otherwise indicated on the drawings, materials shall be as indicated below.

Cast-In-Place Anchor Bolts and Anchor Rods

Stainless steel	Bolts, ASTM F593, Alloy Group 1 or 2 (minimum yield strength of 45 ksi); nuts, ASTM F594, Alloy Group 1 or 2.
Flat Washers	ANSI B18.22.1; of the same material as anchor bolts and nuts.
Expansion Anchors in Concrete	Products shall be single component anchors tested in accordance with ICC AC193, and shall have a manufacturer’s research report in compliance with the applicable building code. The anchors shall be approved for use in cracked concrete, and for resisting seismic forces. Hilti "Kwik-Bolt TZ", Simpson “Strong-Bolt 2”, or DeWalt “Power-Stud+SD2” (carbon steel), “Power-Stud+SD4” (304 stainless steel), and “Power-Stud+SD6” (316 stainless steel).

Undercut Anchors in Concrete	Products shall be tested in accordance with ICC AC193, and shall have a manufacturer's research report in compliance with the applicable building code. Hilti "HDA Undercut Anchor" (carbon steel) and "HDA-R Undercut Anchor" (stainless steel), or DeWalt "Atomic+ Undercut Anchor" (A36 carbon steel).
Adhesive Anchors in Concrete	Products shall be tested in accordance with ICC AC308, and shall have a manufacturer's research report in compliance with the applicable building code. The anchors shall be approved for use in cracked concrete, and for resisting seismic forces.
Threaded Rods and Nuts (Stainless Steel)	ASTM F593, CW.
Adhesive	Hilti "HIT-HY 200", or DeWalt "Pure 110+".

2-2. ANCHORS.

2-2.01. Cast-in-Place Anchor Bolts and Anchor Rods. Cast-in-place anchor bolts and anchor rods shall have forged heads or embedded nuts and washers. Anchors shall be delivered in time to permit setting prior to the placing of structural concrete or masonry grout. Anchor sleeves shall not be used unless acceptable to Engineer. Unless installed in sleeves, anchor bolts and anchor rods shall be provided with sufficient threads to permit a nut to be installed on the concrete side of the concrete form or the supporting template. Two nuts, a jam nut, and a washer shall be furnished for cast-in-place anchor bolts and anchor rods indicated on the Drawings to have locknuts; two nuts and a washer shall be furnished for cast-in-place anchor bolts and anchor rods without locknuts.

2-2.02. Adhesive, Expansion, and Undercut Anchors. When adhesive, expansion, or undercut anchors are indicated on the Drawings, only acceptable systems shall be used. Acceptable systems shall include only those systems and products specified or specifically indicated by product name on the Drawings. Alternative anchoring systems may be used only when specifically accepted by Engineer.

Unless otherwise noted, single nuts and washers shall be provided with adhesive anchors, expansion anchors, and undercut anchors. Adhesive anchors shall be free of coatings that would weaken the bond with the adhesive.

Adhesive anchors in hollow CMU masonry and unreinforced brick masonry shall utilize screen tubes as recommended by the manufacturer.

PART 3 - EXECUTION

3-1. GENERAL. Anti-seize thread lubricant shall be liberally applied to projecting, threaded portions of stainless steel anchors immediately before tightening of the nuts.

3-1.01. Compliance With Manufacturer's Instructions. Post-installed anchors shall be installed in accordance with the manufacturer's printed installation instructions and all applicable requirements of the manufacturer's research report for the specific anchor system. If conflicts are found between the Drawings, the manufacturer's printed installation instructions, and the manufacturer's research report installation requirements, Contractor shall notify Engineer for resolution.

3-2. CAST-IN-PLACE ANCHOR BOLTS AND ANCHOR RODS. Cast-in-place anchor bolts and anchor rods shall be carefully positioned with templates and secured in the forms prior to placing concrete, or in masonry bond beams prior to placing grout. Contractor shall verify that anchorage devices are positioned in accordance with the Drawings and with applicable equipment or structure submittal drawings.

Threads, bolts, and nuts spattered with concrete or masonry grout during placement shall be cleaned prior to final installation of the bolts and nuts.

Sleeves shall be filled with non-shrink grout.

3-3. ADHESIVE ANCHORS. Adhesive shall be statically mixed in the field during application. All proportioning and mixing of the components shall be in accordance with the manufacturer's recommendations.

Anchors or bars shall be installed in holes hammer drilled into hardened concrete or masonry. Drill shall be set to rotation-only mode when drilling into hollow CMU or into brick. Diameter of holes shall be 1/16 inch larger than the outside diameter of the rod or bar unless recommended otherwise by the anchor system manufacturer. Holes shall be prepared by removing all dust and debris using procedures recommended by the adhesive manufacturer.

Adhesive anchors and holes shall be clean, dry, and free of grease and other foreign matter at the time of installation. The adhesive shall be placed and the rods or bars shall be set in accordance with the recommendations of the manufacturer. Care shall be taken to ensure that all spaces and cavities are filled with adhesive, without voids.

3-3.01. Concrete Installation. Unless indicated otherwise on the Drawings, reinforcing bars shall be embedded to a depth of 15 bar diameters, and threaded rods shall be embedded to a depth that will develop the yield strength of the rod.

Adhesive anchors in concrete shall be installed under the following conditions.

Minimum Age of Concrete Prior to Anchor Installation	21 days.
Concrete Temperature Range	Maximum short-term temperature 162 F, maximum long-term temperature 110 F.
Moisture Condition	Dry concrete.
Type of Lightweight Concrete	N/A
Hole Drilling and Preparation	Hammer drill only.

Installation of adhesive anchors into concrete that are either horizontal or upwardly inclined shall be performed only by personnel certified by the ACI/CRSI Adhesive Anchor Installation Certification Program.

3-4. EXPANSION AND UNDERCUT ANCHORS. Expansion and undercut anchors shall be installed using all procedures and accessory devices recommended by the anchor manufacturer.

End of Section

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Section 09940

PROTECTIVE COATINGS

PART 1 - GENERAL

1-1. SCOPE. This section covers field applied protective coatings, including surface preparation, protection of surfaces, inspection, and other appurtenant work for equipment and surfaces designated to be coated.

1-2. GENERAL. Cleaning, surface preparation, coating application, and thickness shall be as specified herein and shall meet or exceed the coating manufacturer's recommendations. When the manufacturer's minimum recommendations exceed the specified requirements, Contractor shall comply with the manufacturer's minimum recommendations. When equivalent products are acceptable to Engineer, Contractor shall comply with this Specification and the coating manufacturer's recommendations.

1-2.01. Governing Standards. All cleaning, surface preparation, coating application, thickness, testing, and coating materials (where available) shall be in accordance with the referenced standards of the following AWWA, ANSI, NACE, SSPC, NSF, and ASTM.

1-2.02. Delivery and Storage. All coating products shall be received and stored in accordance with the coating manufacturer's recommendations.

1-3. SUBMITTALS. Contractor shall submit color cards for all coatings proposed for use, together with complete descriptive specifications and manufacturer's product data sheet.

1-4. QUALITY ASSURANCE.

1-4.01. Coating System Certifications. The coating applicator and coating manufacturer shall review and approve in writing the coating manufacturer's written recommendations for the coating system and the intended service. Any variations from the Specifications or the coating manufacturers published recommendations shall be submitted in writing and approved by the coating manufacturer. The coating manufacturer shall observe the surface preparation, mixing, and application of the coating systems and submit a written report of his observations and any additional recommendations.

PART 2 - PRODUCTS

2-1. ACCEPTABLE MANUFACTURERS.

2-1.01. Alternative Manufacturers. In addition to the coatings listed herein, equivalent products of other manufacturers that distribute globally will also be acceptable.

2-2. MATERIALS. All coatings shall be delivered to the job in original, unopened containers, with labels intact. Coatings shall be stored indoors and shall be protected against freezing. No adulterant, unauthorized thinner, or other material not included in the coating formulation shall be added to the coating for any purpose.

All coatings shall conform to the air quality regulations applicable at the location of use. Coating materials that cannot be guaranteed by the manufacturer to conform, whether or not specified by product designation, shall not be used.

With the exception of heat resistant coatings, the coatings specified have been selected on the basis of the manufacturer's statement that the VOC content of the product is 2.8 lbs per gallon or less; however, it shall be the Contractor's responsibility to use only coating materials that are in compliance with the requirements of all regulatory agencies. Local regulations may require some coatings to have a lower VOC content than specified herein. The coatings specified may meet the VOC limits in the unthinned (as shipped) condition, but may exceed the limits if thinned according to the manufacturer's recommendations. In such case, the coatings shall not be thinned beyond the 2.8 lbs per gallon limit, and if the product cannot be thinned to suit the application method or temperature limits, another manufacturer's coating shall be used, subject to acceptance by Engineer.

Contractor shall be responsible for ensuring the compatibility of field coatings with each other or with any previously applied coatings. Coatings used in successive field coats shall be produced by the same manufacturer. The first field coat over shop coated or previously coated surfaces shall cause no wrinkling, lifting, or other damage to underlying coats.

All intermediate and finish coating materials that will be in contact with wastewater atmosphere shall be guaranteed by the manufacturer to be fumeproof and suitable for wastewater plant atmosphere that contains hydrogen sulfide. Coatings that cannot be so guaranteed shall not be used. Lead-free, chromium-free, and mercury-free coatings shall be used.

2-2.01 Primers.

Universal Primer	PPG Amercoat "Amercoat 385 Epoxy", Carboline "Rustbond", ICI Devoe "Devran 224HS", Tnemec "Series 27 F.C. Typoxy", or Sherwin-Williams "Dura Plate 235".

2-2.02. Intermediate and Finish Coatings.

Epoxy	PPG Amercoat "Amercoat 385 Epoxy", Carboline "Carboguard 890", ICI Devoe Devran "224HS", Tnemec "Series N69 Hi-Build Epoxoline II", or Sherwin-Williams "Dura Plate 235".
Aliphatic Polyurethane	PPG Amercoat "Amercoat 450H", Carboline "Carbothane 134HG", ICI Devoe "Devthane 379H" Tnemec "Series 1074 Endura-Shield II", or Sherwin-Williams "Acrolon 218HS".

PART 3 - EXECUTION

3-1. SURFACE PREPARATION. All surfaces to be coated shall be clean and dry and shall meet the recommendations of the coating manufacturer for surface preparation. Freshly coated surfaces shall be protected from dust and other contaminants. Oil and grease shall be completely removed by use of solvents or detergents before mechanical cleaning is started. The gloss on previously coated surfaces shall be dulled if necessary for proper adhesion of topcoats.

Surfaces shall be free of cracks, pits, projections, or other imperfections that would interfere with the formation of a smooth, unbroken coating film, except for concrete block construction where a rough surface is an inherent characteristic.

When applying touchup coating or repairing previously coated surfaces, the surfaces to be coated shall be cleaned as recommended by the coating manufacturer, and the edges of the repaired area shall be feathered by sanding or wire brushing to produce a smooth transition that will not be noticeable after the coating is applied. All coatings made brittle or otherwise damaged by heat of welding shall be completely removed.

3-1.01. Ferrous Metal Surfaces. Ungalvanized ferrous metal surfaces shall be prepared for coating by using one or more of the following cleaning procedures specified here-in: solvents (SSPC-SP1); abrasive blasting (SSPC-SP5, -SP10, -SP6, or -SP7) power tools (SSPC-SP3 or -SP11); or hand tools (SSPC-SP2). Oil and grease shall be completely removed in accordance with SSPC-SP1 before beginning any other cleaning method. Surfaces of welds shall be scraped

and ground as necessary to remove all slag and weld spatter. Tools which produce excessive roughness shall not be used.

All components of equipment that can be properly prepared and coated after installation shall be installed prior to surface preparation. Components that will be inaccessible after installation shall have the surfaces prepared and coated before installation. Motors, drive trains, and bearings shall be protected during surface preparation in accordance with the equipment manufacturer's recommendations.

All cut or sheared edges shall be ground smooth to a 1/8 inch minimum radius for all material 1/4 inch thickness and larger. For material thickness less than 1/4 inch all cut or sheared edges shall be ground smooth to a radius equal to 1/2 the material thickness. Grinding of rolled edges on standard shapes with a minimum radius of the 1/16 inch will not be required.

All ferrous metal surfaces shall have all welds ground smooth and free of all defects in accordance with NACE Standard SP0178, Appendix C, Designation C and sharp edges ground smooth, if not previously prepared in the shop. Instead of blending of the weld with the base metal as required by the NACE standard, it will be acceptable to furnish a welded joint that has a smooth transition of the weld to the base metal. All welds shall be ground smooth to ensure satisfactory adhesion of paint.

The cleaning methods and surface profiles specified herein are minimums, and if the requirements printed in the coating manufacturer's data sheets exceed the limits specified, the value printed on the data sheets shall become the minimum requirement.

