

METROPOLITAN WASTEWATER
MANAGEMENT COMMISSION (MWMC)

EUGENE-SPRINGFIELD, OREGON

BIDDING REQUIREMENTS
AND
CONTRACT DOCUMENTS

for the construction of the

PRIMARY CLARIFIER AND FINAL
TREATMENT CONCRETE REPAIR

Contract No. P80118

JACOBS

Corvallis, Oregon

March 2026

00 01 03 Project Summary Sheet

Project Name: Primary Clarifier and Final Treatment Structural Repair

Project Number: P80118

Project Owner: Metropolitan Wastewater Management Commission (MWMC)

Owner's Representative: Matt Dapkus **Phone No.:** (541) 726-3790

Design Consultant: Jacobs Engineering Group,
Corvallis, OR **Phone No.:** (541) 752-4271

Mandatory Pre-Bid Meeting: April 30, 2026

Construction Bid Due: May 22, 2026

Anticipated Award Date: June 26, 2026

Anticipated Notice to Proceed Date: July 20, 2026

Construction Substantial Completion: October 25, 2030

Final Completion Date: 60 days following Substantial Completion

Other Critical Dates (explain): See milestones include in Section 00 52 00, Contract

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SECTION 00 01 07
SEALS PAGE

SPECIFICATIONS

DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS

DIVISION 01 – GENERAL REQUIREMENTS

EXCLUDING 01 45 33, 01 88 15

DIVISION 09 – FINISHES



Digitally Signed on

March 18, 2026

Riley Walsh

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FINAL TREATMENT CONCRETE REPAIR

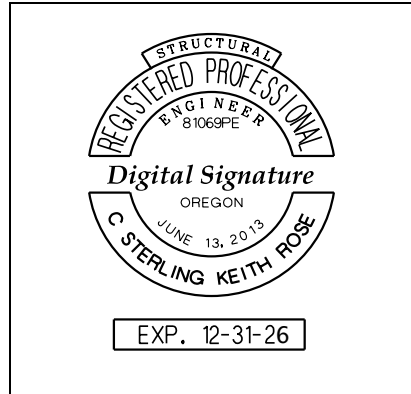
SPECIFICATIONS

DIVISION 01 – GENERAL REQUIREMENTS

01 45 33, 01 88 15

DIVISION 03 – CONCRETE

DIVISION 05 – METALS



Digitally Signed on

March 18, 2026

Sterling Rose

MWMC PRIMARY CLARIFIER AND
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SPECIFICATIONS

DIVISION 40 – PROCESS INTERCONNECTIONS



Digitally Signed on

March 18, 2026

David W. Brunkow

END OF SECTION

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PROCUREMENT REQUIREMENTS

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**SECTION 00 11 13
INVITATION TO BID**

Bids for construction of the Primary Clarifier and Final Treatment Concrete Repair P80118 will be received electronically by the **Metropolitan Wastewater Management Commission** (“MWMC”) via email submission **on or before 1:30 p.m. local time, Thursday, May 21**. All Bids must be sent to the Owner’s Representative at mdapkus@springfield-or.gov. Each Bidder must submit its electronic Bid on the Bid Form found in Specification Section 00 41 00 and provide additional documents in accordance with Specification Section 00 43 93, Bid Submittal Checklist. These documents are considered an integral part of each bid. The Subject line of an email used to submit a Bid must contain the words “**BID: MWMC Project # P80118**”, and Bids will be opened immediately following the time when bids are due via Microsoft teams at the link below:

<https://teams.microsoft.com/meet/24935325690257?p=EMudnIUxNRDUZuzGuo>

Questions about the contents of the Bid Documents must be directed to Owner’s Representative at the email address above, and not to the Design Consultant. All responses to questions will be provided as a written addendum to the Bid Documents and posted to the [MWMC webpage for Invitations to Bid](#). As a courtesy, addenda *may* be issued directly to all listed document holders at the discretion of the Owner’s Representative.

Copies of the Bid Documents can be downloaded from the [MWMC webpage for Invitations to Bid](#).

Bids received after the time established for receipt of Bids will not be considered. Bids may be withdrawn or modified at any time prior to the Bid closing time provided that any modified Bid is received by the date and time when Bids are due.

To submit a Bid, Bidders must be prequalified and comply with the requirements listed in the Instructions to Bidders.

Unless specifically waived by written notice to the Bidder, Bidder must provide this information within the above specified time limit. If the apparent low Bidder is not responsive and responsible, Owner reserves the right to award the Contract to the next lowest Bidder who is responsive and responsible.

Owner reserves the right to accept or reject any or all Bids in whole or in part, to waive irregularities not affecting substantial rights, and to postpone award of the Contract for a period not to exceed 90 days from the date and time when Bids are due. By submitting its Bid, Bidder agrees that its Bid remains valid for this 90-day period.

A mandatory Pre-bid Conference will be held Wednesday, April 29 @ 10:00 a.m. local time at 410 River Ave., Eugene, OR to review the project site. A representative *must be present and sign in* at the pre-bid meeting for each Bidder submitting a Bid for this Project if the Bid

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is to be considered. Representatives of the Owner and Design Consultant will be present to discuss the Project, and attendance by major subcontractors is encouraged. Oral statements made at the pre-bid may not be relied upon and will not be binding or legally effective. Only responses to questions made by written addendum will become a part of the Contract.

Except for mandatory pre-bid conference walk-through, no other access to the project site will be granted pre-bid except as provided for in Specification Section 00 21 00, Instructions to Bidders. During all site visits Bidders must be accompanied by an authorized representative of the Owner.

Any contract resulting from this solicitation will be a Public Work contract subject to ORS 279C.800 through 279C.870.

Dated this 20th day of April 2026.

METROPOLITAN WASTEWATER
MANAGEMENT COMMISSION

Matt Stouder, MWMC Executive Director

END OF SECTION

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**SECTION 00 21 00
INSTRUCTIONS TO BIDDERS**

1. INSPECTION OF JOB SITE

A **mandatory** pre-bid conference will be held for potential Bidders to inspect the location of the proposed work and observe actual existing conditions of the project site. Potential Bidders may inspect the site only during periods scheduled for such inspection, except by special arrangement with the Owner's Representative. The date, time, and location of the pre-bid conference is listed in Specification Section 00 11 13 Advertisement for Bids. **Bids will not be accepted from Bidders who do not have a representative at the pre-bid conference.** In response to questions arising at the pre-bid conference, the Project Manager will respond via written addendum posted to the [MWMC webpage for Invitations to Bid](#) and *may*, as a courtesy, provide addenda by email to all potential Bidders. Oral statements may not be relied upon and will not be legally binding. If, during the course of its site inspection, a potential Bidder finds conditions that appear to be in conflict with the Bid Documents, the Bidder must apply to the Owner's Representative, in writing, for additional information and explanation at least seven (7) calendar days before the date and time when Bids are due.

Prior to submitting a Bid, it will be the sole responsibility of each potential Bidder to conduct any additional examination, investigation, exploration, test, study or other inquiry and to obtain any additional information pertaining to the physical conditions (including surface, subsurface, and underground utilities) at or near the Project site that may affect the cost, progress, or performance of the Project, and that the Bidder deems necessary to prepare its Bid for performance of the Project in accordance with the Bid Documents. Potential Bidders seeking any such additional examination or other inquiries or information concerning the Project will do so at the Bidder's sole expense.

Potential Bidders seeking to conduct additional examination or other inquiry at the Project site must request site access from Owner's Representative in writing at least five (5) days in advance. The location of any excavation, boring or other invasive testing will be subject to approval by Owner's Representative and any other agencies with jurisdiction over such testing. Bidders must comply with all applicable laws and regulations related to excavation and utility locates. Potential Bidders may not conduct tests at the Project site prior to obtaining approval from Owner's Representative. Potential Bidders must also contact utility owners to verify all utility locations and anticipated utility owner involvement on the project site.

Additionally, any such potential Bidder must deliver an executed INSURANCE, ACCESS, INDEMNITY AND RELEASE AGREEMENT found in Specification Section 00 73 16, and provide an insurance certificate as described therein by noon of the day prior to Bidder's approved site visit. Once approved testing is complete, Bidder must fill all trenches or holes, restore all pavement to match existing structural section, and otherwise clean up and restore the test site to its pre-test condition. Potential Bidders who intend only to observe site

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conditions and not conduct such examinations are not required to provide an executed Indemnity and Release Agreement or insurance information.

The Site is identified in the Bid Documents. Unless otherwise provided in the Bid Documents, Owner has or will obtain sufficient rights in the real property comprising the Project site to permit the construction of permanent improvements or permanent changes in existing improvements on the site. With the exception of areas on the site designated in the Bid 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.

Submission of a Bid by a Bidder shall constitute acknowledgment that, if awarded the Contract, the Bidder has relied and is relying on its own examination of (a) the job site, (b) access to the job site, and (c) all other data and matters requisite to the fulfillment of the Work, and on its own knowledge of existing facilities on and in the vicinity of the job site. Each Bidder must satisfy itself as to the conditions affecting the Work, including but not limited to those bearing upon transportation, disposal, handling, and storage of materials; availability of labor, water, electric power, and access to the site; uncertainties of weather, river stages, or similar physical conditions at the site; and the character of equipment and facilities needed preliminary to and during prosecution of the Work. The Owner and its employees will not be responsible for loss or unanticipated costs suffered by the Bidder because of the Bidder's failure to become fully informed about the conditions of the project site, or failure to request clarification of Bid Documents Bidder believes to be erroneous or incomplete.

The information provided by the Owner is not intended to be a substitute for, nor shall it be deemed a supplement to the independent verification by the Bidder to the extent such independent investigation of job site conditions is deemed necessary or desirable by the Bidder.

2. EXAMINATION OF CONTRACT DOCUMENTS, AND OTHER RELATED DATA

2.1 GENERAL. Each Bidder shall thoroughly examine and become familiar with the Bid Documents including any Addenda and other related items identified in the Bid Documents. Submission of a Bid constitutes acknowledgment upon which the Owner may rely that the Bidder has thoroughly examined and is familiar with the Bid Documents. Failure or neglect of a Bidder to examine any of the Bid Documents in no way relieves the Bidder from any obligation with respect to its Bid or to the Contract. No claim will be allowed for additional compensation based upon a lack of knowledge of the Bid Documents.

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2.2 COPIES OF BID DOCUMENTS

No hard copies of the Bid Documents will be provided. Each Bidder is responsible for obtaining an electronic copy of the Bid Documents and may reproduce those in electronic or hard copy form for the purpose of submitting a Bid for the Work. Copies of Bid Documents may be downloaded from the [MWMC webpage for Invitations to Bid](#).

2.3 SUBSURFACE AND PHYSICAL CONDITIONS

Section 00 31 00 Available Project Information, identifies:

- a) Those reports of explorations and tests of subsurface conditions at or contiguous to the site that the Engineer or Owner's Representative has used in preparing the Bid Documents.
- b) Those Drawings of physical conditions in or relating to existing surface and subsurface structures at or contiguous to the site (except Underground Facilities) the Engineer or Owner's Representative has used in preparing the Bid Documents.

Copies of reports and Drawings referenced in Specification Section 00 31 00 Available Project Information will be made available by the Owner's Representative electronically to any Bidder on request. Those reports and Drawings are not part of the Bid Documents and are made available solely for the convenience of the Bidder and shall not relieve the Bidder of any risk or duty to make examinations and investigations they deem necessary or desirable. Bidder is responsible for any interpretation or conclusion Bidder draws from any "technical data" or any other data.

2.4 UNDERGROUND FACILITIES

Information and data shown or indicated in the Bid 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.

2.5 HAZARDOUS ENVIRONMENTAL CONDITIONS

No reports or Drawings related to Hazardous Environmental Conditions are known to Owner or Design Consultant.

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3. INTERPRETATION OF BID DOCUMENTS

Potential Bidders, subcontractors, manufacturers, and suppliers may request interpretation of the Bid Documents at least seven (7) calendar days prior to the date and time when Bids are due. Requests must be directed in writing to:

Metropolitan Wastewater Management Commission
Attention: Matt Dapkus, MWMC Project Manager
Springfield City Hall
225 Fifth Street
Springfield, Oregon 97477
Telephone: (541)726-3790
E-mail: mdapkus@springfield-or.gov
Fax: 541-726-2309

All questions must be submitted by email in the time set forth herein. For e-mail to be effective it must be clearly identified with the following title in the Subject line:

“Primary Clarifier and Final Treatment Concrete Repair: Bidder Questions.”

It is each Bidder's sole responsibility to ensure that e-mail questions are received by the Owner's Representative in a timely manner. Upon receipt of a question, Owner's Representative shall provide acknowledgement of receipt within two (2) business days. If the Bidder does not receive an acknowledgement of receipt of an e-mail question from the Owner's Representative within the above referenced timeframe, Bidder shall assume the e-mail transmission was not received by the Owner's Representative, and Bidder is responsible for confirming the correct email address for the Owner's Representative and resubmitting the same in a timely manner.

Requests to clarify the source of materials, equipment suppliers, or any other such matter, which does not modify, change, increase or decrease the scope of the work, require no action by the Owner other than a response to the Bidder. Oral and other interpretations or clarifications will be without legal effect.

Clarifications which modify, change, increase, or decrease the scope of work require issuance of an addendum by the Owner's Representative for the interpretation to become effective. Such addenda will be posted to the [MWMC webpage for Invitations to Bid](#) and *may*, as a courtesy, be emailed to all known holders of the Bid Documents. Only answers provided by addenda will be binding. Questions received less than seven (7) calendar days prior to the date for opening of Bids may not be answered.

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4. TYPE OF BID

4.1 LUMP SUM BID

Bidders must submit the base Bid on a lump sum basis, except for items specified to be provided under another bid type on the Bid Form, and include a separate price for each alternate described in the Bid Documents as provided for in the Bid. The price for each Bid alternate will be the amount added to or deleted from the base Bid if Owner selects the alternate. Everything required to complete the Work under the Contract shall be considered to be included in the lump sum Bid except where Work, materials or equipment is explicitly mentioned to be provided by Owner, or as provided for in the Bid Documents. Bids will be accepted only for the entire Work. Separate award for portions of the Work will not be made.

4.2 LUMP SUM CASH ALLOWANCE ITEMS

When specific lump sum allowance items have been entered on the Bid form by the Owner, the total amount to be paid to the Contractor for work covered under the lump sum allowance items shall be determined in accordance with Part 7, Subsection C.6 of Specification Section 00 72 00 General Conditions of the Contract.

4.3 UNIT PRICE PROPOSAL

When the Bid for a portion of the Work is to be submitted on a unit price basis, unit price Bids will be accepted on all items of unit price Work set forth in Specification Section 00 41 00 Bid Form. The estimate of quantities of Work to be done is tabulated in the Bid Form and, although stated with as much accuracy as possible, is approximate only and is assumed solely for the basis of calculation upon which the award of Contract shall be made. Payment to the Contractor will be made on the measurement of the Work actually performed by the Contractor in accordance with the Contract Documents. The Owner reserves the right to increase or diminish the amount of any class of Work as may be deemed necessary. Quoted unit prices must be adequate to cover Contractor's overhead and profit as no additional payment will be made for those items.

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

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4.4 ALTERNATE ITEMS

In addition to the items to be base Bid as a lump sum, all Bidders are required to submit a lump sum price for each of the Alternate items set forth in the Bid Form as separate lump sum Bids. Alternates requiring pricing on the Bid Form are described in Specification Section 01 23 00 Alternates, and in the Bid Form.

Include cost of all related Work, including modifying surrounding Work to integrate the Work of each alternate.

Alternates listed on the Bid Form will be reviewed and accepted or rejected at Owner's option. Alternates accepted will be added to or subtracted from the base Bid in determining Contract award and will be identified in the Contract.

5. BID DOCUMENTS

5.1 BID FORM

Bidders shall make Bids on the Bid Form prepared by Owner and provided with the Bid Documents in Specification Section 00 41 00. Bid prices must be stated both in writing and in numerical figures, must give all other information requested herein, and must indicate Bidder's address and be signed by the Bidder or its authorized representative.

The Bid must include everything necessary for the completion of construction and fulfillment of the Contract, including but not limited to furnishing all materials, equipment, tools, plant and other facilities, and all management, supervision, labor and services. Bidder is responsible for all federal, state, and local taxes, and no additional amount will be paid to Contractor by Owner for taxes owed by Contractor.

In the event the Bidder's Bid contains a difference between a Bid quoted in words and a Bid quoted in numerical figures for the same quotation, the words govern and constitute the amount of the Bid. While price extensions are required as a matter of convenience for unit price Bids, in the event of error in extensions, the unit price Bid governs. If the sum of two (2) or more items in a bidding schedule does not equal the total amount quoted, the individual item amounts govern, and the correct total is deemed to be the amount of the Bid.

- A. Bid Irregularities: Each Bidder must submit a completed Bid Form and all information requested in accordance with Specification Sections 00 11 13 Advertisement for Bids, 00 21 00 Instructions to Bidders, and 00 43 93 Bid Submittal Checklist. Bids which contain omissions, erasures, or irregularities of any kind may be rejected.
- B. Modification of a Bid already received will be considered only if the modification is received prior to the date and time when Bids are due. The Bid

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modification communication should not reveal the Bid price; it should, however, state the addition or subtraction or other modification so that the final price or terms will not be known by Owner until the Bid is opened.

- C. Bids may be withdrawn by an appropriate document duly executed (in the same manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the date and time when Bids are due.
- D. **Covenant Against Contingent Fees:** The Contractor certifies that no person or selling agency has been employed or retained to solicit or secure the Contract upon agreement or understanding for a commission, percentage, brokerage or contingent fee excepting bona fide employees or bona fide established commercial or selling agencies maintained by the Contractor for the purpose of securing business. For breach or violation of the Contract with liability or, at its discretion, to deduct from the Contract price or consideration, or otherwise recover the full amount of such commission, percentage, brokerage or contingent fee.

5.2 BIDDER'S SIGNATURE AND AUTHORITY

If the Bid is made by an individual, the individual's name, signature, and post office address must be shown; if made by a firm or partnership, the name and post office address of the firm or partnership and the signature of at least one of the general partners and a list of all partners must be shown; if made by a corporation, the Bid must show the name of the state under the laws of which the corporation is chartered, the name and post office address of the corporation, and the title of the person who signs on behalf of the corporation. If the Bid is made by a joint venture, the bid must be signed by a representative of each of the joint venture firms. If the Bid is made by a limited liability company (LLC) the Bid must show the name of the state under the laws of which the LLC is organized, the name and post office address of the LLC, and the title of all the person(s) authorized to sign on behalf of the LLC.