3-1.01.01. Ferrous Metal Surfaces – Non-immersion Service. Ferrous metal surfaces, including fabricated equipment, in non-immersion service shall be cleaned to the degree recommended by the coating manufacturer for surfaces to be coated with coal tar epoxy, epoxy, and heat-resistant coatings, except galvanized surfaces. Surface preparation of ferrous metal surfaces in non-immersion service shall consist of abrasive blast cleaning to SSPC-SP6, and the first application of coating shall be performed on the same day. If more surface area is prepared than can be coated in one day, the uncoated area shall be blast cleaned again to the satisfaction of Engineer. Surface profile shall be as recommended by coating manufacturer, but not less than 2.0 mils.

3-1.01.02. Ferrous Metal Surfaces - Immersion Service. Surface preparation of ferrous metal surfaces in immersion service shall consist of abrasive blast cleaning to at least SSPC-SP10 and the first application of coating shall be performed on the same day. If more surface area is prepared than can be coated in one day, the uncoated area shall be blast cleaned again to the satisfaction of Engineer. Surface profile shall be as recommended by coating manufacturer, but not less than 3.5 mils.

3-1.02. Plastic Surfaces. All wax and oil shall be removed from plastic surfaces that are to be coated, including PVC and FRP, by wiping with a solvent compatible with the specified coating.

3-1.03. Hardware. Hardware items such as bolts, screws, washers, springs, and grease fittings need not be cleaned prior to coating if there is no evidence of dirt, corrosion, or foreign material.

3-2. MIXING AND THINNING. Coating shall be thoroughly mixed each time any is withdrawn from the container. Coating containers shall be kept tightly closed except while coating is being withdrawn.

Coating shall be factory mixed to proper consistency and viscosity for hot weather application without thinning. Thinning will be permitted only as necessary to obtain recommended coverage at lower application temperatures. In no case shall the wet film thickness of applied coating be reduced, by addition of coating thinner or otherwise, below the thickness recommended by the coating manufacturer. Thinning shall be done in compliance with all applicable air quality regulations.

3-3. APPLICATION. Coating shall be applied in a neat manner that will produce an even film of uniform and proper thickness, with finished surfaces free of runs, sags, ridges, laps, and brush marks. Each coat shall be thoroughly dry and hard before the next coat is applied. Each coat shall be a different color, if available. In no case shall coating be applied at a rate of coverage greater than the maximum rate recommended by the coating manufacturer.

Coating failures will not be accepted and shall be entirely removed down to the substrate and the surface recoated. Failures include but are not limited to sags, checking, cracking, teardrops, fat edges, fisheyes, or delamination.

3-3.01. Priming. Edges, corners, crevices, welds, and bolts shall be given a brush coat (stripe coat) of primer before application of the primer coat. The stripe coat shall be applied by a brush and worked in both directions. Special attention shall be given to filling all crevices with coating.

Abraded and otherwise damaged portions of shop-applied coating shall be cleaned and recoated as recommended by the manufacturer of the finish coating. Welded seams and other uncoated surfaces, heads and nuts of field-installed bolts, and surfaces where coating has been damaged by heat shall be given a brush coat of the specified primer. Before the specified spot or touchup coating of metal surfaces, edges, corners, crevices, welds, and bolts in the area of the spot or touchup coating shall be given a brush coat of primer. This patch, spot, or touchup coating shall be completed, and the paint film shall be dry and hard, before additional coating is applied.

3-3.02. Epoxy. When used, epoxy shall be applied in accordance with the coating manufacturer's recommendations, including temperature limitations and protection from sunlight until top-coated.

When applying high build epoxy coatings with a roller or brush and where a dry film thickness of at least 4-6 mils per coat is required, two or more coats shall be applied to achieve the recommended dry film thickness equal to a spray applied coating.

3-3.03. Film Thickness. The total coating film thickness including intermediate coats and finish coat, shall be not less than the following:

Type of Coating	Minimum Dry Film Thickness
Epoxy	
Surfaces with first coat of epoxy and final coat of aliphatic polyurethane	7 mils (5 mils DFT for epoxy plus 2 mils DFT for aliphatic polyurethane).

3-3.04. Weather Conditions. Coatings shall not be applied, except under shelter, during wet, damp, or foggy weather, or when windblown dust, dirt, debris, or insects will collect on freshly applied coating.

Coatings shall not be applied at temperatures lower than the minimum temperature recommended by the coating manufacturer, or to metal surfaces such as tanks or pipe containing cold water, regardless of the air temperature, when metal conditions are likely to cause condensation. When necessary for proper application, a temporary enclosure shall be erected and kept heated until the coating has fully cured.

Coatings shall not be applied at temperatures higher than the maximum temperature recommended by the coating manufacturer. Where coatings are applied during periods of elevated ambient temperatures, Contractor and the coatings manufacturer shall be jointly responsible to ensure that proper application is performed including adherence to all re-coat window requirements. Precautions shall be taken to reduce the temperature of the surface application, especially for metal, at elevated temperatures above 100°F including shading application area from direct sunlight, applying coating in the evening or at night, and ventilating the area to reduce the humidity and temperature,

3-4. REPAIRING FACTORY FINISHED SURFACES. Factory finished surfaces damaged prior to acceptance by Owner shall be spot primed and recoated with materials equivalent to the original coatings. If, in the opinion of Engineer, spot repair of the damaged area is not satisfactory, the entire surface or item shall be recoated.

3-5. PROTECTION OF SURFACES. Throughout the work Contractor shall use drop cloths, masking tape, and other suitable measures to protect adjacent surfaces. Contractor shall be responsible for correcting and repairing any damage resulting from its or its subcontractors' operations. Coatings spilled or spattered on adjacent surfaces which are not being coated at the time shall be immediately removed. Exposed concrete or masonry not specified to be coated which is damaged by coatings shall be either removed and rebuilt or, where authorized by Owner, coated with two coats of masonry coating.

3-6. FIELD QUALITY CONTROL. The following inspection and testing shall be performed: surface profile, visual inspection, spark testing, adhesion testing, and wet and dry film thickness testing. All inspection and testing shall be witnessed by Engineer.

3-6.01. Surface Profile Testing. The surface profile for ferrous metal surfaces shall be measured for compliance with the specified minimum profile. The surface profile for concrete shall comply with SSPC 13/NACE 6 Table 1 for severe service.

3-6.02. Visual Inspection. The surface of the protective coatings shall be visually inspected.

3.6.03. Film Thickness. Coating film thickness shall be verified by measuring the film thickness of each coat as it is applied and the dry film thickness of the entire system. Wet film thickness shall be measured with a gauge that will measure the wet film thickness within an accuracy of ±0.5 mil. Dry film thickness shall be measured in accordance with SSPC-PA 2.

3-7. FIELD PRIMING SCHEDULE. Primers used for field priming, unless otherwise required for repair of shop primers, shall be:

Surface To Be Primed	Material
Steel and cast iron, surfaces to be coated with Epoxy	Same as finish coats
Plastic surfaces, including PVC and FRP	Same as finish coats.
Insulated piping	As recommended by manufacturer of finish coats.

3-8. FINISH COATING SYSTEMS. The following schedule lists coatings systems.

No.	Finish Coating Systems	Coating Surface Designation						
		A	C	E	F	G	H	P
1.	Epoxy – One coat	x			x	x		
2.	Epoxy – Two coats	x	x	x	x	x		x
3.	Epoxy / NSF – Two coats		x	x				
4.	Epoxy – Three coats	x	x	x				
5.	Epoxy / NSF – Three coats	x	x	x				
6.	Epoxy – First coat Aliphatic polyurethane – Finish coat	x	x	x	x	x		x

3-9. METAL SURFACES COATING SCHEDULE.

Surface To Be Coated	Finish Coating System
Cast Iron, Ductile Iron and steel piping above grade exposed to the elements and to view outdoors, including piping to be insulated, valves, fittings, flanges, bolts, supports, and accessories, and galvanized surfaces after proper priming.	A6

3-10. MISCELLANEOUS SURFACES COATING SCHEDULE.

Plastic Surfaces, exposed above grade including PVC and FRP piping	P6
PVC Piping Insulation, exposed above grade	P6

3-11. PIPING IDENTIFICATION. All exposed piping shall be color coded by painting. Piping shall be painted for the entire length of service. Colors shall be as directed by Owner.

Refer to Section 10400, Identifying Devices for pipe labeling requirements

End of Section

Section 10400

IDENTIFYING DEVICES

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards that may be referenced in this Section:

1. American National Standards Institute (ANSI): A117.1, American Standard for Building and Facilities Providing Accessibility and Usability for Physically Handicapped People.
2. American Society of Mechanical Engineers (ASME): A13.1, Scheme for the Identification of Piping Systems.
3. ASTM International (ASTM):
    a. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
    b. D709, Standard Specification for Laminated Thermosetting Materials.
4. Occupational Safety and Health Act (OSHA).

1.02 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
    a. Drawings showing layouts, actual letter sizes and styles, and Project-specific mounting details.
    b. Manufacturer’s literature showing letter sizes and styles, sign materials, and standard mounting details.

B. Informational Submittals: Manufacturer’s installation instructions.

PART 2 PRODUCTS

2.01 IDENTIFICATION LABELS

A. Pipe Labels:

1. Labels: Self-adhesive tape, with separate directional flow arrow banding tape.
2. Material: Pressure sensitive vinyl.
3. Label Size:
   a. 3/4-Inch to 1-1/4-Inch Pipe: 1/2-inch label.
   b. 1-1/2-Inch to 2-Inch Pile: 3/4-inch label.
   c. 2-1/2-Inch to 6-Inch Pipe: 1-1/4-inch label.
   d. 8-Inch to 10-Inch Pipe: 2-inch label.
   e. Over 10-Inch Pipe: 3-1/2-inch label.
4. Letters and Arrows: Black on OSHA safety yellow background or as shown in pipe schedule located on Drawings.
5. Color Field and Letter Height: ASME A13.1, Pipe colors as shown on pipe schedule located on Drawings.
6. Message: Piping system name as indicated on Piping Schedule located on Drawings.
7. Manufacturers:
   a. Brady Signmark.
   b. Seton Identification Products.

B. Equipment Labels:

1. Provide identifying nameplate and nametag on new and reused panels and equipment as shown in Supplement Signage for Existing Panels and Equipment, or as listed elsewhere. Enclosure identification shall be located on the enclosure surface of PLC control panel, motors, pumps, local control stations, instrument transmitters, analytical controllers, etc.
2. Equipment Nameplates and Nametags: Pumps, valves, gates, and equipment shall be labeled as follows:
   a. Nameplates: Enclosure identification located on the enclosure face with rectangular screw-on nameplates.
   b. Materials: Laminated phenolic plastic nameplates with white background and engraved black enamel filled lettering.
   c. Fastening: Secure with self-tapping Type 316 stainless steel screws.

d. Size: 2 1/4 inch high plate.

e. Text:

1) Descriptive Name: 1 inch high block lettering.

2) Descriptive Tag: 1/2 inch high block lettering.

f. For the same piece of equipment, descriptive nameplate shall be consistently provided at various locations for all associated equipment with that piece.

g. Manufacturers:

1) Brady Signmark.

2) Seton Identification Products.

2.02 ANCILLARY MATERIALS

A. Fasteners: Stainless steel screws or bolts of appropriate sizes.

B. Chain: Type 304 stainless steel, No. 16 single jack chain or No. 2 double loop coil chain.

PART 3 EXECUTION

3.01 INSTALLATION—GENERAL

A. In accordance with manufacturer's recommendations.

B. Mount securely, plumb, and level.

3.02 IDENTIFICATION LABELS

A. Pipe Labels:

1. Locate at connections to equipment, valves, or branching fittings at wall boundaries.

2. At intervals along piping not greater than 18 feet on center with at least one label applied to each exposed horizontal and vertical run of pipe.

3. At exposed piping not normally in view, such as above suspended ceilings and in closets and cabinets.

4. Supplementary Labels: Provide to Owner those listed on Piping Schedule that do not receive arrows.

5. Application: To pipe only after painting in vicinity is complete or as approved by Engineer.

6. Installation: In accordance with manufacturer's instructions.

B. Equipment Labels:

1. Locate and install on equipment or concrete equipment base.
2. Anchor to equipment or base for easy removal and replacement with ordinary hand tools.

End of Section

Section 11350

BIO-FILTER SYSTEM (ODOR CONTROL)

PART 1 – GENERAL

1-1. GENERAL. This section covers the supply, furnishing and installation of a biofiltration odor control system (OCS) for odor control of Wet Well “A” and Wet Well “B” within the Influent Pump Station. The system will be connected to existing blowers, blower controls, ductwork and irrigation controls and shall include, but not be limited to biofilter floor system, irrigation piping for connection to existing irrigation controller, inorganic media, ducting, piping, valves, fittings, civil, mechanical, or other items necessary for a fully functional system.

The OCS will treat air extracted from Wet Well “A” and Wet Well “B” within the Influent Pump Station.

The OCS shall contain inorganic media. All other piping, pipe supports, valves, and accessories which are not an integral part of the OCS that are not specified herein are covered in other sections.

1-2. DEFINITIONS.

- OCS – Odor Control System.

1-3. REFERENCE DRAWINGS AND DOCUMENTS. This set of specifications should be read in conjunction with the following drawings and documents:

Refer to Mechanical Drawing MO101.
Refer to Mechanical Drawing MO301.
Refer to Mechanical Drawing MO501.