5.3 BID SECURITY

Each Bid must be accompanied by Bid Security in accordance with Specification Section 00 43 13 Bid Security. The amount payable to Owner under the Bid Security will be forfeited to Owner as liquidated damages in case of a failure or neglect of the Bidder to furnish, execute, and deliver to Owner the required Performance Bond, Payment Bond, and evidence of insurance, and execute and deliver the Contract within 15 calendar days after final award and tender of the Contract. Award may then be made to the next lowest responsive and responsible Bidder, the Project may be readvertised, or the Work may be performed otherwise as Owner decides in Owner's sole discretion.

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5.4 RETURN OF BID SECURITY

Owner will return the Bid security to all unsuccessful Bidders within thirty (30) days of Contract execution in accordance with ORS 279C.385.

5.5 LIST OF SUBCONTRACTORS

Each Bidder must submit a First-tier Subcontractor Disclosure Form in accordance with ORS 279C.370 using the form provided in Specification Section 00 43 37 First-tier Subcontractor Disclosure Form. If the Bidder will not be using any subcontractors that are subject to the disclosure requirements, the Bidder is **required** to indicate “NONE” on the accompanying form.

Failure to submit a First-tier Subcontractor Disclosure Form within two (2) hours after the date and time when Bids are due will be cause for rejection of the Bid.

Bidders must also supply a list of other Proposed Subcontractors as required by Specification Section 00 43 36 Proposed Subcontractors within two (2) working hours after Bid closing time using the form found in Specification Section 00 43 38 Non-first tier Subcontractor Form.

5.6 WORK PERCENTAGES

Each Bid must reflect that the Work of Specification Section 03 01 32, other than hydro-demolition, will be performed by Bidder under the Contract or the Owner may treat the Bid as nonresponsive and reject it on that basis. Performance of the Work under the Contract means performance of Work by the Contractor’s own forces and equipment, the procurement of materials and equipment by the Contractor, and field-related Work required to support and supervise the construction effort. Subcontractors must not perform any Work or procurement of materials or equipment within the above Contractor’s Work allotment and must not include cost of general cleanup and trash removal in their bid.

5.7 QUALIFICATIONS OF BIDDERS

Each Bidder must certify that they are skilled, experienced and regularly engaged in the general class and type of Work called for in the Contract Documents; that they are familiar with the hazards associated with such Work; and, that they can satisfactorily perform such Work. Specifically, each Bidder must certify that it meets the standards of responsibility set forth in ORS 279C.375(3)(b)(A-K).

Prior to submitting a Bid, each Bidder is required by law to be registered with the Oregon Construction Contractors Board which has jurisdiction to investigate complaints against a contractor if a complaint is filed within three (3) years of the date of the alleged violation. Prior to submitting a bid, each Bidder and its

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subcontractors shall hold the license classification required for the performance of the Work. The MWMC may not receive or consider a Bid unless the Bidder and applicable subcontractors are license by the Construction Contractors Board or the State Landscape Contractors Board, as applicable.

In order to submit a Bid, Bidders must have been prequalified under a separate solicitation in accordance with the applicable parts of ORS 279C.430 through ORS 279C.450.

Bidder must 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.

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

5.8 ADDENDA

Each Bid must include specific acknowledgment, in the space provided, of receipt of all Addenda issued by Owner's Representative during the bidding period. Failure to acknowledge addenda will result in the Bid being rejected as not responsive.

6. PROCUREMENT PROTEST PROCEDURES

Protest of procurement procedures based upon an alleged violation of the procurement requirements set forth in ORS Chapter 279C must conform to Specification Section 00 91 15 Procurement Protest Procedures.

7. REJECTION OF BIDS

Owner reserves the right to reject Bids that are incomplete; Bids that omit a bid on any one or more items for which Bids are required; Bids that omit unit prices if unit prices are required; Bids accompanied by insufficient or irregular Bid security; and Bids from Bidders who are disqualified. Owner may reject Bids that are not in compliance with all prescribed public contracting procedures and requirements, including the requirement to demonstrate the Bidder's responsibility pursuant to ORS 279C.375(3)(b) and MWMC Rule 137-049-0390 and may reject all Bids for good cause upon determining it is in the public interest to do so.

8. AWARD OF CONTRACT

At least seven (7) calendar days before the award of a public improvement contract, unless Owner determines that seven (7) calendar days is impractical in accordance with ORS 279C.375(2) and MWMC Rule 137-049-0395, Owner's Representative shall issue to each Bidder or post, electronically or otherwise, a notice of Owner's intent to award the Contract.

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9. LABOR REQUIREMENTS

This Contract is a contract for a Public Works project subject to the state prevailing rates of wage under ORS 279C.800 to 279C.870 and Owner will not receive or consider a Bid unless the Bid contains a statement by Bidder that Bidder will comply with ORS 279C.800 to 279C.870.

10. DRAWINGS

The Drawings are part of the Bid Documents and bound separately from this document.

11. RESIDENCY STATUS

Each Bid must identify whether the Bidder is a resident Bidder as defined by ORS 279A.120. In determining the lowest Bid, Owner will, for the purpose of awarding the Contract, give preference to goods or services that have been produced or manufactured in Oregon if price, fitness, availability, and quality are otherwise equal; and add a percentage increase to the Bid of a nonresident Bidder equal to the percentage, if any, of the preference given to that Bidder in the state in which the Bidder resides (ORS 279A.120). The percentage preference applied in each state will be published on or before January 1 of each year by the Oregon Department of Administrative Services. In accordance with ORS 279A.120(4), Owner will rely on these percentages and is not liable to any Bidder for any inaccuracies.

This increase will only be applied to determine the lowest Bid and will not cause an increase in payment to Contractor after award of the Contract.

12. ASBESTOS ABATEMENT LICENSE

If asbestos is present and Work will be performed where it will be encountered, Contractor and subcontractors performing the work must have a license issued pursuant to ORS 468A.720. Asbestos or asbestos containing materials is not anticipated to be encountered at the Project site.

13. PRODUCT SUBSTITUTION

A. Materials and Equipment Identified by Brand or Trade Name.

1. Some materials and equipment specified in the Bid Documents are identified by brand or trade name.

2. Except as stipulated under the following paragraph B and as outlined in the Bid, it is the intent of the Bid Documents to allow Bidders to select such materials and equipment from two or more brands or trade names specified in the Specifications or indicated in the Drawings, or from other brands or trade

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names of materials and equipment of equal quality and utility to those specified or indicated, in accordance with the General Conditions.

3. Where only one brand or trade name is listed followed by the words “or equal,” only one brand name or trade name of the required quality and utility was known to the Design Consultant when preparing the Bid Documents.

- B. In order to match existing installations or where the product involves a unique or novel application required to be used in the public interest, some materials and equipment specified may not be substituted.
- C. The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bid Documents without consideration of possible substitute or “or-equal” items. Whenever it is specified or described in the Bid Documents that a substitute or “or-equal” item of material or equipment may be furnished or used by Contractor if acceptable to Owner’s Representative, application for such acceptance will not be considered by Owner’s Representative until after the Effective Date of the Contract.

END OF SECTION

SECTION 00 31 00
AVAILABLE PROJECT INFORMATION

1.0 Subsurface Conditions:

A. In preparation of the Drawings and Specifications, Engineer or Related Entities relied upon the following reports of explorations and tests of subsurface conditions at the Site:

1. Report date October 2025, prepared by Specialty Analytical, Clackamas, Oregon including Chloride Content in Concrete test data consisting of 62 pages including figures. The data report is included as a supplement to this Specification Section and is a part of the Contract Documents.

Electronic and hard copies of reports and drawings itemized that are not included with Bidding Documents may be requested from Owner as needed.

B. These reports and drawings are not part of the Contract Documents and are made available solely for the convenience of the Bidder and do not relieve the Bidder of any risk or duty to make examinations and investigations they deem necessary or desirable. Bidder is responsible for any interpretation or conclusion Bidder draws from any “technical data” or any other data in these reports.

2.0 Physical Conditions:

A. In preparation of the Drawings and Specifications, Engineer or related entities relied upon the following reports of explorations and tests of physical conditions in or relating to existing surface and subsurface structures (except Underground Facilities), which are at or contiguous to the Site:

1. Eugene-Springfield Metropolitan Wastewater Management Commission Wastewater Treatment Plant Expansion, Contract C2 As Builts – Primary Clarifiers, Jun 1985, CH2M HILL
2. Eugene-Springfield Metropolitan Wastewater Management Commission Wastewater Treatment Plant Expansion, Contract C6 – Final Treatment, Aug 1985, CH2M HILL
3. Eugene-Springfield Metropolitan Wastewater Management Commission Wastewater Treatment Plant Expansion, Contract C10 – Final Sitework, Aug 1985, CH2M HILL
4. Eugene-Springfield Metropolitan Wastewater Management Commission Wastewater Treatment Plant Expansion, Contract C10 – Final Sitework, Aug 1985, CH2M HILL

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5. Eugene-Springfield Metropolitan Wastewater Management Commission Wastewater Treatment Plant Expansion, Contract P80033 – Primary and Secondary Clarifier Improvements, Aug 2008, CH2M HILL
6. Eugene-Springfield Metropolitan Wastewater Management Commission Wastewater Treatment Plant Expansion, Contract P80057 – Sodium Hypochlorite Conversion, June 2010, HDR

These reports and drawings are not part of the Contract Documents and are made available solely for the convenience of the Bidder and do not relieve the Bidder of any risk or duty to make examinations and investigations they deem necessary or desirable. Bidder is responsible for any interpretation or conclusion Bidder draws from any “technical data” or any other data in these reports.