1-4. WORKS INCLUDED UNDER THIS SECTION. All equipment sited within the contract limits shall be the responsibility of the Contractor. The Works shall consist of the design, supply, testing and delivery of a complete Odor Control System, complete with inorganic media, and shall fully comply with all necessary standards, codes of practice and statutory requirements as well as technical specifications particular to this contract. In addition, the Contractor shall provide the following but not be limited to:

1. A biofilter complete with inorganic media, and irrigation system.

2. OCS shall be supplied complete with all specified and necessary appurtenances such that the systems can run fully in automatic operation.

1-5. MECHANICAL IDENTIFICATION. Equipment shall be identified in accordance with 10400 Identifying Devices.

1-6. QUALITY ASSURANCE.

1-6.01. Applicable Standards. Except as modified or supplemented herein, all materials and construction methods shall comply with the applicable provisions of the following standards:

ASTM D2563	Recommended Practice for Classifying Visual Defects in Glass-Reinforced Plastic Laminate Parts.
ASTM D3299	Standard Specification for Filament-Wound Glass Fiber Thermoset Resin Chemical-Resistant Tanks.
ASTM E84	Standard Test Method for Surface Burning Characteristics of Building Materials.
PS-15-69	National Bureau of Standards Voluntary Product Standard, "Custom Contact-Molded Reinforced Polyester Chemical-Resistant Process Equipment".

1-6.02. Welding Qualifications. All welding procedures and welding operators shall be qualified by an independent testing laboratory in accordance with the applicable provisions of AWS Standard Qualification Procedures. All procedure and operator qualifications shall be in written form and subject to Engineer's review. Accurate records of operator and procedure qualifications shall be maintained by Contractor and made available to Engineer upon request.

1-7. HDPE LINER QUALITY ASSURANCE.

1-7.01. Manufacturer’s field services. The field services provided by the material manufacturer shall include review of the project; certification of the manufacturer’s product for the application; approval of the installer, the materials, and the procedure to be used.

A representative of the corrosion protection system material manufacturer shall submit, through Contractor, written approvals/certification of the proposed liner system to include product data, dimensions and weights. The representative shall be an employee of the material manufacturer.

Contractor shall notify the material manufacturer and Engineer at least 10 days prior to anticipated date of the commencement of HDPE Liner system work.

After the installation is complete, the manufacturer’s representative shall inspect the liner system and certify that it is complete and free from defects. A field installation report shall be provided.

1-7.02. Field Installation Report. Furnish a manufacturer’s service report after inspection of each components’ installation with the following:

List of deficiencies and the recommended action.

Statement certifying that components are properly installed and fully operational except for deficiencies noted.

1-7.03. Installer Field Services. Contractor shall employ the services of a qualified HDPE liner installer (Installer). The Installer of the liner system shall contact the liner system material manufacturer during the bidding phase of the project and shall include in the cost of this work and the estimated cost of the manufacturer's engineering field services as specified.

The liner system Installer shall submit a satisfactory experience record including references for previous liner installation work of HDPE liner systems to concrete structures of similar design and complexity. The material manufacturer shall approve the Installer in writing.

1-8. OTHER.

1-8.01. General Equipment Stipulations. Section 01610, General Equipment Stipulations shall apply to all equipment and materials furnished under this section. If requirements in this specification differ from those in Section 01610, General Equipment Stipulations, the requirements specified herein shall take precedence.

1-8.02. Governing Standards. Except as modified or supplemented herein, all work covered by this section shall be performed in accordance with all applicable municipal codes and ordinances, laws, and regulations. In case of a conflict between this section and any state law or local ordinance, the latter shall govern.

All work shall comply with Underwriters' Laboratories (UL) safety requirements.

1-8.03. Metal Thickness. Metal thickness and gages specified herein are minimum requirements. Gages refer to US Standard gage.

1-9. DELIVERY, STORAGE, AND HANDLING.

1-9.01. General. Protect coated items from damage. Replace or repair damaged items as directed by OWNER.

1-10. HDPE LINER WARRANTY. Material manufacturer shall warrant the liner system (products and labor) for a period of three years from the date of Substantial Completion when exposed to the customer's normal operating conditions as stated in the specification. This warranty shall not cover wear and tear such as abrasion resistance or mechanical abuse.

The Manufacturer shall warrant to repair or replace, without cost or undue hardship to the OWNER, Manufacturer's Work that is found to be defective, that is not in accordance with the Contract Documents, that fails to perform as represented by the Manufacturer's published product information, or that does not meet generally recognized standards of quality or performance for such work, whichever is greater.

Such warranty shall include the repair or removal and replacement, without cost or undue hardship to the OWNER, of other Work which is damaged as a result of removal or replacement of the Manufacturer's work which is defective or nonconforming, as set forth above.

1-11. SUBMITTALS.

1-11.01. Drawings and Data. Complete assembly and installation drawings, and wiring and schematic diagrams, together with detailed specifications and data covering materials, parts, devices, and accessories forming a part of the equipment furnished, shall be submitted in accordance with Section 01330, Submittal Procedures. The submittals for each unit shall include, but shall not be limited to, the following:

Bio-Filter
- Media type and material.
- Media density.
- EBRT.
- Media volume.
- Media height.
- Average bed velocity.

Transition Pieces
- Name of manufacturer.
- Materials of construction.
- Pressure and vacuum rating.
- Dimensions.

Irrigation System
- Name and manufacturer.
- Piping and nozzle general arrangement drawings.
- Size and orientation of all connections.
- Irrigation volume.
- Type and model.
- Materials of construction.
- Sprinkler radius.
- Arc adjustment range.

HDPE Liner
- Name and manufacturer.
- Type and model.
- Weights of components.
- Sizes and quantities of accessories.
- Performance characteristics.
- Manufacturer’s literature, illustrations, specifications, and engineering data.
- Liner dimensions, materials, sizes, and weights.

Layout drawings including: connection detail drawings, pipe penetration details, seam welding details, details for liner attachment to concrete wall(s).
Warranty and guarantee including a written warranty from the manufacturer stating compliance with the requirements of paragraph 1-10 of this section.
Repair parts and maintenance manuals.
Field installation report as described in paragraph 1-7.02. of this section.

Biofilter Floor System
Name and manufacturer.
Materials of construction.
Live load rating of flooring.
Catalog cut-sheets including general arrangement drawings, overall dimensions, weights, and connection details.
Installation arrangement drawings.

Biofilter Perimeter Seal
Name and manufacturer.
Materials of construction.
Installation drawings including connection details.
Catalog cut-sheets.

Geonet Barrier
Name and manufacturer.
Type and model.
Barrier dimensions, materials, sizes, weights, and quantities.
Catalog cut-sheets.

1-11.02. Operations and Maintenance Data and Manuals. Adequate operation and maintenance information shall be supplied as required in the Drawings and Section 01330, Submittal Procedures. Operation and maintenance manuals shall be submitted in accordance with the Drawings and Section 01330, Submittal Procedures. The operation and maintenance manuals shall be in addition to any instructions or parts lists packed with or attached to the equipment when delivered.

PART 2 - PRODUCTS

2-1 SERVICE CONDITIONS. The biofilter odor control system shall be installed as shown on Drawings.

The Biofilter System shall be suitable for the following service conditions:

Ambient temperature range.	15 to 110	°F
Influent air temperature range.	35-85	°F
Influent air relative humidity range	20-100	%
Environmental exposure.	Outdoor	
Site elevation.	150	ft
H2S Influent Concentration	5-10	ppm
Odorous Air Airflow Rate	6,000	cfm
Maximum Allowable System Pressure Loss at 6,000 cfm	7	in WC
Minimum empty bed residence time (EBRT)	45	sec
Number of cells	1	
Nominal total area (bottom of filter)	750	ft^2
Biofilter media depth	72	in

2-2 DESIGN REQUIREMENTS.

2-2.01. General. All parts which are exposed to corrosive conditions shall be made from corrosive-resistant materials. All pipe, equipment, and components of plastic or FRP construction shall contain ultraviolet inhibitors.

The OCS shall be a biofilter containing media as specified herein. All collected foul air shall be passed through this stage to improve relative humidity of the gas.

The air shall be supplied to the biofilter through the piping connection to the air distribution box and speed holes connecting to the biofilter plenum floor as shown on the Drawings.

The biofilter bed and air distribution box shall be covered with an HDPE liner, as recommended by the biofilter manufacturer. The liner shall be installed to cover the bottom of the vessel, and the walls, stopping at minimum 6 inches from the top of the vessel walls. The air distribution box shall be completely lined as recommended by the biofilter manufacturer. Exposed concrete in locations that may be exposed to corrosive conditions is not acceptable.

The odorous compounds present in the foul air stream shall include but not be limited to, hydrogen sulfide, mercaptans, reduced sulfur compounds, ammonia, and volatile organic compounds typical of this type of application.

All parts and materials shall also be suitable for installation in conditions as described on Structural General Notes Drawing S001.

2-3. MATERIALS. All components of the biofilter system shall be compatible with the conditions and chemical to which they will be subjected to during normal operation. Compounds with which the materials of construction must be compatible include but are not limited to Hydrogen Sulfide (H_2S) and Sulfuric Acid as a result of the presence of H_2S in a moist environment.

2-4. DIMENSIONAL RESTRICTIONS. The biofilter system shall fit within the allocated space as indicated on the Drawings.

2-5. OTHER DESIGN DATA AND PARTICULAR REQUIREMENTS.

2-5.01. Biofilter Media. The biofilter media shall have the depths as specified herein and shall consist of the materials specified herein.

2-5.01.01. Biofilter Media Material. The biofilter media shall be free flowing random mineral based media that is inorganic and resistant to corrosion and bio-fouling. The media shall promote thorough mixing and contact between the odorous air and irrigation water. The media shall not shrink or swell with changes in moisture.

Biofilter media shall be formulated with nutrient such that no nutrient addition is required over the life of the media. Nutrient and other agents shall be chemically bonded to the base product and released over the life of the media.

Media shall be formulated with buffering agents to maintain a neutral bed pH. This additive must be chemically bonded to the base product with an agent which will not degrade over the life of the media.

Media shall be suitable to handle the sulfide loads as specified. A pressure drop greater than 1 inch W.C. per foot will be considered an indication of biofouling of media.

Media shall have a ten-year warranty and shall be guaranteed against plugging, compaction, and shrinkage for a period of ten years. The warranty shall be a full replacement warranty and non-prorated.

The manufacturer is responsible for providing the proper media content to ensure the system meets the specified performance criteria.

The biofilter engineered media shall be by Biorem, Bioair, or ECS Environmental without exception.

2-5.02. Fan. The existing foul air exhaust fans shall be reconnected to the new bio-filter system.

2-5.03. Irrigation System.

2-5.03.01. Irrigation Water Nozzles. Irrigation water nozzles shall be provided for the biofilter in the locations as shown on the Drawings. All nozzles shall have purple “Nonpotable Water” markings. Nozzle trajectory shall be standard full circle pattern with 360-degree arc, standard half circle pattern with 180-degree arc, or standard quarter circle nozzle with 90-degree arc, as best suited for the installation location within the biofilter vessel to provide irrigation water within the boundaries of the biofilter vessel as recommended by the OCS manufacturer. Nozzle size shall be as required to achieve a precipitation rate of 1.58 to 2.85 inches per hour as recommended by the OCS manufacturer. Sprinkler radius shall be a minimum of 8 feet. Nozzles shall be installed to best provide water within the boundaries of the biofilter. Water pressure shall be provided at 40 psig. 360-degree nozzles shall be as manufactured by Rainbird “U-8F”, 180-degree nozzles shall be as manufactured by Rainbird “U-8H”, 90-degree nozzles shall be as Rainbird “U-8Q”, or equal.

2-5.05.02. Valves. Shut-off valves are required for irrigation header line and where otherwise recommended by the biofilter manufacturer. Valves shall be provided per manufacturer’s recommendation in each irrigation leg as required to properly balance irrigation flow.

2-5.05.03. Irrigation Water Piping. Irrigation water piping shall conform to the requirements of section 15067 Miscellaneous Plastic Pipe, Tubing, and Accessories.

2-5.05.04. Irrigation Control. The existing water controller shall be used to start and stop irrigation water flow.

2-6. GEONET BARRIER. The geonet barrier shall be an open mesh, tri-planar material (no woven fabrics attached) and shall serve as a boundary layer between the Inorganic media and biofilter floor system to prevent migration of particles. Bi-planar materials and materials with woven fabrics shall not be acceptable. The geonet barrier shall be placed where indicated and as shown on the Drawings prior to the addition of the biofilter media. The geonet core shall have a tri-planar structure and the following material properties at a minimum.

Property	Test Method	Value
Resin Density	ASTM D 792 or D1505	0.94g/cm^2
Geonet Cross-Rib Spacing	Calibered	0.4 inch
Geonet Main-Rib Spacing	Calibered	0.5 inch
Unsupported Aperture Area	Calibered	0.3 inch (Max)
Carbon Black	ASTM D 4218	2 %
Thickness	ASTM D 5199	0.275 inches
Tensile Strength – MD	ASTM D 7179	1000 lb/ft
Roll Size Minimum Width		12 ft

Geonet barrier shall be as manufactured by Syntech Tendrain BF, or equal.