END OF SECTION

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SECTION 00 41 00
BID FORM

CONTRACT NUMBER [Project P80118]

1.0 BID RECIPIENT

1.1 This Bid is submitted to:

Metropolitan Wastewater Management Commission
Springfield City Hall
225 Fifth Street, Suite 101
Springfield, Oregon 97477

1.2 The undersigned, having full knowledge of the quality of the material and labor to be performed, hereby proposes to perform all labor and furnish all materials necessary for the Primary Clarifier and Final Treatment Structural Repair Contract P80118, for the prices as stated herein.

1.3 The undersigned as Bidder, declares that Bidder has received and examined the Contract Documents entitled Primary Clarifier and Final Treatment Structural Repair (Contract P80118), and will contract with the Metropolitan Wastewater Management Commission ("Owner") to do everything required for the fulfillment of the Contract for the construction at the prices and on the terms and conditions herein contained.

Bidder: _____

Date: _____

Person representing the bidder:

Name: _____

Address: _____

Telephone: _____

E-mail: _____

2.0 BIDDER'S ACKNOWLEDGEMENTS

Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

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3.0 BIDDER'S DECLARATION AND REPRESENTATIONS

In submitting this Bid, Bidder represents that:

3.1 The undersigned Bidder declares that the only persons or parties interested in the Bid are those named herein, that this Bid is, in all respects, fair and without fraud, that it is made without collusion with any official of the Owner, and that the Bid is made without any connection or collusion with any person submitting another Bid on the Contract.

3.2 The Bidder further declares that they have carefully examined the Contract Documents entitled "Contract Documents for the construction of Primary Clarifier and Final Treatment Structural Repair Contract P80118 and that this Bid is made according to the provisions and under the terms of the Contract Documents, which documents are hereby made a part of this Bid.

3.3 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.

3.4 Bidder has carefully studied all: i) reports of explorations and tests of subsurface conditions at or contiguous to the site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except underground facilities) that have been identified in specification Section 01 31 13, Project Coordination.

3.5 Bidder 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.

3.6 Bidder does not consider that any 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 and in accordance with the other terms and conditions of the Bid Documents.

3.7 Bidder has given Project Manager written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bid Documents, and the written resolution thereof by Project Manager is acceptable to Bidder.

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

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4.0 FURTHER REPRESENTATIONS

Bidder further represents that:

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

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

4.3 Bidder has not solicited or induced any individual or entity to refrain from bidding; and

4.4 Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.

4.5 All 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.

4.6 Bidder agrees to be bound by and will comply with the provisions of ORS 279C.838; ORS 279C.840; or 40 U.S.C. 3141 to 3148 as applicable.

5.0 ADDENDA

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

Addendum No.	Addendum Date
_____	_____
_____	_____
_____	_____
_____	_____

(Bidder shall insert number of each Addendum received.)

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6.0 CONTRACT TIMES

The Bidder agrees that the Work, and any stages and/or milestones specified in specification Section 01 31 13, Project Coordination, will be substantially complete and will be completed and ready for final payment in accordance with the General Conditions on or before the dates or within the number of calendar days indicated in the Contract.

7.0 LIQUIDATED DAMAGES

Bidder accepts the provisions in the Contract as to Liquidated Damages.

8.0 CONTRACT EXECUTION AND BONDS

The Bidder agrees that if this Bid is accepted, it will, within 15 calendar days after notice of award is provided to Bidder, sign the Contract in the form annexed hereto, and will at that time deliver to the Owner the required bonds and certificates of insurance, and will, to the extent of this Bid, furnish all labor, machinery, tools, apparatus, and other means to do the Work and furnish all the materials necessary to complete the Work as specified in the Contract Documents.

9.0 LUMP SUM AND/OR UNIT PRICE WORK

9.1 The Bidder agrees to accept as full payment for the Work proposed herein the amounts computed under the provisions of the Contract Documents and based on the following lump sum or unit price amounts including installation of Owner-furnished equipment, it being expressly understood that the unit prices are independent of the exact quantities involved. The Bidder agrees that the lump sum prices and the unit prices represent a true measure of the labor and materials required to perform the Work, including all allowances for overhead and profit for each type and unit of Work specified in these Contract Documents. The Bidder shall provide prices for Work listed in numerical figures and words in the Schedule of Contract Prices.

SCHEDULE OF CONTRACT PRICES

9.2 The Work consists of all labor, materials, equipment and all other Work necessary for the completion of the following portions of the work described in the Bid Documents:

1. Work summarized in specification Section 01 11 00, Summary of Work.
7. Associated Sitework Improvements including Contractor Courtyard and Contractor Staging Areas.

9.2.1 LUMP SUM WORK: Bidder agrees to accept as full payment for the Lump Sum Work proposed within the Bid Documents, based upon the undersigned's own estimate of quantities and costs and including sales,

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consumer, use, and other taxes, except as provided below, and overhead and profit, the following lump sum of:

_____ Dollars
(words)
and _____ Cents \$ _____
(numerals)

9.2.2 UNIT PRICE WORK: The undersigned Bidder represents that, if awarded the Contract, the Total of all Extended Bid Unit prices as shown in the Unit Price Bid Schedule below will be supplied in accordance with Article 4.3 of specification Section 00 21 00, Instructions to Bidders, for the lump sum price of:

_____ Dollars
(words)
and _____ Cents \$ _____
(numerals)

9.2.2.1 Unit prices have been computed in accordance with Article 4.3 of the Instructions to Bidders.

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9.2.2.2 Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

UNIT PRICE BID SCHEDULE					
Item No.	Description	Estimated Quantity	Unit	Bid Unit Price	Extended Bid Unit Price
1	Primary Clarifier 1 and 3 Vertical Concrete Surface removal and repair – 5/8 to 1 inch removal depth and repair thickness	2,680	Square Feet	\$	\$
2	Primary Clarifier 1 and 3 Vertical Concrete Surface removal and repair – 1 1/8 to 1 1/2 inch removal depth and repair thickness	1,150	Square Feet	\$	\$
3	Primary Clarifier 1 and 3 Vertical Concrete Surface removal and repair – 1 5/8 to 2 inch removal depth and repair thickness	4,070	Square Feet	\$	\$
4	Primary Clarifier 1 and 3 Vertical Concrete Surface removal and repair – 2 1/8 to 2 1/2 inch removal depth and repair thickness	1,020	Square Feet	\$	\$
5	Chlorine Contact Basins 1-4 Vertical Concrete Surface removal and repair – 5/8 to 1 inch removal depth and repair thickness	44,440	Square Feet	\$	\$
6	Chlorine Contact Basins 1-4 Vertical Concrete Surface removal and repair – 1-1/8 to 1-1/2 inch removal depth and repair thickness	19,050	Square Feet	\$	\$
7	Chlorine Contact Basins 1-4 Vertical Concrete Surface removal and repair – 1 5/8 to 2 inch removal depth and repair thickness	17,190	Square Feet	\$	\$
8	Chlorine Contact Basins 1-4 Vertical Concrete Surface removal and repair – 2 1/8 to 2-1/2 inch removal depth and repair thickness	7,370	Square Feet	\$	\$
Total of All Extended Bid Unit Prices					\$

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9.2.3 **BASE BID SUMMARY:** The undersigned Bidder agrees to provide the Work as denoted in the summary table below for the lump sum price of:

_____ Dollars
(words)
and _____ Cents \$ _____
(numerals)

BASE BID SUMMARY

Lump Sum Amount for supply of all Work included in the bid documents with the exception of items listed below in this Bid Summary (from 10.2.1):	
Total of all Extended Unit Bid Prices (from 10.2.2):	
TOTAL BASE BID	

9.2.4 **BID ADDITIVE ALTERNATE ITEM 1:** Bidder further agrees to accept as full payment for the Lump Sum Work proposed within these Contract Documents, for providing Chemical Resistant Coating in Chlorine Contact Basins as specified, in Section 01 23 00, Alternates, based upon the undersigned's own estimate of quantities and costs, for the following lump sum of:

_____ Dollars
(words)
and _____ Cents \$ _____
(numerals)

9.2.5 **BID ADDITIVE ALTERNATE ITEM 2:** The Undersigned Bidder represents that, the Total of all Extended Bid Alternate Unit prices as shown in the Unit Price Bid Schedule below will be supplied in accordance with Article 4.3 of Section 00 21 00, Instruction to Bidders, for providing Polyurethane Injection for leak prevention on external wall of Primary Clarifiers as specified, in Section 01 23 00, Alternates, for the following lump sum of:

_____ Dollars
(words)
and _____ Cents \$ _____
(numerals)

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9.2.5.1 Unit prices have been computed in accordance with Article 4.3 of the Instructions to Bidders.

9.2.5.2 Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

UNIT PRICE BID SCHEDULE					
Item No.	Description	Estimated Quantity	Unit	Bid Unit Price	Extended Bid Unit Price
1	Mobilization of Polyurethane Injection Grouting Equipment, Material and Personnel for Dry weather season	4	EA	\$	\$
2	Polyurethane Injection Grouting	1000	Linear Feet	\$	\$
Total of All Extended Bid Unit Prices					\$

9.2.6 BASIS OF AWARD: The award of this Contract shall be made to the responsible bidder with the lowest Total Base Bid.

10.0 SUBCONTRACTORS

Bidder agrees to submit as part of its Bid, or within two (2) working hours after the effective Bid submittal time, the names of subcontractors as required in the **Instructions to Bidders** and by State law, whom Bidder, if awarded Contract, will name for performance of the categories of Work.

11.0 ALTERNATE ITEMS

11.1 After award of the Contract and if the Owner elects to delete or add any work covered by an Alternate Item, the Contractor will reduce or add to the Contract Price the amount set forth above for the Alternate Item designated by the Owner.

12.0 BIDDER

12.1 If the Bid is accepted, Bidder hereby agrees to contract with the Owner in the form of a Contract prepared by the Owner's Attorney to furnish the performance and payment bonds and the required evidence of the insurance within 15 calendar days after receiving written notice of the final award of the Contract.

12.2 The Bidder further agrees, if its Bid is accepted and a Contract for performance of the Work is entered into with the Owner, to construct said project at

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the Lump Sum Amounts Bid and to so plan work and to prosecute it with such diligence that all of the Work shall be completed within the time stipulated in the Bid.

The name of the Bidder submitting this Bid is _____
doing business at _____, _____, _____
_____ Street _____ City _____
State _____ Zip _____ which is the address to which all communications
concerned with this Bid and with the Contract shall be sent.

Bidder's Federal Employer's Identification No. _____

RESIDENT/NONRESIDENT

The Bidder submitting this Bid _____ a resident bidder as defined in
ORS 279A.120. (Bidder insert "is" or "is not," as appropriate.)

Oregon Construction Contractors Board Registration Number: _____

If Sole Proprietor or Partnership or Joint Venture

Names of partners (if co-partnership) or names of joint venturers (if a joint venture):

IN WITNESS hereto the undersigned has set (its) hand this _____ day of
_____, 20____.

Signature of Bidder

Name (typed)

Title

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If Corporation

IN WITNESS WHEREOF the undersigned corporation has caused this instrument to be executed and its seal affixed by its duly authorized officer this _____ day of _____, 20__.

(Seal)

Name of Corporation

By

Title

Attest _____
Secretary

END OF SECTION

SECTION 00 43 13
BID SECURITY

PART 1 GENERAL

1.01 FORMS AND AMOUNT OF BID SECURITY

Each Bidder must submit Bid Security with his Bid, in the amount of ten percent (10%) of the base Bid, in accordance with ORS 279C.365:

- A. A surety bond (Bid Bond)
- B. An irrevocable letter of credit issued by an insured institution
- C. A cashier's check or certified check

1.02 BID BOND FORM

- A. Each Bidder submitting his Bid Security in the form of a surety bond (Bid Bond) must use the form found in this specification section or a similar form containing the same information and requirements.

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BID BOND FORM

KNOW ALL MEN AND WOMEN BY THESE PRESENTS, that

(Contractor), and _____
a corporation duly organized under the laws of the State of _____ having its principal
place of business at _____ in the State of _____
and authorized to do business in the State of Oregon (Surety) are held and firmly bound unto the
Metropolitan Wastewater Management Commission for Eugene, Springfield, and Lane County,
Oregon, (Owner) in the penal sum of _____
DOLLARS (\$_____), lawful money of the United States of America, for the
payment of which we bind ourselves, our heirs, executors, administrators, successors, and
assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS BOND IS SUCH THAT:

WHEREAS the Contractor is herewith submitting its Bid Form for construction of Primary Clarifier and Final Treatment Structural Repair, P80118, said Bid Form, by reference thereto, being hereby made a part hereof.

NOW, THEREFORE, if the Bid Form submitted by the Contractor is accepted and the Contract awarded to the Contractor, and if the Contractor executes the proposed Contract and furnishes such Performance and Payment Bonds and evidence of insurance as required by the Contract Documents within the time fixed by the documents, then this obligation becomes void; if, in the event the Contractor seeks to revoke its offer for any reason not authorized by law and not consented to by the Owner and if awarded the Contract and the Contractor fails, neglects, or refuses to enter into a contract to perform said Work and furnish said labor, equipment and/or material, and to furnish Performance and Payment Bonds and evidence of insurance as required within the time specified, then the amount herein stated will be declared to be forfeited and become due and payable to the Owner as liquidated damages.

SIGNED, SEALED, AND DATED this _____ day of _____, 20_____.

Contractor

Address

Phone Number

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E-mail Address

By _____
Title

Surety _____

By _____
Attorney-in-Fact

Oregon Agent for Service

Address

CORPORATE SEAL (CONTRACTOR) CORPORATE SEAL (SURETY)

If the Contractor is operating under an assumed business name, there must also be set forth in the first paragraph of the bond the names of all the partners or the individual owning the business, and the bond must be executed by one of them.

If the Contractor is a corporation, the bond must be executed by one of the officers authorized to execute bonds, showing its official title and the seal of the corporation.

If the Contractor is a limited liability company, the bond must be executed by one of the Members and/or Managers authorized to execute bonds, showing its official title and the seal of the corporation, if any.

The bond must be executed by an Attorney-In-Fact for the surety company, show on the face thereof the Oregon agent for service, and bear the seal of the surety company. Where the bond is executed by an agent, there must be included a certified copy of the authority of the agent to act for the surety company at the time of the execution of the bond.

The bond must be issued by a Surety authorized to issue such bonds in the State of Oregon and that is named on the current list of approved surety companies acceptable on federal bonds as published in the Federal Register by the audit staff, Bureau of Accounts, United States Treasury Department.

END OF SECTION

**SECTION 00 43 36
PROPOSED SUBCONTRACTORS**

PART 1 FIRST-TIER SUBCONTRACTOR DISCLOSURE

Instructions for First-Tier Subcontractor Disclosure. Each Bidder must submit a First-tier Subcontractor Disclosure Form in accordance with ORS 279C.370 using the form provided in specification Section 00 43 37, First-tier Subcontractor Disclosure Form. If the Bidder will not be using any subcontractors that are subject to the disclosure requirements, the Bidder is **required** to indicate “NONE” on the accompanying form.

Failure to submit a First-tier Subcontractor Disclosure Form within two (2) hours after the date and time when Bids are due will be cause for rejection of the Bid.

PART 2 NON-FIRST TIER SUBCONTRACTORS

On the form found in specification Section 00 43 38 Non-first tier Subcontractor Form, list the name, business address, and portion of Work (description of Work to be done) for each proposed subcontractor who Bidder desires to use in the Work if the Bidder is awarded the Contract, and who is not identified on the First-Tier Subcontractor Disclosure Form. No subcontractor doing work exceeding 10,000 dollars or one percent (1%) of the total amount of the Bid and who is not listed shall be used without the written approval of the Owner.

END OF SECTION

**SECTION 00 43 37
FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM**



PROJECT NAME: _____

PROJECT #: _____

BID CLOSING: Date: _____ Time: _____

This form must be submitted at the location specified in the Invitation to Bid on the advertised bid closing date and within two hours after the advertised bid closing time. List below the name of each subcontractor who will be furnishing labor, or labor and materials who 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 who need to be disclosed.**

(ATTACH ADDITIONAL SHEETS IF NEEDED.)

NAME	DOLLAR VALUE	CATEGORY OF WORK
(1)	\$	
(2)	\$	
(3)	\$	
(4)	\$	
(5)	\$	
(6)	\$	
(7)	\$	
(8)	\$	

Failure to submit form by the disclosure deadline will result in a non-responsive bid which will not be considered for award.

Form submitted by (bidder name): _____

Contact name: _____ Phone no.: () _____

ORS 279C.370 First-tier subcontractor disclosure. (1)(a) Within two hours after the date and time of the deadline when bids are due to a contracting agency for a public improvement contract, a bidder must submit to the contracting agency a disclosure of the first-tier subcontractors who:

- (A) Will be furnishing labor or will be furnishing labor and materials in connection with the public improvement contract; and
- (B) Will have a contract value that is equal to or greater than five percent of the total project bid or \$15,000, whichever is greater, or \$350,000 regardless of the percentage of the total project bid.
 - (b) For each contract to which this subsection applies, the contracting agency shall designate a deadline for submission of bids that has a date on a Tuesday, Wednesday or Thursday and a time between 2 p.m. and 5 p.m., except that this paragraph does not apply to public contracts for maintenance or construction of highways, bridges or other transportation facilities.
 - (c) This subsection applies only to public improvement contracts ("**projects**") with a value estimated by the contracting agency of more than **\$100,000**.
 - (d) This subsection does not apply to public improvement contracts exempted from competitive bidding requirements under ORS 279C.335(2).
- (2) The disclosure of first-tier subcontractors under subsection (1) of this section must include the name of each subcontractor, the category of work that each subcontractor will perform and the dollar value of each subcontract.
- (3) A contracting agency must accept a subcontractor disclosure. The contracting agency must consider the bid of any bidder who does not submit a first-tier subcontractor disclosure form to the contracting agency to be a non-responsive bid and may not award the contract to the contractor. A contracting agency is not required to determine the accuracy or the completeness of the subcontractor disclosure.
- (4) After bids are opened, the subcontractor disclosures must be made available for public inspection.
- (5) A contractor may substitute a first-tier subcontractor under the provisions of ORS 279C.585.
- (6) A subcontractor may file a complaint under ORS 279C.590 based on the disclosure requirements of subsection (1) of this section.