2-7. BIOFILTER FLOOR SYSTEM.

2-7.01. Biofilter Plenum Floor. The biofilter plenum floor shall be designed for a live load of 25,000 pounds per square foot. The biofilter plenum floor shall be molded from U.V. stabilized polyethylene or polypropylene.

Layout dimensions will vary between manufacturers and the layout area indicated on the Drawings is based on typical values. CONTRACTOR shall review the contract Drawings, the manufacturer's layout drawings, and installation requirements and shall make any modifications required for proper installation subject to acceptance by Engineer.

Biofilter floor system shall be as manufactured by Hallsten Corporation, or equal.

2-7.02. Biofilter Plenum Floor Perimeter Seal. The biofilter plenum floor perimeter adjacent to the concrete walls shall be sealed with an uncured EPDM flashing membrane with a nominal thickness of 0.060 inches and a width of 12 inches.

The flashing membrane shall be secured to the biofilter plenum floor with #8 x 3/4-inch self-tapping stainless steel screws with washers. Screws shall be installed at 18 inches on center minimum.

Biofilter plenum floor perimeter seal shall be Carlisle “Elastoform Flashing Membrane”, or equal.

2-8. HDPE LINER SYSTEM. The polyethylene liner shall serve as an impenetrable (or impervious) barrier between the biofilter media and the surrounding concrete, and for protection of the air distribution box. The liner shall be installed to cover the bottom of the vessel, and the walls, stopping at minimum 6 inches from the top of the vessel walls. The air distribution box shall be completely lined as recommended by the biofilter manufacturer. The liner shall be constructed of High Density Polyethylene (HDPE). The polyethylene liner shall be extrusion welded in the field, utilizing welders authorized by the liner manufacturer. Welds for the polyethylene liner shall be tested as per the manufacturers recommendation. Welds shall be free from all bubbles, cracks, and air holes.

The HDPE liner shall conform to the following properties at a minimum.

1) Thickness: 60 mils
2) Density: 0.94 g/cc
3) Tear Resistance: 47 pounds
4) Puncture Resistance: 120 pounds, ASTM D 4833 method.
5) Tensile Strength at Yield: 150 lbs./in width
6) Tensile Strength at Break: 250 lbs./in width
7) Modulus of Elasticity: 100,000 psi

The liner shall be fastened to the biofilter walls with stainless steel battens and anchors in accordance with the manufacturer’s recommendations.

The HDPE liner shall be as manufactured by GSE Environmental, AEG, A Tetra Tech Company, JH Waters Inc., Gundle Lining Systems Inc., Serrot Co., Poly-Flex Inc., or equal.

2-10. GENERAL. All fasteners, angles, structural metals, nuts, bolts, washers, and hardware shall be 316 stainless steel.

PART 3 - EXECUTION

3-1. INSPECTION. For new work at existing facilities, Contractor shall field verify the locations of existing piping, structural members, ductwork, equipment, lighting, conduit, etc., and locate all new piping, ductwork, and equipment to avoid conflicts with such items. Equipment installed in existing facilities with limited access shall be suitable for being installed through available openings. Contractor shall field verify existing opening dimensions and other provisions for installation prior to submittal of bids.

3-2. OCS INSTALLATION. Equipment and materials furnished under this section shall be installed in proper operating condition in full conformity with the drawings, specifications, engineering data, instructions, and recommendations of the equipment manufacturer.

After final alignment and bolting, connections shall be tested for applied piping stresses by loosening the flange bolts. No stress shall be transmitted to the equipment flanges. If any movement or opening of the joints is observed, piping shall be adjusted to proper fit.

3-3. HDPE LINER INSTALLATION. All details, methods, and procedures of installation, welding, testing and certification and protection of the lining system shall be in strict accordance with the recommendations of the material manufacturer. The Installer shall comply with the recommendations of the material manufacturer.

Provide water tight seals at all liner penetrations for pipe openings.

3-4. ADJUSTING AND CLEANING.

3-4.01. Adjustments. Contractor shall make all adjustments to the biofilter, fan, or accessory item as directed by the equipment manufacturer, including rebalancing the existing fans and system for the new bio-filter system installation.

3-4.02. Cleaning. The inside of all pipe, specials, and fittings shall be smooth, clean, and free from blisters, sand or dirt when erected. All lines shall be thoroughly air purged before placing in service.

At the completion of testing, all equipment, pipes, ductwork, valves, and fittings shall be cleaned of grease, debris, metal cuttings, and sludge. Any stoppage, discoloration, or other damage to parts of the building, its finish, or furnishings shall be repaired at no additional cost to Owner.

3-4.02.01. Fabricated Piping Assemblies. Fabricated piping assemblies shall be cleaned to remove all loose foreign materials such as scale, sand, weld splatter particles, or cutting chips by hand or mechanical cleaning.

3-4.02.02. Installed Piping. All installed piping shall be cleaned and free from debris and any loose foreign materials, as may be introduced during field installation. Installed piping shall be cleaned by hand or flushing.

3-5. BIOFILTER OCS FIELD QUALITY CONTROL.

3-5.01. Performance Test. A performance test shall be conducted on the odor control equipment to demonstrate that the equipment meets the specified requirements, prior to final acceptance. The performance tests shall not begin until all airflow rates have been adjusted and balanced for the installation of the new bio-filter system

After completion of the 7 day trial operation, and prior to final acceptance, performance tests shall be conducted on the OCS to demonstrate that the equipment meets the specified requirements.

All necessary personnel, materials and equipment for the tests shall be provided.

Smoke tests shall be carried out in phases, over each layer of the plenum and media of the biofilter, to check for even distribution of the foul air. A smoke generator shall be provided, and all smoke generated should be non-toxic. The smoke should be introduced upstream of the ventilation fans in such quantities that the smoke is easily visible in the air stream. Where short circuiting is detected as a result of the smoke tests, repairs shall be carried out prior to continuation of performance testing. The smoke tests should be witnessed in person by the Engineer. Alternatively, with Engineer's approval, the smoke tests may be videotaped and the video made available to the Engineer to ensure that the tests have been carried out correctly.

The smoke test on the biofilter media shall be conducted between fourteen (14) days of media placement and within forty five (45) days of planned biofilter startup under the design conditions specified herein.

Prior to the formal start of the performance tests, the systems shall be operated until the stable biological operating parameters and biofilter controls are established. All fine-tuning of operating conditions shall be performed prior to testing.

The system shall be designed for a minimum H2S removal of 95% removal, or 0.1 ppm H2S measured at the outlet, whichever is less stringent.

The performance tests shall be conducted after installation and initial startup, and after testing and balancing has been completed. The performance test will be conducted under actual loading conditions for the OCS. Continuous data logging meters shall be used to record inlet and outlet H_2S for a period of one week, the outlet meter shall have a sensitivity of 0.01 ppm H_2S or less.

Results of the performance tests shall be provided to Engineer in a written report. The report shall include the raw test data and a graphical plot for each of the tests showing inlet and outlet H_2S. The graph shall also show H_2S removal efficiency over the duration of each test. The report shall also include operating data including airflow and operating pH for the OCS

If the equipment fails to meet the performance requirements, operational adjustments to the system and repeat testing may be allowed at the discretion of the Engineer. Subsequent failure of the equipment to meet the performance and design requirements specified will require equipment modifications to be made by, and at the expense of Contractor. Costs of additional testing and subsequent observation by Engineer will be borne entirely by Contractor.

3-5.02. Applied Pipe Stress Test. After final alignment and bolting, all flanged connections shall be tested for applied piping stresses by loosening the flange bolts. If any movement or opening of the joint is observed, piping shall be adjusted to proper fit.

3-6. HDPE LINER FIELD QUALITY CONTROL. Examine all surfaces to lined for surface finish, imperfections, and other conditions detrimental to the application of the liner. Reject items not acceptable. Welds and seals shall be tested in accordance with the manufacturer's recommendations. Failures shall be cut out and resealed. Welds shall be free from all bubbles, cracks, and air holes.

3-6.01. HDPE Liner Visual Inspection. The surface of the liner shall be visually inspected for areas defects, air inclusion, pinholes, or other imperfections in the system that may prevent a complete seal of the surfaces.

3-7. HDPE LINER PROTECTION. Care shall be taken to prevent liner from being dropped, torn or damaged during installation of the liner, floor system and media installation. All materials damaged shall be repaired or replaced as acceptable to Engineer.

3-8. TRAINING.

3-8.01. Operator Instruction and Training. After completion of the field testing, operator instruction and training on equipment and system operation shall be provided. The training shall provide a complete overview of all equipment, testing, adjusting, operation, and maintenance procedures. The training shall take the form of classroom instruction and shall cover:

1. Documentation in the final Operation and Maintenance Manuals.
2. Use the Operation and Maintenance Manuals.
3. Equipment and system startup and shutdown.
4. System operation procedures for all modes of operation.
5. Procedures for dealing with abnormal conditions and emergency situations for which there is a specified system response.
6. System maintenance procedures for both typical cleaning/maintenance and removal/installation of defective equipment.

The training shall take the form of classroom sessions at the project site conducted by the equipment manufacturer representatives who are knowledgeable and familiar with the project. Hands-on instruction and training will be conducted so that actual operation and maintenance of the equipment and systems can be performed by Owner upon completion of the training. The length of the operator instruction and training shall be a minimum of one day or shall be as needed.

At least two weeks prior to the proposed date for the operator instruction and training session, Contractor shall notify Engineer and shall submit an outline for the proposed operator instruction and training session. The proposed outline shall be approved before any training is conducted.

End of Section

Section 15010

VALVE INSTALLATION

PART 1 - GENERAL

1-1. SCOPE. This section covers the installation of new valves and actuators purchased by Contractor as part of this Work.

Cleaning, disinfection, pressure and leakage testing, insulation, and pipe supports are covered in other sections.

The following specification sections are applicable to valves to be installed:

Title
Section 15091, Miscellaneous Ball Valves

1-2. GENERAL. Equipment installed under this section shall be erected and placed in proper operating condition in full conformity with Drawings, Specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless exceptions are noted by Engineer.

Any valves and actuators that are identified as being provided by others will be furnished complete for installation by Contractor. Technical specifications under which the equipment will be purchased are available.

1-2.01. Coordination. When manufacturer's field services or installation check services are provided by the valve manufacturer, Contractor shall coordinate the services with the valve manufacturer. Contractor shall give Engineer written notice at least 30 days prior to the need for manufacturer's field services.

Submittals for equipment that will be furnished by others under each procurement contract will be furnished to Contractor upon completion of review by Engineer. Contractor shall review equipment submittals and coordinate with the requirements of the Work and the Contract Documents. Contractor accepts sole responsibility for determining and verifying all quantities, dimensions, and field construction criteria.

Flanged, push-on, and grooved connections to valves including the bolts, nuts, and gaskets are covered in the appropriate pipe specification section. Valve ends shall match piping.

PART 2 - PRODUCTS - Not Used.

PART 3 - EXECUTION

3-1. INSPECTION. All valves and accessories shall be inspected for damage and cleanliness before being installed. Any material damaged or contaminated in handling on the job shall not be used unless it is repaired and re-cleaned to the original requirements by Contractor. Such material shall be segregated from the clean material and shall be inspected and approved by Owner or his representative before its use.

3-2. INSTALLATION.

3-2.01. General. Valves shall be installed with sufficient clearance for proper operation of any external mechanisms, and with sufficient clearance to dismantle the valve for in-place maintenance. Installation shall be in accordance with the valve manufacturer's recommendations.

Unless otherwise indicated on the Drawings or specified, all valves installed in horizontal runs of pipe having centerline elevations 4 feet 6 inches [1.3 m] or less above the finish floor shall be installed with their operating stems vertical. Valves installed in horizontal runs of piping having centerline elevations between 4 feet 6 inches [1.3 m] and 6 feet 9 inches [2 m] above the finish floor shall be installed with their operating stems horizontal. If adjacent piping prohibits this, the stems and operating handwheel shall be installed above the valve horizontal centerline as close to horizontal as possible. Valves installed in vertical runs of pipe shall have their operating stems oriented to facilitate the most practicable operation, as reviewed by Engineer.

3-2.02. Installation Checks. When specified in the valve sections, the valve manufacturer will provide installation checks. For installation checks, the manufacturer's field representative will inspect the valve installation immediately following installation by Contractor. The manufacturer's representatives will revisit the site as often as necessary to ensure installation satisfactory to Owner.

Contractor shall perform no work related to the installation or operation of materials or equipment furnished by others without direct observation and guidance of the field representative, unless Engineer and manufacturer furnishing such materials concur otherwise.

3-3. VALVE ACTUATORS. Valve actuators and accessories shall be factory mounted on the valve, calibrated, and tested by the valve or actuator manufacturer.

3-4. FIELD QUALITY CONTROL.

3.4.01. Field Testing. After installation, all valves shall be tested in accordance with Section 01656, Pressure Pipe Testing and Disinfection.