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SECTION 00 43 38
NON-FIRST TIER SUBCONTRACTOR FORM

The following information gives the name, business address, and portion of Work (description of Work to be done) for each subcontractor who Bidder desires to use in the Work, and who is not listed on the First-tier Subcontractor Disclosure Form, if Bidder is awarded the Contract. No subcontractor doing work exceeding 10,000 dollars or one percent (1%) of the total amount of the Bid and who is not listed will be used without the written approval of the Owner. **This form must be submitted within two (2) working hours following the date and time when Bids are due.**

(IF NEEDED, ADD ADDITIONAL SHEETS)

CATEGORY OF WORK: _____

Name: _____

Subcontractor's Construction Contractors Board Registration Number _____

CATEGORY OF WORK: _____

Name: _____

Subcontractor's Construction Contractors Board Registration Number _____

CATEGORY OF WORK: _____

Name: _____

Subcontractor's Construction Contractors Board Registration Number _____

CATEGORY OF WORK: _____

Name: _____

Subcontractor's Construction Contractors Board Registration Number _____

Bidder: _____ **Date:** _____
(Signature)

**SECTION 00 43 93
BID SUBMITTAL CHECKLIST**

THE FOLLOWING FORMS ARE TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID, USING THE FORMS INCLUDED IN THE BID DOCUMENTS;

1. BID FORM – SPECIFICATION SECTION 00 41 00

The Bid prices must be shown in the spaces provided. Show prices in both words and numerical figures. Complete the statement of residency and acknowledgment of receipt of Addenda included in the Bid form.

2. BID SECURITY – SPECIFICATION SECTION 00 43 13

Each Bidder must submit Bid Security with his Bid, in the amount of ten percent (10%) of the base Bid, in accordance with ORS 279C.365.

3. PROPOSED EQUIPMENT AND SYSTEMS – SPECIFICATION SECTION 00 43 33

Each Bidder must submit Bid Security with his Bid, in the amount of ten percent (10%) of the base Bid, in accordance with ORS 279C.365.

4. FIRST-TIER SUBCONTRACTOR DISCLOSURE – SPECIFICATION SECTION 00 43 37

Bidder must submit a Disclosure of any First Tier Subcontractors and Other Subcontractors either enclosed with the Bid or within two (2) working hours of Bid closing.

5. NON-FIRST TIER SUBCONTRACTOR FORM – SPECIFICATION SECTION 00 43 38

Bidder must submit a list of proposed, non-first tier subcontractors within two (2) hours of the date and time when Bids are due.

6. NON-COLLUSION AFFIDAVIT – SPECIFICATION SECTION 00 45 19

To be executed and submitted by Bidder.

7. CERTIFICATION OF COMPLIANCE WITH ORS CHAPTER 279C – SPECIFICATION SECTION 00 45 46

To be executed and submitted by Bidder.

MWMC PRIMARY CLARIFIER AND
FINAL TREATMENT CONCRETE REPAIR

**THE FOLLOWING INFORMATION IS TO BE SUBMITTED BY THE THREE (3)
APPARENT LOW BIDDERS WITHIN FIVE (5) CALENDAR DAYS FOLLOWING
OPENING OF BIDS:**

1. STATEMENT OF THE BIDDER'S EXPERIENCE

Information regarding the Bidder's experience and qualifications, experience of key personnel and other information requested by Owner to show qualification to be awarded the Contract (see the Invitation to Bid.)

**THE FOLLOWING FORMS ARE TO BE EXECUTED AND SUBMITTED BY THE
SUCCESSFUL BIDDER WITHIN 10 CALENDAR DAYS AFTER THE CONTRACT
IS AWARDED:**

1. CONTRACT – SPECIFICATION SECTION 00 52 00

This Contract is to be executed by the successful Bidder and submitted in the required number of copies.

2. PERFORMANCE BOND – SPECIFICATION SECTION 00 61 14

To be executed by the successful Bidder and Bidder's surety company.

3. PAYMENT BOND – SPECIFICATION SECTION 00 61 15

To be executed by the successful Bidder and Bidder's surety company.

4. AFFIDAVIT – SPECIFICATION SECTION 00 45 47

To be executed by the authorized representative of successful Bidder's surety company.

5. WARRANTY FORM – SPECIFICATION SECTION 00 65 36

To be executed by the successful Bidder.

6. INSURANCE CERTIFICATES

Satisfactory to the Owner. Please carefully read the requirements for the Insurance Certificates as contained in the General Conditions of the Bid Documents (Specification Section 00 72 00, General Conditions).

MWMC PRIMARY CLARIFIER AND
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**SECTION 00 45 19
NON-COLLUSION AFFIDAVIT**

NON-COLLUSION AFFIDAVIT TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID

The undersigned states that this Bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the Bid is genuine and not collusive or sham; that the Bidder has not directly or indirectly induced or solicited any other Bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the Bid price of the Bidder or any other Bidder, or to fix any overhead, profit, or cost element of the Bid price, or of that of any other Bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the Bid are true; and, further, that the Bidder has not, directly or indirectly, submitted his, her, or its Bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

(Signature of Affiant)

State of Oregon)
)ss.
County of)

On _____, 201_, _____, personally

Appeared before me, Notary Public,

Personally known to me OR provided to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

(Signature of Notary Public)

END OF SECTION

PART 2

CONTRACTING REQUIREMENTS

MWMC PRIMARY CLARIFIER AND
FINAL TREATMENT CONCRETE REPAIR

SECTION 00 45 46
BIDDER'S CERTIFICATIONS OF COMPLIANCE WITH
ORS CHAPTER 279C REQUIREMENTS

Project Name: Primary Clarifier and Final Treatment Concrete Repair

Project No. P80118

The undersigned Bidder certifies that:

- 1) Throughout the period of the Contract, Bidder shall be licensed by the State of Oregon to do the type of work required under terms of the Contract Documents;
- 2) Bidder is skilled, experienced and regularly engaged in the general class and type of work called for in the Contract Documents and has the manpower and resources to satisfactorily perform such work;
- 3) Prior to commencing work under this Contract, all subcontractors under this Contract will be licensed by the Oregon Construction Contractor's Board or State Landscape Contractor's Board, if applicable;
- 4) Bidder is currently in compliance with all Oregon tax laws and will remain in compliance throughout the period of the Contract;
- 5) Bidder has not and will not in obtaining any required subcontracts discriminate against any a) minority; b) women; c) emerging small business enterprise certified under ORS 200.005; or d) a business enterprise that is owned or controlled by or that employs a disabled veteran, as defined in ORS 408.225; and
- 6) Bidder will comply with the provisions of ORS 279C.840 or 40 U.S.C. 276a.
- 7) Bidder certifies that it has and will continue during the term of this contract an employee drug testing program as required by ORS 279C.505 (2).

Signed this ____ day of _____, 202__.

Name of Bidder

Signature of Bidder

Title of Signatory

END OF SECTION

MWMC PRIMARY CLARIFIER AND
FINAL TREATMENT CONCRETE REPAIR

SECTION 00 45 47
AFFIDAVIT

STATE OF OREGON
County of Lane

I, _____, being first duly sworn on oath
depose and say that I am (Attorney-In-Fact) (Agent)

of _____, Surety on the attached

Contract on _____

Executed by _____
(Contractor)

Affiant further deposes and says that no officer, official, or employee of the Owner has any interest directly or indirectly, or is receiving any premium, commission, fee or other thing of value on account of the same or furnishing of the bond, undertaking or contract of indemnity, guaranty, or suretyship in connection with the above-mentioned Contract.

(Affiant)

Subscribed and sworn to before me this _____ day of _____, 201__.

Notary Public for Oregon

My Commission expires: _____

END OF SECTION

MWMC PRIMARY CLARIFIER AND
FINAL TREATMENT CONCRETE REPAIR

SECTION 00 52 00
CONTRACT

This Contract, made and entered into by and between the Metropolitan Wastewater Management Commission, hereinafter called the "Owner," and _____ (Contractor's Name) of _____ (Contractor's City and State) hereinafter called the "Contractor;"

WITNESSETH:

The Contractor, in consideration of the sum to be paid by the Owner and of the covenants and agreements herein contained, hereby agrees at its own proper cost and expense to do all the Work and furnish all the materials, tools, labor, transportation, and all appliances, machinery and appurtenances for construction to the extent of the Contract Documents, dated this _____ day of _____, 2026.

The BIDDING REQUIREMENTS, the BID FORM, the CONTRACT FORMS, the GENERAL CONDITIONS, the PERFORMANCE AND PAYMENT BONDS, the SPECIFICATIONS, DRAWINGS, and ADDENDA entitled "Contract Documents for the Construction of Primary Clarifier and Final Treatment Concrete Repair Contract Project P80118" dated March 20, 2026, are hereby referred to and by reference made a part of this Contract as fully and completely as if the same were fully set forth herein and are mutually cooperative therewith.

In consideration of the performance of the Work as set forth in these Contract Documents, the Owner agrees to pay to the Contractor the amount bid in the Bid Form as adjusted in accordance with the Contract Documents, or as otherwise herein provided, and to make such payments in the manner and at the times provided in the Contract Documents.

CONTRACT TIME

The Contractor agrees to complete the Work in the manner described in the Contract Documents, and within the time specified below subject to adjustments of the Contract Time as provided for in the Contract Documents, for the following Schedules. The Contractor agrees to accept as full payment hereunder the amounts computed as determined by the Contract Documents.