3-4.01.01. Pressure Tests. Pressure testing shall be in accordance with Section 01656, Pressure Pipe Testing and Disinfection.

3-4.01.02. Leakage Tests. All valves shall be free from leaks. Each leak that is discovered within the correction period stipulated in the General Conditions shall be repaired by and at the expense of Contractor. This requirement applies whether pressure testing is required or not.

End of Section

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Section 15020

MISCELLANEOUS PIPING AND ACCESSORIES INSTALLATION

PART 1 - GENERAL

1-1. SCOPE. This section covers the installation of piping and accessories as indicated on the Drawings for the following piping sections:

Section Title
Section 15020, Miscellaneous Piping and Accessories
Section 15067, Miscellaneous Plastic Pipe, Tubing, and Accessories

Contractor shall furnish all necessary jointing materials, coatings, and accessories that are specified herein.

Pipe supports and anchors shall be furnished by Contractor, and are covered in Section 15140, Pipe Supports. Pipe trenching and backfilling are covered in Section 02202, Trenching and Backfilling.

1-2. GENERAL.

1-2.01. Coordination. Materials installed under this section shall be installed in full conformity with Drawings, Specifications, engineering data, instructions, and recommendations of the manufacturer, unless exceptions are noted by Engineer.

1-3. SUBMITTALS.

1-3.01. Drawings and Data. Complete specifications, data, and catalog cuts or drawings shall be submitted in accordance with Section 01330, Submittal Procedures. Items requiring submittals shall include, but not be limited to, the following:

Watertight/dusttight/airtight pipe sleeves.

Materials as specified herein.

1-3.02. Welder Certification. Prior to the start of the work, Contractor shall submit a list of the welders he proposes using and the type of welding for which each has been qualified. Copy of certification and identification stamp shall be submitted for each welder. Qualification tests may be waived if evidence of prior qualification is deemed suitable by Engineer.

1-3.03. Spool Drawings. Spool drawings indicating the complete line, showing all welded and assembly items, except for insulation shoes or nonstress-relieved lines, shall be developed and submitted for Aeration Piping.

1-4. QUALITY ASSURANCE.

1-4.01. Welding and Brazing Qualifications. All welding and brazing procedures and operators shall be qualified by an independent testing laboratory in accordance with the applicable provisions of Section IX of the ASME Code. All procedure and operator qualifications shall be submitted to the Engineer for review.

1-4.02. Tolerances. These tolerances apply to in-line items and connections for other lines.

The general dimension, such as face-to-face, face or end-to-end, face- or end-to center, and center-to-center shall be 1/8 inch.

The inclination of flange face from true in any direction shall not exceed 3/64 inch per foot.

Rotation of flange bolt holes shall not exceed 1/16 inch.

1-5. DELIVERY, STORAGE, AND HANDLING. Shipping, handling and storage shall be in accordance with Section 01610, General Equipment Stipulations. All materials shall be stored in a sheltered location above the ground, separated by type, and shall be supported to prevent sagging or bending.

Plastic pipe, tubing, and fittings shall be stored between 40°F and 90°F.

1-5.01. Coated Pipe. Handling methods and equipment used shall prevent damage to the protective coating and shall include the use of end hooks, padded calipers, and nylon or similar fabric slings with spreader bars. Bare cables, chains, or metal bars shall not be used. Coated pipe shall be stored off the ground on wide, padded skids. Plastic-coated pipe shall be covered or otherwise protected from exposure to sunlight.

PART 2 - PRODUCTS

2-1. SERVICE CONDITIONS. Pipe, tubing, and fittings covered herein shall be installed in the services indicated in the various pipe sections.

2-2. MATERIALS.

Threaded Fittings	
Anti-Seize Thread Lubricant	Jet-Lube "Nikal", John Crane "Thred Gard Nickel", Never-Seez "Pure Nickel Special", or Permatex "Nickel Anti-Seize".
Teflon Thread Sealer	Paste type; Hercules "Real-tuff", John Crane "JC-30", or Permatex "Thread Sealant with Teflon".
Teflon Thread Tape	Hercules "Tape Dope" or John Crane "Thread-Tape".
Solvent Welded Fittings	
Solvent cement for PVC Systems	ASTM D2564.
Primer for PVC Systems	ASTM F656.
Pipe Insulation	See Section 15250, Mechanical Insulation.
Watertight/Dusttight Pipe Sleeves	O-Z Electrical Manufacturing "Thruwall" and "Floor Seals", or Thunderline "Link-Seals"; with modular rubber sealing elements, nonmetallic pressure plates, and galvanized bolts.
Pipe Sleeve Sealant	Polysulfide or urethane. Joint Sealant or as indicated on the Drawings.
Protective Coatings	
Tape Wrap	ANSI/AWWA C209, except single ply tape thickness shall not be less than 30 mils ; Protecto Wrap "200" or Tapecoat "CT".
Primer	As recommended by the tape manufacturer.

PART 3 - EXECUTION

3-1. INSPECTION. All piping components shall be inspected for damage and cleanliness before being installed. Any material damaged or contaminated in handling on the job shall not be used unless it is repaired and recleaned to the original requirements by Contractor. Such material shall be segregated from the clean material and shall be inspected and approved by Owner or his representative before its use.

3-2. PREPARATION.

3-2.01. Field Measurement. Pipe shall be cut to measurements taken at the site, not from the Drawings. All necessary provisions shall be made in laying out piping to allow for expansion and contraction. Piping shall not obstruct openings or passageways. Pipes shall be held free of contact with building construction to avoid transmission of noise resulting from expansion.

3-3. INSTALLATION.

3-3.01. General. All instruments and specialty items shall be installed according to the manufacturer's instructions and with sufficient clearance and access for ease of operation and maintenance.

Flat faced wrenches and vises shall be used for copper tubing systems. Pipe wrenches and vises with toothed jaws will damage copper materials and shall not be used. Bends in soft temper tubing shall be shaped with bending tools.

3-3.02. Pipe Sleeves. Piping passing through concrete or masonry shall be installed through sleeves that have been installed before the concrete is placed or when masonry is laid. Pipe sleeves installed through floors with a special finish, such as ceramic or vinyl composition tile, shall be flush with the finished floor surface and shall be provided with nickel or chromium plated floor plates. Unless otherwise indicated on the Drawings, in all other locations where pipes pass through floors, pipe sleeves shall project not less than 1 inch nor more than 2 inches above the floor surface, with the projections uniform within each area. In the case of insulated pipes, the insulation shall extend through pipe sleeves. Where the Drawings indicate future installation of pipe, sleeves fitted with suitable plastic caps or plugs shall be provided.

Holes drilled with a suitable rotary drill will be considered instead of sleeves for piping which passes through interior walls and through floors with a special finish.

Unless otherwise indicated on the Drawings, all pipes passing through walls or slabs which have one side in contact with earth or exposed to the weather shall be sealed watertight with special rubber-gasketed sleeve and joint assemblies, or with sleeves and modular rubber sealing elements.

3-3.03. Pipe Joints. Pipe joints shall be carefully and neatly made in accordance with the indicated requirements.

3-3.03.01. Threaded. Pipe threads shall conform to ANSI/ASME B1.20.1, NPT, and shall be fully and cleanly cut with sharp dies. Not more than three threads at each pipe connection shall remain exposed after installation. Ends of pipe shall be reamed after threading and before assembly to remove all burrs. Unless

otherwise indicated, threaded joints shall be made up with teflon thread tape, thread sealer, or a suitable joint compound.

Threaded joints in plastic piping shall be made up with teflon thread tape applied to all male threads. Threaded joints in stainless steel piping shall be made up with teflon thread sealer and teflon thread tape applied to all male threads. Threaded joints in steel piping for chlorine service shall be made up with teflon thread tape or litharge and glycerine paste applied to all male threads.

3-3.03.02. Epoxy and Adhesive Bonded. Epoxy and adhesive bonded joints shall only be used for FRP pipe. All joint preparation, cutting, and jointing procedures shall comply with the pipe manufacturer's recommendations. Adhesive shall be mixed and applied in accordance with the manufacturer's recommendations. After joining, either the pipe or the fitting shall be rotated approximately one-half turn to uniformly distribute adhesive. A slight fillet of adhesive at the bond line is desirable, but all excess adhesive shall be wiped off immediately. Newly assembled joints shall be suitably blocked or restrained to prevent movement during the curing period recommended by the manufacturer.

3-3.04. Pipe. Pipe shall be installed as specified, as indicated on the Drawings, or, in the absence of detail piping arrangement, in a manner acceptable to Engineer.

Piping shall be installed without springing or forcing the pipe in a manner which would induce stresses in the pipe, valves, or connecting equipment.

Piping shall be supported in conformance with Section 15140, Pipe Supports.

Piping shall be connected to equipment by flanges or unions as specified in the various piping sections. Piping connecting to equipment shall be supported by a pipe support and not by the equipment.

Water, gas, and air supply piping shall be provided with a shutoff valve and union at each fixture or unit of equipment, whether or not indicated on the Drawings, to permit isolation and disconnection of each item without disturbing the remainder of the system. Air supply piping shall be provided with sectionalizing valves and valved air inlet connections as needed for isolation of portions of the system for periodic testing. Gas supply lines to buildings shall be provided with a shutoff valve and union located above grade immediately outside the building. A capped drip leg shall be provided at the bottom of the vertical riser of gas supply piping adjacent to gas-fired appliances.

A union shall be provided within 2 feet of each threaded-end valve unless there are other connections which will permit easy removal of the valve. Unions shall also be provided in piping adjacent to devices or equipment which may require removal in the future and where required by the Drawings or the Specifications.

All air piping shall be graded to points of drainage collection where drip legs and drain valves shall be provided. Air piping shall be sized for the service conditions, with the indicated minimum sizes:

Service	Minimum Size
Air signal	1/4 inch OD
Power air	1/2 inch OD
Air supply	1/2 inch OD
Bubbler drop pipes	3/4 inch
Buried piping	3/4 inch

Water supply piping within structures shall be arranged, and facilities provided, for complete drainage. All piping serving metering equipment shall be uniformly graded so that air traps are eliminated and complete venting is provided.

In all piping, insulating fittings shall be provided to prevent contact of dissimilar metals, including but not limited to, contact of copper, brass, or bronze pipe, tubing, fittings, valves, or appurtenances, or stainless steel pipe, tubing, fittings, valves, or appurtenances with iron or steel pipe, fittings, valves, or appurtenances. Insulating fittings shall also be provided to prevent contact of copper, brass, or bronze pipe, tubing, fittings, valves or appurtenances with stainless steel pipe, tubing, fittings, valves, or appurtenances.

Branch connections in horizontal runs of steam, air, and gas piping shall be made from the top of the pipe.

Drains required for operation are shown on the Drawings. However, vents at all high points and drains at all low points in the piping that are required for complete draining for pressure test may not be shown on these Drawings. Contractor shall add such items as found to be necessary during detail piping design and/or piping installation.

3-3.05. Reducers. Eccentric reducers shall be installed flat on the bottom for steam, condensate return and digester gas services.

3-3.06. Valves. Isolation valves provided with equipment and instruments shall be located in a manner which will allow ease of access and removal of the items to be isolated. Prior to soldering or brazing valves, teflon and elastomer seats and seals shall be removed to prevent damage.

3-4. PIPING ASSEMBLY.

3-4.01. General. Contractor shall only use labor that has been qualified by training and experience to capably perform the specified activities required to accomplish the work in a satisfactory manner

Any deviations from the Specifications or piping locations shown on the Drawings require prior review and approval by Engineer.

3-5. PRESSURE AND LEAKAGE TESTING. All specified tests shall be made by and at the expense of Contractor in the presence, and to the satisfaction of Engineer. Each piping system shall be tested for at least 4 hours with no loss of pressure. The Contractor shall coordinate this section with Section 01656, Pressure Pipe Testing and Disinfection. Piping shall be tested at the indicated pressures:

Service	Test Pressure	Test Medium
Water supply	1-1/2 times working pressure but not less than 120 psi	Water
Odor Control	5 psi	Suitable fluid or gas
Other piping	1-1/2 times working pressure but not less than 50 psi	Suitable fluid or gas; for distilled water piping, distilled water or filtered oil-free compressed air may be used

Compressed air or pressurized gas shall not be used for testing plastic piping unless specifically recommended by the pipe manufacturer.

Leakage may be determined by loss-of-pressure, soap solution, chemical indicator, or other positive and accurate method acceptable to Engineer. All fixtures, devices, or accessories which are to be connected to the lines and which would be damaged if subjected to the specified test pressure shall be disconnected and the ends of the branch lines plugged or capped as needed during the testing.

Unless otherwise required by the applicable codes, drainage and venting systems shall be water tested. For water testing, the drainage and venting system shall be filled with water to the level of the highest vent stack. For air testing, the system shall be charged with air to a minimum pressure of 5 psig . Openings shall be plugged as necessary for either type of test. To be considered free of leaks, the system shall hold the water or air for 30 minutes without any drop in the water level or air pressure.

All necessary testing equipment and materials, including tools, appliances and devices, shall be furnished and all tests shall be made by and at the expense of Contractor. Contractor shall give Engineer 5 working days advanced notice of scheduled testing.