Milestone 1: The Work must be Substantially Completed on or before September 30, 2030. The Work must be completed in all respects and ready for final payment in accordance with Specification Section 00 72 00, General Conditions of the Contract, on or before 60 days following the date of Substantial Completion.

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Milestone 2: Structural rehab and associated Work for one chlorine contact basin and one covered primary clarifier must be completed on or before September 30, 2027.

Milestone 3: Structural rehab and associated Work for one chlorine contact basin and one covered primary clarifier must be completed on or before September 30, 2028.

Milestone 4: Structural rehab and associated Work for one chlorine contact basin and final treatment effluent channel must be completed on or before September 30, 2029.

Milestone 5: Structural rehab and associated Work for one chlorine contact basin must be completed on or before September 30, 2030.

LIQUIDATED DAMAGES

The Contractor agrees that the damages for delay sustained by the Owner by reason of the Contractor's failure to timely perform its obligations under this Contract and within the time noted above are difficult, if not impossible, to ascertain. The Contractor also agrees that liquidated damages in the amounts shown below for each schedule are reasonable in light of the anticipated or actual harm which may be caused by the delay, the difficulties of proving loss, and the inconvenience or nonfeasibility of otherwise obtaining an adequate remedy for delay. Such liquidated damages shall not be the exclusive remedy of the Owner but shall be in addition to any other remedies Owner may have for breach of this Contract and shall be in addition to any actual provable damages, other than for delay, sustained by Owner by reason of a breach of this Contract by the Bidder. Saturdays, Sundays and any other Oregon legal holidays shall be excluded in determining days in default.

Liquidated Damages for Milestone 1: Five Hundred Dollars (\$500) for each day or partial day that begins after the time specified herein for Substantial Completion, subject to adjustments of the Contract Time as provided for in the Contract Documents, until the Work is Substantially Complete.

After Substantial Completion, if the Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner the following Liquidated Damages noted below for each Schedule:

Liquidated Damages for Milestone 2, 3, 4 and 5: One Thousand Dollars (\$1,000) for each day or partial day that begins after the time specified herein for final completion and readiness for final payment, subject to adjustments of the Contract Time as provided for in the Contract Documents, until the Work is completed and ready for final payment.

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The Contractor agrees to remedy all defects appearing in the Work or developing in the materials furnished and the workmanship performed under this Contract for the period of time as specified by the Contract Documents, and, to the greatest extent permitted by law, the Contractor further agrees to defend, indemnify and save the Owner harmless from any expenses encountered in remedying such defects.

IN WITNESS WHEREOF, we, the parties hereto, each herewith subscribe the same on the dates set forth below.

METROPOLITAN WASTEWATER
MANAGEMENT COMMISSION

By _____

Title _____

dated the ____ day of _____, 20____.

Contractor _____

By _____

Title _____

dated the ____ day of _____, 20____.

APPROVED AS TO FORM

Attorney

END OF SECTION

MWMC PRIMARY CLARIFIER AND
FINAL TREATMENT CONCRETE REPAIR

SECTION 00 61 14
PERFORMANCE BOND FORM

KNOW ALL MEN AND WOMEN BY THESE PRESENTS, that we,
_____ as Principal, and _____,
a corporation organized and existing under the laws of the State of _____ and
duly authorized to transact a surety business in the State of Oregon, as Surety, are held and
firmly bound unto the Metropolitan Wastewater Management Commission in the penal sum of
_____ Dollars, (\$) _____
lawful money of the United States of America, for the payment of which we and each of us,
jointly and severally, bind ourselves, our heirs, executors, administrators, successors and assigns,
firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT whereas the above-mentioned
Principal accepted the award of a Contract with the Metropolitan Wastewater Management
Commission for the construction of the Primary Clarifier and Final Treatment Structural Repair
Contract, P80118, and which Contract hereby is made a part hereof as if fully copied herein;

NOW, THEREFORE, if the Principal faithfully, punctually and completely performs and abides
by all covenants, conditions and agreements of said Contract, including all modifications thereof
and with the laws, ordinances, regulations and orders of the State of Oregon, the United States,
and the agencies, subdivisions and municipalities thereof, directly or indirectly governing or
applicable to the Principal's performance under said Contract, including but not limited to,
ORS 279C.505, ORS 279B.220; ORS 279B.230; and ORS 279B235 which is hereby made part
hereof as if fully copied herein, then this obligation shall be null and void, otherwise it shall
remain in full force and effect.

After the Owner has declared the Contractor to be in default and formally terminated the
Contractor's right to complete the Contract, the Surety shall promptly, but no later than
30 calendar days after receiving written notice of the Contractor default and termination, at the
Surety's expense, take one of the following actions:

1. Arrange for the Contractor, with the consent of the Owner, to perform and complete
the Contract;
2. To perform and complete the Contract itself, through its agents or through independent
contractors; or
3. Obtain bids or negotiated proposals from qualified contractors acceptable to the
Owner, for a contract for performance and completion of the Contract, arrange a contract
to be prepared for execution by the Owner and the contractor selected with the Owner's
concurrence, to be secured with performance and payment bonds executed by a qualified
surety equivalent to the bonds issued on the Contract.

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Under all of the options listed above, Surety shall remain liable to the Owner for the payment of damages, including but not limited to liquidated damages, and additional legal, design consultant and engineering expenses resulting from the Contractor's default and/or resulting from the actions or failure to act of the Surety under this performance bond.

Surety agrees (1) that no extension of time allowed the Principal, with or without notice to the Surety, for completion of work or for delivery under said Contract shall impair this obligation or reduce any period of maintenance or warranty provided in said Contract; (2) that no change made in the terms or provisions of said Contract, with or without notice to the Surety, shall impair this obligation, but any such change shall automatically increase the obligation of the Surety hereunder in a like amount, PROVIDED that such increase shall not exceed twenty-five percent (25%) of the original amount of this obligation without consent of the Surety; and (3) that this obligation shall continue to bind the Principal and Surety notwithstanding successive payments made hereunder for successive breaches, until the full amount of this obligation is exhausted.

Surety further agrees that no termination or cancellation of this bond shall relieve the Surety from its obligation hereunder for the Principal's performance prior to the termination or cancellation.

IN WITNESS HEREOF, the Principal and Surety have caused these presents to be executed this _____ day of _____, 20____.

Principal

By _____

Title _____

APPROVED AS TO FORM:

Surety

By _____

Attorney-In-Fact

MWMC PRIMARY CLARIFIER AND
FINAL TREATMENT CONCRETE REPAIR

COUNTERSIGNED:

Oregon Resident Agent (signature)

Print Name

Address

Phone No.:

Email Address

If the Principal is operating under an assumed business name, there must also be set forth in the first paragraph of the bond, the names of all the partners or the individual owning the business, and the bond must be executed by one of them.

If the Principal is a corporation, the bond must be executed by one of the officers authorized to execute bonds, showing its official title and the seal of the corporation.

If the Principal is a limited company (LLC), the bond must be executed by one of the Members or Managers authorized to execute bonds, showing his/her official title and seal of the LLC.

The bond must be executed by an Attorney-In-Fact for the surety company, show on the face thereof the Oregon agent for service, and bear the seal of the surety company. Where the bond is executed by an agent, there must be included a certified copy of the authority of the agent to act for the surety company at the time of the execution of the bond.

To each executed original of this bond, there must be attached a complete set of Contract Documents, with all corrections, interlineations, signatures, etc., completely reproduced herein.

The performance bond shall be executed by a surety company authorized to carry on business in the State of Oregon and named on the current list of approved surety companies acceptable on federal bonds as published in the Federal Register by the Audit Staff, Bureau of Accounts, U.S. Treasury Department.

END OF SECTION

MWMC PRIMARY CLARIFIER AND
FINAL TREATMENT CONCRETE REPAIR

SECTION 00 61 15
PAYMENT BOND FORM

KNOW ALL MEN AND WOMEN BY THESE PRESENTS that we, _____,
as Principal, and _____ a corporation
organized and existing under the laws of the State of _____ and
duly authorized to transact a surety business in the State of Oregon, as Surety, are held and
firmly bound unto the Metropolitan Wastewater Management Commission in the penal sum of
_____ Dollars (\$ _____)
lawful money of the United States of America, for the payment of which we and each of us,
jointly and severally, bind ourselves, our heirs, executors, administrators, successors and assigns,
firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT whereas the above-mentioned
Principal accepted the award of a Contract with the Metropolitan Wastewater Management
Commission for the construction of the Primary Clarifier and Final Treatment Structural Repair,
Contract P80118, and which Contract hereby is made a part hereof as if fully copied herein;

NOW, THEREFORE, if the Principal shall make payment promptly, as due, to all subcontractors
and to all persons supplying to the Principal or its subcontractors equipment, supplies, labor or
materials for the prosecution of the work, or any part thereof, provided for in said Contract, then
this obligation shall be null and void, otherwise it shall remain in full force and effect.

Upon receipt of a written claim on this payment bond, the Surety shall promptly, at its expense,
send an answer to the claimant with a copy to the Owner, within forty-five (45) calendar days
after receipt of the claim, stating the amounts that are undisputed and the basis for challenging
any amounts that are disputed and pay or arrange for payment of any undisputed amounts. The
Owner shall not be liable for payment of any costs or expenses of any claimant under this
payment bond and shall have no obligations to make payment to, give notices on behalf of, or
otherwise have obligations to claimants or Surety under this bond.