All joints in piping shall be tight and free of leaks. All joints which are found to leak, by observation or during any specified test, shall be repaired, and the tests repeated.

3-6. CLEANING. The interior of all pipe, valves, and fittings shall be smooth, clean, and free of blisters, loose mill scale, sand, dirt, and other foreign matter when installed. Before being placed in service, the interior of all lines shall be thoroughly cleaned, to the satisfaction of Engineer.

3-7. ACCEPTANCE. Owner reserves the right to have any section of the piping system which he suspects may be faulty cut out of the system by Contractor for inspection and testing. Should the joint prove to be sound, Owner will reimburse Contractor on a time-and-material basis as specified in the Contract. Should the joint prove to be faulty, the destructive test will continue joint by joint in all directions until sound joints are found. Costs for replacement of faulty work and/or materials shall be the responsibility of Contractor.

End of Section

Section 15067

MISCELLANEOUS PLASTIC PIPE, TUBING, AND ACCESSORIES

PART 1 - GENERAL

1-1. SCOPE. This section covers the furnishing of miscellaneous plastic pipe, tubing, and accessories. Pipe and tubing shall be furnished complete with all fittings, flanges, unions, jointing materials and other necessary appurtenances.

1-2. SUBMITTALS.

1-2.01. Drawings and Data. Complete specifications, data and catalog cuts or drawings shall be submitted in accordance with Section 01330, Submittal Procedures. Submittals are required for all piping, fittings, gaskets, sleeves, and accessories, and shall include the following data:

Name of Manufacturer
Type and model
Construction materials, thickness, and finishes
Pressure and temperature ratings

Contractor shall obtain and submit a written statement from the gasket material manufacturer certifying that the gasket materials are compatible with the joints specified herein and are recommended for the specified field test pressures and service conditions.

1-3. DELIVERY, STORAGE, AND HANDLING. Shipping, handling and storage shall be in accordance with Section 01610, General Equipment Stipulations. All materials shall be stored in a sheltered location above the ground, separated by type, and shall be supported to prevent sagging or bending.

Pipe, tubing, and fittings shall be stored between 40°F and 90°F.

PART 2 - PRODUCTS

2-1. PVC PIPE MATERIALS. PVC pipe materials and services shall be as specified herein.

2-1.01. Material Classification PVC-1.

PVC-1 – Schedule 80 PVC Pipe with Solvent Welded Joints. Irrigation system piping.	Pipe	ASTM D1785, Cell Classification 12454, bearing NSF seal, Schedule 80.
	Fittings	ASTM D2464, Cell Classification 12454, bearing NSF seal.

2-1.02. Material Classification PVC-4.

PVC-4 – PVC DWV Pipe (Single Wall) with Solvent Welded Joints. Chemical resistant waste and vent piping for plumbing systems. Buried odor control drain piping (not within the filter).	Pipe Fittings	ASTM D1785, cell classification 12454, bearing NSF seal. ASTM D2665 and ASTM D3311, cell classification 12454, bearing NSF seal.

2-1.03. Material Classification PVC-6.

PVC-6 – PVC Underdrain Pipe Foundation drains	Pipe Fittings	ASTM F758, perforated wall, Cell Classifications 12454 or 12364, Type PS 46 ATM D3034 Cell Classification 12454, wall thickness SDR 35, with solvent welded joints.

2-1.04. Accessory Materials. Accessory materials for the PVC Pipe systems shall be as indicated.

Flanges	Diameter and drilling shall conform to ANSI/ASME B16.5, Class 150. Schedule 80 for DWV systems.
Flange Bolts and Nuts	ASTM A307, Grade B, length such that, after installation, the bolts will project 1/8 to 3/8 inch beyond outer face of the nut. Stainless steel for DWV and chemical feed systems, galvanized steel for all other systems.
Flat Washers	ANSI B18.22.1, plain. Same material as bolts and nuts.
Flange Gaskets	Full face, 1/8 inch thick, chemical-resistant elastomeric material suitable for the specified service.
Expansion Joints	Edlon "Thermo-molded TFE" or Resistoflex "Style R6905" molded expansion joint.

PART 3 - EXECUTION

3-1. INSTALLATION. Materials furnished under this section will be installed in accordance with Section 15020, Miscellaneous Piping and Pipe Accessories.

End of Section

Section 15091

MISCELLANEOUS BALL VALVES

PART 1 - GENERAL

1-1. SCOPE. This section covers the furnishing of manually operated two position (open-close) ball valves as specified herein.

Miscellaneous ball valves shall be provided where AWWA type ball valves are not required.

Piping, pipe supports, insulation, and accessories that are not an integral part of the valves or are not specified herein are covered in other sections.

1-2. GENERAL.

1-2.01. General Equipment Stipulations. Section 01610, General Equipment Stipulations shall apply to all equipment and materials furnished under this section. If the requirements in this section are different from those in the General Equipment Stipulations, the requirements in the section shall take precedence.

1-2.02. Identification. Valves specified herein shall be tagged in accordance with Section 10400, Identifying Devices.

1-3. SUBMITTALS. Complete drawings, details, and specifications covering the valves and their appurtenances shall be submitted in accordance with Section 01330, Submittal Procedures. Included in the submittal shall be drawings by the valve manufacturer to indicate the position of the valve actuator and valve shaft.

PART 2 - PRODUCTS

2-1. CONSTRUCTION. Ball valves shown on the drawing, but not specified herein, shall be selected to match piping material they are installed in.

2-1.01. Valves Type VB-10.

VB-10 Service as specified in Section 15067, Miscellaneous Plastic Pipe, Tubing, and Accessories 4 inch and smaller Socket	Rating	150 psig nonshock cold WOG
	Type	In-line, true union, full port (Schedule 80)
	Body/Bonnet	PVC or CPVC to match piping system
	Trim	
	Seat	Teflon
	Ball	PVC or CPVC to match piping system
	Stem	PVC or CPVC to match piping system
	Thrust Washer	Teflon
	Stem Seal	Viton O-ring
	Body Seals	Viton O-rings
	End Connection	Socket
	Temp. Limitations	0 to 140°F
	Valve Operator	Lever
	Manufacturers	Hayward, TB Series, or approved equal.

2-1.02. Valves Type VB-17.

VB-17 Water service 2 inch and smaller	Rating	2000 psi nonshock cold WOG
	Type	In-line, two piece, end entry, full port
	Body/Bonnet	ASTM B548-C84400, bronze
	Trim	
	Seat	Reinforced Teflon
	Ball	ASTM A276-316, stainless Steel
	Stem	ASTM A276-316, stainless Steel
	Thrust Washer	Reinforced Teflon
	Stem Seal	Reinforced Teflon
	End Connection	Threaded End
	Temp. Limitations	-20 to 400°F
	Valve Operator	Electric Actuator
	Manufacturers	Conbraco Industries “Apollo 77-Arx-35-00 Series”, Nibco, or approved equal.

2-1.03. Length Tolerance. Unless otherwise specified, the actual length of valves shall be within plus or minus 1/16 inch of the specified or theoretical length.

2-1.04. Shop Coatings. All ferrous metal surfaces of valves and accessories, both interior and exterior, shall be shop coated for corrosion protection. The valve manufacturer's standard coating will be acceptable, provided it is functionally equivalent to the specified coating.

Coating Materials

Coal Tar Epoxy	High-build coal tar epoxy; Ameron "Amercoat 78HB Coal Tar Epoxy", Carboline "Bitumastic 300 M", Tnemec "46H-413 Hi-Build Tneme-Tar", or Sherwin-Williams "Hi-Mil Sher-Tar Epoxy".
Epoxy Enamel (for liquid service)	Ameron "Amerlock 400 High-Solids Epoxy Coating", Carboline "Carboguard 891", or Tnemec "Series N140 Pota-Pox Plus".
Rust-Preventive Compound	As recommended by the manufacturer.

Surfaces To Be Coated

Unfinished Surfaces

Interior Surfaces	
Liquid Service	Epoxy enamel.
Exterior Surfaces of Valves To Be Buried, Submerged, or Installed in Manholes or Valve Vaults	Coal tar epoxy.
Exterior Surfaces of all other valves	Universal primer.

2-2. VALVE ACTUATORS. Ball valve, except those which are equipped with power actuators or are designed for automatic operation, shall be provided with manual actuators. Unless otherwise specified or indicated on the drawings, each manual actuator shall be equipped with a lever operator. Ball valves with center lines more than 7'-6" above the floor shall be provided with chain levers.

2-3. ACCESSORIES. If the drawings indicate the need for extension stems, stem guides; position indicator; floor boxes; valve boxes; or operating stands.

PART 3 - EXECUTION

3-1. INSTALLATION. Materials furnished under this section shall be installed in accordance with Section 15010, Valve Installation.

End of Section

Section 15140

PIPE SUPPORTS

PART 1 - GENERAL

1-1. SCOPE. This section covers the furnishing and installation of pipe hangers, brackets, supports, bracing, anchorage, and the design for the pipe support system for pipes 12 inches and smaller. Pipe supports shall be furnished complete with all necessary inserts, bolts, nuts, rods, washers, and other accessories. This section also covers the spacing of expansion joints in pipes 12 inches in diameter and smaller. Expansion joint products and materials are covered in the respective piping sections.

This section covers pipe supports for the following pipe materials:

PVC/CPVC Schedule 80 (other)

1-2. GENERAL. Contractor shall provide pipe supports, anchors, flexible couplings, and expansion joints for all piping systems. The Drawings indicate pipe supports, anchors, flexible couplings, and expansion joints for pipes larger than 12 inches in diameter, and in special cases for pipes that are 12 inches and smaller. Contractor shall design anchors, pipe supports, expansion joints, and flexible couplings not already shown on the Drawings, in accordance with the requirements specified herein.

Contractor's design shall include pipe supports, bracing, and anchorage adjacent to expansion joints, couplings, valves, in-line devices, equipment, wyes and tees, or changes in direction as required for dismantling piping, removing valves or other in-line devices, disconnecting piping from equipment, and pipe support, in addition to supports in accordance with the maximum spacing specified herein. The pipe support system design by Contractor shall rigidly support pipe so there is no visible movement or visible sagging between supports. The system shall comply with specified piping code requirements.

Contractor shall not delete or relocate the supports, expansion joints, or couplings indicated on the Drawings without written approval of Engineer.

Pipe supports and expansion joints are not required in buried piping, but concrete blocking or other suitable anchorage shall be provided as indicated on the Drawings or specified in other sections.

1-2.01. General Equipment Stipulations. The General Equipment Stipulations shall apply to all supports furnished under this section. If requirements in this

specification differ from those in the General Equipment Stipulations, the requirements specified herein shall take precedence.

1-3. SUBMITTALS. Complete data, catalog information, and drawings covering fabricated pipe supports, fabricated inserts, and stainless steel, galvanized, and copper-plated and plastic-coated pipe supports shall be submitted in accordance with Section 01330, Submittal Procedures.

Data shall include a listing of the intended use and general location of each item submitted.

When a wind and/or seismic design is required, Contractor shall submit confirmation of compliance with the Structural General Notes, Drawing S001.

PART 2 - PRODUCTS

2-1. MATERIALS. Unless otherwise indicated, all pipe supports shall comply with ANSI/MSS SP-58 and MSS SP-69. Materials of construction for fabricated steel supports are covered in Section 05990, Structural and Miscellaneous Metals. All pipe support materials shall be packaged as necessary to ensure delivery in satisfactory condition.

Unless otherwise specified or indicated on the Drawings, pipe supports shall be fabricated of manufacturer's standard materials and provided with manufacturer's standard finish.

Design loads for inserts, brackets, clamps, and other support items shall not exceed the manufacturer's recommended loads.

Pipe supports shall be manufactured for the sizes and types of pipe to which they are applied. Strap hangers will not be acceptable. Threaded rods shall have sufficient threading to permit the maximum adjustment available in the support item. Continuously threaded rod is not acceptable for hanger rods over 12 inches in length.

Unless accepted by Engineer, the use of supports which rely on stressed thermoplastic components to support the pipe will not be permitted.

Contact between dissimilar metals, including contact between stainless steel and carbon steel, shall be prevented. Portions of pipe supports which come into contact with other metals that are dissimilar shall be rubber or vinyl coated. Supports for brass or copper pipe or tubing shall be copper plated or plastic coated.

Stainless steel supports shall be AISI Type 304 or 316 stainless steel, except for stainless steel supports fabricated by welding which shall be AISI Type 304L or 316L. Stainless steel supports shall be provided for aeration service piping.

Pipe support types and application shall comply with Table 1.

2-2. WIND AND SEISMIC LOADS. Wind and seismic loads for worst case conditions of either full, partially full, or empty pipes shall be considered in the design. Seismic design requirements for products specified herein shall be as indicated in Section 01611, Meteorological and Seismic Design Criteria.

PART 3 - EXECUTION

3-1. APPLICATION. Concrete inserts or anchor bolts shall be used to support piping from new cast-in-place concrete. Fastening of supports to existing concrete and masonry shall be in accordance with Section 05550, Anchorage in Concrete and Masonry.

Anchorage shall be provided to resist thrust due to temperature changes, changes in diameter or direction, or dead-ending. Anchors shall be located as specified to force expansion and contraction movement to occur at expansion joints, loops, or elbows, and as needed to prevent excessive bending stresses and opening of mechanical couplings. Anchorage for temperature changes shall be centered between elbows and mechanical joints used as expansion joints. Anchorage for bellows type expansion joints may be located adjacent to the joint.

When expansion joints are required, pipe guides shall be provided adjacent to bellows type expansion joints. Guides will not be required where mechanical couplings are permitted as expansion joints. Guides shall be located on both sides of expansion joints, except where anchors are adjacent to the joint. Unless otherwise indicated on the Drawings, one guide shall be within four pipe diameters from the joint and a second guide within 14 pipe diameters from the first guide. Pipe supports shall allow adequate movement; pipe guides shall not be used for anchoring pipe against longitudinal forces. Pipe guides shall be provided at locations as recommended by the manufacturer.

Insulated hot piping systems shall be supported by clevises, clamps, support saddles, or rollers. Pipe clamps shall be attached directly to the pipe. Support saddles and rollers shall be sized for the outside diameter of the insulated pipe, and an insulation protection saddle shall be installed at the support.

3-2. TYPES OF SUPPORTS. The products for pipe supports shall be as indicated in Table 1 for the specified type and size of support. Where stainless steel is specified for pipe supports but is not available from the name suppliers for the model specified in Table 1, Contractor shall provide a heavier duty support that is available in stainless steel.

TABLE 1 - TYPES OF SUPPORTS

Description and Service	MSS SP 69 Type (Note 1)	Specification
Hangers		
2-1/2 inch and smaller pipe		
Other services		
J-style	5	B-Line "B3690", Anvil "67", Unistrut "J Hanger", or Piping Technology & Products Fig. 67.
Clevis	1	B-Line "B3104", Anvil "260", or Piping Technology & Products Fig 83.
Concrete Inserts, Steel		
12 inch and smaller pipe	18	Channel 12 ga , galv, 1-5/8 by 1-3/8 inches , min. 8 inches long, anchor lugs on 4 inch centers, at least three lugs, end caps, and filler strip.
Beam Clamps, Malleable Iron or Steel, 12 inch and smaller pipe	21	B-Line "3050" and "3055", Anvil "133" and "134", or Piping Technology & Products Fig. 130 and Fig. 130 (SP).
	28, 29	Anvil "292" or Piping Technology & Products Fig. 140.
	30	B-Line "3054", Anvil "228", or Piping Technology & Products Fig. 140.
Side Beam Bracket	34	B-Line "B3062", Anvil "202", or Piping Technology & Products Fig. 20L.
Wall Supports and Frames, Steel, 12 inch and smaller pipe (Note 2)		
Brackets	32	B-Line "B3066", Anvil "195", or Piping Technology & Products Fig. 76.
	33	B-Line "B3067", Anvil "199", or Piping Technology & Products Fig. 76.
Prefabricated channels	--	12 ga , galv, 1-5/8 inches , with suitable brackets and pipe clamps.

TABLE 1 - TYPES OF SUPPORTS

Description and Service	MSS SP 69 Type (Note 1)	Specification
Offset pipe clamp, 1-1/2 inch and smaller pipe	--	Galv, 1-1/4 by 3/16 inch steel, with 3/8 inch bolts.
Offset pipe clamp, 2 to 3-1/2 inch pipe	--	Galv, 1-1/4 by 1/4 inch steel, with 3/8 inch bolts.
Floor Supports, Steel or Cast Iron		
6 inch and smaller pipe	37 (with base)	B-Line "B3090", Anvil "259" or Piping Technology & Products Fig. 48.
Pipe Alignment Guides	--	B-Line "B3281" through "B3287", Anvil "255", or Piping Technology & Products Fig. 6.
Turnbuckles Steel	13	B-Line "B3202", Anvil "230", or Piping Technology & Products Fig. 30.
Hanger Rods, Carbon Steel, Threaded Both Ends, 3/8 inch minimum size	--	B-Line "B3205", Anvil "140", or Piping Technology & Products Fig. 128.
Weldless Eye Nut, steel	17	B-Line "B3200", Anvil "290", or Piping Technology & Products Fig. 40.
Insulation Protection Saddle	39	B-Line "B3160 Series", Anvil "160 Series", or Piping Technology & Products Fig. 184.
Insulation Protection Shield	40	B-Line "B3151", Anvil "167", or Piping Technology & Products Fig. 183.

Table 1 Notes:

1. MSS SP-69 supports and hangers are illustrated on Figure 1-15140.
2. Pipe clamps or other devices which rely on the application of a clamping force to the supported pipe in order to maintain the clamp position or location in a prefabricated channel or track will not be acceptable for use with nonmetallic pipe or tubing.
3. Alternatively, pipe hangers for 12 inch pipe may be saddle type as indicated on the Drawings.

3-3. SUPPORT SPACINGS. Pipe supports and expansion joints shall be spaced in accordance with Tables 2, 3, 4, and 5. The types of pipes to be supported are as specified herein. Table 2 covers spacings for the standard operating conditions specified for each pipe material. Tables 3 and 4 cover PVC and FRP pipe spacings where operating conditions are in excess of the temperature and specific gravity requirements covered in Table 2. Spacing in the tables is the maximum spacing considering gravity loads. Where Contractor's design includes lateral and longitudinal forces due to seismic loads, wind loads, and other forces, the spacing requirement may be less than that indicated in the tables.

TABLE 2 – MAXIMUM PIPE SUPPORT SPACING AT STANDARD TEMPERATURES AND SERVICES

Type of Pipe	Pipe Support Max Spacing feet	Max Run Without Expansion Joint, Loop, or Bend (Note 1) feet	Expansion Joint Max Spacing (Note 2) feet	Type of Expansion Joints
PVC, Schedule 80, for other services at a maximum temperature of 100°F and a maximum specific gravity of 1.0.				
1/8 and 1/4 inch	Continuous Support	20	60	Note 3
1/2 inch	4	20	60	Note 3
3/4 inch	4-1/2	20	60	Note 3
1 and 1-1/4 inch	5	20	60	Note 3
1-1/2 and 2 inch	5-1/2	20	60	Note 3
2-1/2 inch	6	20	60	Note 3
3 inch	7	20	60	Note 3
4 inch	7-1/2	20	60	Note 3
6 inch	8-1/2	20	60	Note 3
8 inch	9-1/2	20	60	Note 3
10 inch	10	20	60	Note 3
12 inch	11	20	60	Note 3

Table 2 Notes:

1. Unless otherwise acceptable to Engineer, an expansion joint shall be provided in each straight run of pipe having an overall length between loops or bends exceeding the maximum run specified herein.
2. Unless otherwise acceptable to Engineer, the spacing between expansion joints in any straight pipe run shall not exceed the maximum spacing specified herein.

3. Expansion joint fittings are specified in the respective piping sections.
4. At least two properly padded supports for each pipe section.
5. At least one support for each pipe section.
6. Expansion joints shall be mechanical couplings.
7. No expansion joints are required.
8. Supports for 5 and 10 foot long pipe sections shall be located within 18 inches of each joint. Supports shall be positioned to maintain the piping alignment and to prevent the piping from sagging.
9 References to specific gravity refer to liquid specific gravity and are referenced to water which is assumed to have a specific gravity of 1.0.

3-4. INSTALLATION.

3-4.01. General. All piping shall be supported in a manner which will prevent undue stress on any valve, fitting, or piece of equipment. In addition, pipe supports shall be provided at changes in direction or elevation, and adjacent to flexible couplings. Pipe supports and hangers shall not be installed in equipment access areas.

Where horizontal piping is arranged with two or more parallel lines, trapeze hangers may be used in lieu of individual hangers. Trapeze assembly shall consist of structure attachments as previously specified with rod size dependent upon total weight supported. Spacing of assemblies shall be determined by the minimum pipe size included in the group supported. Trapeze horizontal assemblies shall be structural angle or channel section of sufficient size to prevent measurable sag between rods when pipes are full. All lines shall be attached to the horizontal with intermediate pipe guides and U-bolts or one-hole clamps. Pre-engineered support equipment may be used when selected and installed in accordance with the manufacturer's recommendations.

No piping shall be supported from the pipe above.

Horizontal piping hanger support rods shall attach to steel beams with center-loading I-clamps, or welded beam clips. Hanger support rods shall attach to concrete slabs or beams with inserts.

Anchorage shall be provided to resist both lateral and longitudinal seismic forces.

3-4.02. Inserts. Reference building structural concrete Drawings for concrete inserts. When not provided as part of the building concrete structure, provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

Where concrete slabs form finished ceilings, provide inserts flush with the slab surface.

Where inserts are omitted, drill through concrete slab from below and provide thru-bolt with recessed square steel plate and nut recessed into and grouted flush with slab. NDE (Non-Destructive Evaluation) shall be used to locate existing reinforcing before drilling.

3-4.03. Pipe Hangers and Supports. Hanger rod sizes for plastic pipe shall be the size of hanger rods for steel pipe. Install hangers to provide a minimum 1/2 inch space between finished covering and adjacent work.

A hanger shall be placed within 18 inches of each horizontal elbow, and on both sides of all piping accessories and valves weighing 20 lbs or more.

Hangers shall have 1-1/2 inches minimum vertical adjustment.

Support horizontal cast iron, ductile iron and no-hub piping systems adjacent to each joint.

Support vertical piping at every floor using riser clamps.

Support riser piping independently of connected horizontal piping.

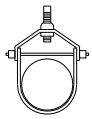
Hanger and hanger components shall be sized specifically for the pipe size it is to be used on.

3-5. PLACEMENT. The maximum spacing for pipe supports and expansion joints shall be as indicated in Table 2.

Rubber hose and flexible tubing shall be provided with continuous angle or channel support.

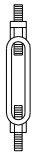
Unless otherwise indicated on the Drawings or acceptable to Engineer, piping shall be supported approximately 1-1/2 inches out from the face of walls and at least 3 inches below ceilings.

End of Section

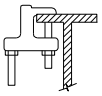


ADJ. STEEL CLEVIS
TYPE-1

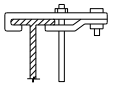
ADJ. STEEL
BAND HGR
TYPE-7



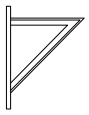
STEEL TURNBUCKLE
TYPE-13



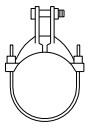
TOP BEAM
C-CLAMP
TYPE-19



TOP I-BEAM CLAMP
TYPE-25



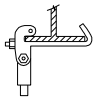
LIGHT WELDED
STEEL BRACKET
TYPE-31



ALLOY STEEL
PIPE CLAMP
TYPE-2

EXTENSION PIPE ON
RISER CLAMP
TYPE-8

STEEL CLEVIS
TYPE-14

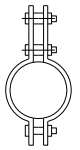


SIDE I-BEAM ON
CHANNEL CLAMP
TYPE-20

CLIP
TYPE-26

MEDIUM WELDED
STEEL BRACKET
TYPE-32

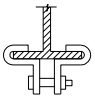
HEAVY WELDED
STEEL BRACKET
TYPE-33



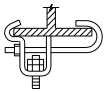
CARBON OR ALLOY
STEEL DOUBLE BOLT
PIPE CLAMP
TYPE-3

ADJUSTABLE
BAND HGR
TYPE-9

SWIVEL
TURNBUCKLE
TYPE-15

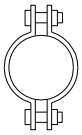


CENTER I-BEAM
TYPE-21



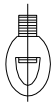
SIDE I-BEAM CLAMP
TYPE-27

SIDE BEAM BRACKET
TYPE-34



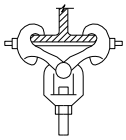
STEEL PIPE CLAMP
TYPE-4

ADJ. SWIVEL RING
BAND TYPE
TYPE-10

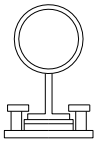


MALLEABLE
IRON SOCKET
TYPE-16

WELDED
ATTATCHMENT
TYPE-22
AS SHOWN OR
INVERTED LESS BOLT

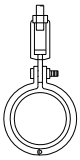


STEEL I-BEAM CLAMP
W/ EYE NUT
TYPE-28



PIPE SLIDE &
SLIDE PLATE
TYPE-35

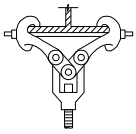
PIPE HANGER
TYPE-5



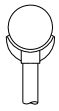
SPLIT PIPE W/WO
TURMBUCKLE ADJ.
TYPE-11

STEEL WELDLESS
EYE NUT
TYPE-17

C-CLAMP
TYPE-23

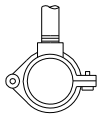


STEEL W.F. CLAMP
W/ EYE NUT
TYPE-29

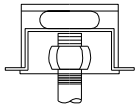


PIPE SADDLE
SUPPORT
TYPE-36

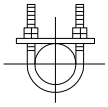
ADJ. SWIVEL PIPE RING
SPLIT RING TYPE OR
SOLID RING TYPE
TYPE-6



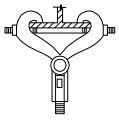
EXTENSION SPLIT
PIPE CLAMP
HINGED OR TWO BOLT
TYPE-12



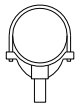
STEEL OR MALLEABLE
CONCRETE INSERT
TYPE-18



U-BOLT
TYPE-24



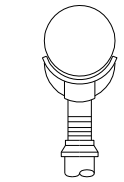
MALLEABLE BEAM CLAMP
W/EXTENSION PIECE
TYPE-30



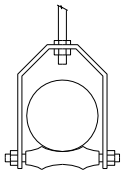
PIPE STANCHION
SADDLE
TYPE-37

HANGERS AND SUPPORTS

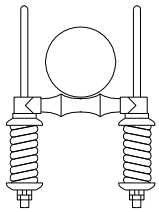
Black & Veatch	PIPE SUPPORTS	FIG 1-15140(A)



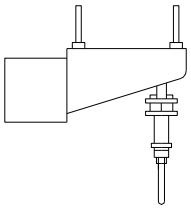
ADJUSTABLE PIPE
SADDLE SUPPORT
TYPE-38



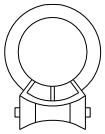
ADJUSTABLE ROLLER
HANGER W/WO SWIVEL
TYPE-43



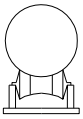
SPRING CUSHION ROLL
TYPE-49



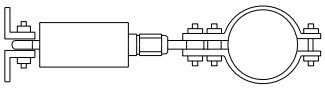
CONSTANT SUPPORT
HORIZONTAL TYPE
TYPE-54



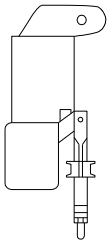
STEEL PIPE COVER
PROTECTION SADDLE
TYPE-39



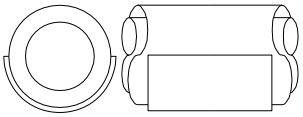
PIPE ROLL
COMPLETE
TYPE-44



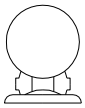
SPRING SWAY BRACE
TYPE-50



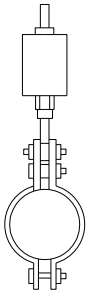
CONSTANT SUPPORT
VERTICAL TYPE
TYPE-55



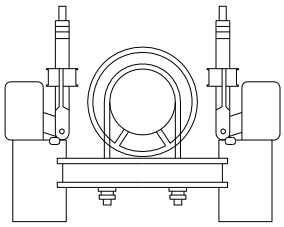
PROTECTION SHIELD
TYPE-40



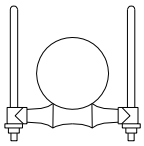
PIPE ROLL & PLATE
TYPE-45



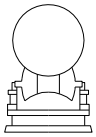
VARIABLE SPRING
HANGER
TYPE-51



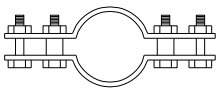
CONSTANT SUPPORT
TRAPEZE TYPE
TYPE-56



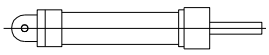
SINGLE PIPE ROLL
TYPE-41



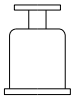
ADJUSTABLE PIPE ROLL & BASE
TYPE-46



CARBON OR ALLOY STEEL
RISER CLAMP
TYPE-42



RESTRAINT CONTROL
DEVICE
TYPE-47



VARIABLE SPRING
BASE SUPPORT
TYPE-52

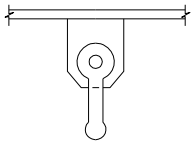
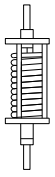
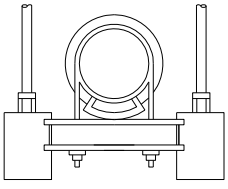


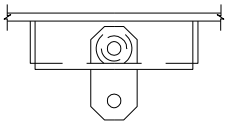
PLATE LUG
TYPE-57



SPRING CUSHION
TYPE-48



VARIABLE SPRING
TRAPEZE HANGER
TYPE-53



HORIZONTAL TRAVELER
TYPE-58

HANGERS AND SUPPORTS

Black & Veatch	PIPE SUPPORTS	FIG 1-15140(B)

Section 15250

MECHANICAL INSULATION

PART 1 - GENERAL

1-1. SCOPE. This section covers the furnishing and installation of insulation, jackets, and accessories for the following mechanical systems:

- Irrigation piping

Building insulation materials are specified in other sections. Insulation for mechanical equipment which is to be applied at the factory prior to shipment is specified in the individual equipment sections.

1-2. GENERAL. Materials furnished and installed under this section shall be in full conformity with the Drawings, Specifications, engineering data, instructions, and recommendations of the equipment manufacturer unless exceptions are noted by Engineer.

1-2.01. Coordination. Contractor shall be responsible for coordinating the installation of insulation with the installation of the items or systems to be insulated. Each item or system shall be tested and accepted by Engineer before installation of the insulation materials.

Contractor shall verify that each component of the insulation systems is compatible with all other parts of the system; that all insulation materials are appropriate for the intended applications; and that all necessary devices and accessories have been provided.

All insulation of the same class shall be the product of a single manufacturer; however, all the insulation types need not be the products of one manufacturer.

1-2.02. General Equipment Stipulations. Section 01610, General Equipment Stipulations shall apply to all equipment furnished under this section. If requirements in this specification differ from those in the General Equipment Stipulations, the requirements specified herein shall take precedence.

1-2.03. Governing Standards. Except as modified or supplemented herein, all work covered by this section shall be performed in accordance with all applicable municipal codes and ordinances, laws, and regulations. In case of a conflict between this section and any state law or local ordinance, the latter shall govern.

All work shall comply with UL, NFPA, and ASTM safety requirements.

1-2.04. Metal Thickness. Metal thickness and gages specified herein are minimum requirements. Gages refer to US Standard gage.

1-2.05. Surface Burning Characteristics. Insulation, jackets, tapes, and adhesives to be used indoors shall have a composite flame spread rating not to exceed 25 and a composite smoke developed rating of 50 when tested by UL 723, NFPA 255, or ASTM E84. All testing shall be done on materials of the same densities and installed thicknesses as the materials being installed. Insulation materials which have been treated with a flame retardant additive to meet the required flame spread and smoke developed ratings are not acceptable.

1-2.06. Painting and Identification. Field painting and identification shall be as specified in Section 09940, Protective Coatings.

1-3. SUBMITTALS.

1-3.01. Drawings and Data. A complete list of materials and catalog cuts, together with detailed specifications, materials performance data, installation instructions, parts, devices, and accessories furnished, shall be submitted in accordance with Section 01330, Submittal Procedures. Information shall include certified test results to show compliance with UL, NFPA, and ASTM safety requirements.

1-4. QUALITY ASSURANCE.

1-4.01. Manufacturer Experience. A manufacturer shall have furnished material of the type specified which has been in successful operation for not less than the past 5 years.

1-5. DELIVERY, STORAGE, AND HANDLING. Shipping, handling and storage shall be in accordance with Section 01610, General Equipment Stipulations.

PART 2 - PRODUCTS

2-1. ACCEPTABLE MANUFACTURERS. Acceptable manufacturers shall be as listed in the respective product description paragraphs.

2-2. MATERIALS. Insulation, vapor retarders, and field applied jackets shall be installed to cover piping, ductwork, equipment, fittings, and appurtenances as indicated in the Insulation Schedule.

2-2.01. Pipe Insulation.

2-2.01.01. Type PMF1 Insulation. Type PMF1 mineral fiber pipe insulation shall be Johns Manville "Micro-Lok", Knauf "Pipe Insulation" or Owens-Corning.

Type PMF1 pipe insulation shall be a one-piece molded glass fiber material with all-purpose jacket. The all-purpose jacket shall be factory-applied, fiberglass reinforced vapor barrier type, with white kraft bonded to aluminum foil and self-sealing adhesive lap. The insulation shall be suitable for a temperature range of 0°F to 850°F, shall have a maximum thermal conductivity (k) of 0.24 Btu in/hr ft^2 °F at 75°F, and shall conform to ASTM C547.

2-2.01.02. Type PFC1 Insulation. Type PFC1 flexible cellular elastomeric pipe insulation shall be Armacell "AP/Armaflex" or K-Flex USA "Insul-Tube" for unslit insulation and Armacell “AP/Armaflex SS” or K-Flex USA “Insul-Lock Seam-Seal” for factory pre-slit insulation. Flexible cellular polyolefin foam insulation shall be IMCOA "Imcolock" or Plastic Technology, Inc. “Innofoam”.

Type PFC1 pipe insulation shall be one-piece, molded elastomeric or polyolefin foam insulation suitable for a temperature range of -40°F to 180°F, and shall have a maximum thermal conductivity (k) of 0.28 Btu in/hr ft^2 °F at 75°F. The insulation shall be suitable for exposure to weather and direct sunlight or, where not indicated to be jacketed, shall be given two coats of an ultraviolet-resistant finish recommended by the manufacturer. Insulation shall conform to ASTM C534 for elastomeric or ASTM C1427 for polyolefin.

2-2.02. Equipment Insulation.

2-2.02.01. Type EMF1 Insulation. Type EMF1 equipment insulation shall be Johns Manville "800 Series Spin-Glas", Knauf "Insulation Board", or Owens-Corning “Fiberglas 705”.

Type EMF1 equipment insulation shall be rigid mineral fiber insulation board with a density of 6 pounds per cubic foot and a factory-applied foil-scrim-kraft facing. Insulation suitable for temperatures of up to 150°F, and shall have a maximum thermal conductivity (k) of 0.23 Btu in/hr ft2 °F at 75°F. The insulation shall conform to ASTM C612.

2-3. ACCESSORIES.

2-3.01. PVC Insulation Jackets. PVC insulation jackets for piping systems shall be furnished and installed as specified herein and indicated on the Drawings.

All fittings in piping systems insulated with mineral fiber shall be jacketed with a polyvinyl chloride (PVC) jacketing material. Piping systems where indicated to have PVC jackets shall be jacketed with the same PVC jacketing material.

Jackets for fittings shall be one piece, factory molded to the contour of the fitting. The PVC jacket and fitting covers shall have a minimum thickness of 0.020 inches when installed indoors and 0.030 inches when installed outdoors. PVC jacketing shall be Johns Manville "Zeston 2000 Series".

PART 3 - EXECUTION

3-1. INSTALLATION.

3-1.01. General. Contractor shall install all insulation materials as specified herein for the piping systems, ductwork, and equipment that are not factory insulated. Insulation materials shall be installed in accordance with the manufacturer's written instructions and recommendations. Surfaces to be insulated shall be cleaned and dried. All work shall be performed within the temperature ranges recommended by the insulation product manufacturer. Insulation shall be kept clean and dry and shall remain in the factory container until it is installed. Packages or factory containers shall bear the manufacturer's stamp or label with the name of the manufacturer and description of materials.

Seams of exposed insulation and jackets shall be in the least visible location.

3-1.02. Piping Insulation.

3-1.02.01. Type PMF1 Insulation. Pipe insulation, vapor retarders, and field applied jackets shall be installed to cover system piping, fittings, and appurtenances. Insulation shall be full factory unit lengths using a single cut piece to complete the run. Abutting cut pieces or scraps shall not be used. End joints and longitudinal seams shall be tightly butted. Insulation for fittings shall be of the same thickness and conductivity as the adjoining pipe insulation.

Insulated piping conveying fluids at lower than ambient temperatures shall be jacketed with a continuous vapor barrier. The insulation shall be continuous through hangers and penetrations, except at firewall penetrations, and shall be sealed with vapor barrier coating. The vapor barrier coating shall be applied at intervals not exceeding 15 feet for straight runs and not more than 6 inches from fittings. Fibrous insulation laps and butt strips that are not self-sealing shall be secured with adhesive and stapled. Staples and seams shall be coated with vapor barrier material.

On piping 2 inches and larger where the insulation is continuous through the hanger, an insert shall be installed between the support shield and piping. The insert shall be of the same thickness and contour as the adjacent insulation and installed to maintain a continuous vapor barrier through the support. The insert shall be constructed of wood or heavy density insulating material suitable for the system operating temperatures.

3-1.05. PVC Jacketing. PVC jacketing for piping systems shall be installed as specified herein and indicated on the Drawings. End joints and longitudinal seams on piping systems conveying fluids at lower than ambient temperatures shall be vapor-sealed, and covered with vapor-barrier tape to ensure a continuous vapor seal. Fittings shall be insulated with glass fiber material.

3-2. INSULATION SCHEDULE.

INSULATION SCHEDULE				
Service	Size Inches	Mechanical Insulation		Notes
		Type	Thickness Inches	
PIPING - OUTDOOR (EXPOSED)				
Biofilter Irrigation Water	All	PMF1	1-1/2	(2)
Mechanical Insulation Types:	FC - Flexible Cellular MF - Mineral Fiber MW - Mineral Wool			
Notes: (1) Aluminum jacket. (2) PVC jackets shall be provided on all portions of insulated piping.				

Unless otherwise indicated in the insulation schedule, all mechanical piping, ductwork, equipment, and accessories with an operating temperature in excess of 140°F and below 60°F shall be insulated.

End of Section

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