Surety agrees (1) that no extension of time allowed the Principal, with or without notice to the
Surety, for completion of work or for delivery under said Contract shall impair this obligation or
reduce any period of maintenance or warranty provided in said Contract; (2) that no change
made in the terms or provisions of said Contract, with or without notice to the Surety, shall
impair this obligation, but any such change shall automatically increase the obligation of the
Surety hereunder in a like amount, PROVIDED that such increase shall not exceed twenty five
percent (25%) of the original amount of this obligation without consent of the Surety; and (3)
that this obligation shall continue to bind the Principal and Surety notwithstanding successive
payments made hereunder for successive breaches, until the full amount of this obligation is
exhausted.

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Surety further agrees that no termination or cancellation of this bond shall relieve the Surety from its obligation hereunder for the Principal's performance prior to the termination or cancellation.

IN WITNESS HEREOF, the Principal and Surety have caused these presents to be

executed this _____ day of _____, 20____.

Principal

By _____

Title _____

APPROVED AS TO FORM:

Surety

By _____

Attorney-In-Fact

COUNTERSIGNED:

Oregon Resident Agent (signature)

Print Name

Address

Phone No.:

Email Address

If Principal is operating under an assumed business name, there must also be set forth in the first paragraph of the bond, the names of all the partners or the individual owning the business, and the bond must be executed by one of them.

If the Principal is a corporation, the bond must be executed by one of the officers authorized to execute bonds, showing its official title and the seal of the corporation.

If the Principal is a limited liability company (LLC), the bond must be executed by one of the Members or Managers authorized to execute bonds, showing his/her official title and seal of the LLC.

**MWMC PRIMARY CLARIFIER AND
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The bond must be executed by an Attorney-In-Fact for the surety company, show on the face thereof the Oregon agent for service, and bear the seal of the surety company. Where the bond is executed by an agent, there must be included a certified copy of the authority of the agent to act for the surety company at the time of the execution of the bond.

To each executed original of this bond, there must be attached a complete set of Contract Documents, with all corrections, interlineations, signatures, etc., completely reproduced therein.

The Payment Bond shall be executed by a surety company authorized to carry on business in the State of Oregon and named on the current list of approved surety companies acceptable on federal bonds as published in the Federal Register by the Audit Staff, Bureau of Accounts, U.S. Treasury Department.

END OF SECTION

MWMC PRIMARY CLARIFIER AND
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SECTION 00 61 23
RETAINAGE SURETY BOND FORM

KNOW ALL BY THESE PRESENTS: That _____, a _____ authorized to do business in the State of Oregon, as Principal, and _____, a corporation organized and existing under the laws of the State of _____ and authorized to transact the business of surety in the State of Oregon, as Surety, are jointly and severally held and bound to _____ (“Obligee”) and _____ (“Owner”), and their lenders, heirs, executors, administrators, successors and assigns in the penal sum of \$_____, plus _____% (not more than five percent) of any increases in the contract amount that may occur because of change orders or increases in the quantities of or that addition of any new item of work.

WHEREAS the Principal has executed a contract for _____ with the Obligee; and

WHEREAS Oregon law allows the Obligee to withhold from the Principal a sum equivalent to _____% (not more than five percent) from moneys the Principal earns on estimates or progress payments during the progress of the work (“Earned Retained Funds”); and

WHEREAS the Principal has requested that the Obligee or Owner accept a surety bond in lieu of Earned Retained Funds as allowed under ORS 279C.560 or 701.435;

NOW, THEREFORE, this obligation is such that the Surety and the Surety’s successors and assigns are held and bound to Obligee, Owner and any lender, and to all beneficiaries for the sum set forth in the first paragraph of this retainage surety bond. This surety bond and any proceeds from this surety bond are subject to all claims and liens by the Obligee against the Principal in the same manner and priority as specified for retainage under ORS 279C.550 to 279C.570, 279C.600 to 279C.625 and 701.420, as applicable. The condition of this obligation is such that if the Principal satisfies all payment obligations to any Obligee that may lawfully claim against project sums due to the Principal and indemnify and hold the Obligee harmless from any and all loss, costs and damages that the Obligee may sustain by release of the retainage to the Principal or Surety, this obligation is null and void if the Obligee notifies the Surety that the Obligee released the obligation. The obligation otherwise remains in full force and effect.

IT IS HEREBY DECLARED AND AGREED that the Surety is liable under this obligation in the same manner and to the same extent as is Principal. The Surety will not be discharged or released from liability for any act, omission or defense of any kind or nature that would not also discharge the Principal.

IT IS HEREBY FURTHER DECLARED AND AGREED that this obligation is binding upon and inures to the benefit of the Principal, the Surety, the Obligee, the Owner, any lender and the

MWMC PRIMARY CLARIFIER AND
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beneficiaries of this obligation and their respective heirs, executors, administrators, successors
and assigns.

SIGNED AND SEALED this _____ day of _____, 20_____

Principal _____

Surety _____

Name _____

Name _____

Title _____

Title _____

Address _____

Address _____

City/State/Zip _____

City/State/Zip _____

Phone _____

Phone _____

MWMC PRIMARY CLARIFIER AND
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**SECTION 00 65 36
WARRANTY FORM**

We guarantee Owner's project Primary Clarifier and Final Treatment Concrete Repair P80118 as constructed for a period of two (2) years from final acceptance of the work, in compliance with Part 4 of specification Section 00 72 00, General Conditions of the Contract, regarding guarantee/warranty requirements, except as otherwise stipulated in specification Section 00 72 00, General Conditions of the Contract.

We agree to correct defective Work and in the event of our failure to comply within a reasonable time after being notified, or should the exigencies of the case require repairs or replacements to be made before we can be notified or respond to notification, we do hereby authorize MWMC to proceed to have the defective Work corrected and made good at our expense, and we will pay upon demand the cost thereof including such applicable costs and expenses.

This warranty shall not be in lieu of but shall be in addition to other warranties or other obligations otherwise imposed by the Contract Documents and by law. Also see Part 4 of specification Section 00 72 00, General Conditions of the Contract, regarding guarantee/warranty requirements.

Contractor: _____

Signed: _____
(Authorized Representative)

Title: _____
(Authorized Representative)

Date: _____

END OF SECTION

MWMC PRIMARY CLARIFIER AND FINAL
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GENERAL CONDITIONS

PART 1 GENERAL INFORMATION

1.A. DEFINITIONS

Where used in the Contract Documents, the following words and terms have the meanings indicated. The meanings apply to the singular, plural, masculine and feminine of the words and terms.

ACCEPTANCE. "Acceptance" occurs when all of the following conditions are satisfied: (1) the Owner has determined that the Work has been completed in accordance with the Contract; (2) Owner has approved the Work; and (3) the Project Manager has notified Contractor in writing of the acceptability of the Work.

ACT OF GOD. A cataclysmic phenomenon of nature, such as an earthquake, flood or cyclone. Rain, wind, high water, or other natural phenomenon that might reasonably have been anticipated from historical records of the general locality of the Work shall not be construed as acts of God.

ADDENDA. Supplemental written Specifications or Drawings issued prior to execution of the Contract which modify or interpret the Contract Documents by addition, deletion, clarification or correction.

ARCHITECT. The term architect means the Design Consultant. [NTS: REMOVE IF THE ARCHITECT IS NOT THE PRIME CONSULTANT]

BID. Offer of a Bidder submitted on the prescribed form setting forth prices of the Work to be performed. Also referred to as "Bid Form."

BIDDER. Individual, partnership, limited liability company, corporation, or a combination thereof, including joint ventures offering a Bid to perform the Work.

BID DOCUMENTS. The bidding forms provided by the Owner, including, but not limited to, the Bid Form, Bid, Bid Bond, Proposed Subcontractors and Certification of Bidder's Experience, Qualifications and Knowledge of Peculiar Risks.

CHANGE ORDER. A written order issued by Owner to Contractor requiring a change in the Work.

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CHANGE REQUEST. A request by the Owner or Project Manager for a written price quotation from Contractor for a proposed change to the Contract. The Owner may or may not accept the written Contractor proposal.

CONTRACT. The writings and drawings embodying the legally binding obligations between Owner and Contractor for completion of the Work described in the Contract Documents.

CONTRACT DOCUMENTS. Those Documents listed below, and all other documents incorporated by specific reference thereto including, but not necessarily limited to:

- Specifications, including Division 00
- Drawings
- Addenda
- Completed Bid Form
- Completed First-tier Subcontractor Disclosure
- Completed non-first Tier Subcontractor Form
- Completed Bidder's Certificate of Compliance
- Completed Affidavits
- Completed Agreement Form
- Completed Warranty Form and other Warranties
- Bonds
- Certificates of Insurance
- Notice of Final Award
- Notice to Proceed
- Directives
- Change Orders

CONTRACT DRAWINGS. All Drawings included in the Contract Documents plus those prepared by the Owner and the Contractor pursuant to the terms of the Contract. They include:

- a. Drawings issued with Bid Documents
- b. Supplemental Drawings issued by Addenda
- c. Drawings submitted by Owner and accepted by Contractor during progress of Work

CONTRACT SUM. Amount payable to the Contractor under the terms and conditions of the Contract, based on the price given on the Bidding Schedule, with adjustments made in accordance with the Contract. The base amount given in the Bidding Schedule shall be either a lump sum bid, or the summation of the unit price bids multiplied by the estimated quantities set forth in the Bid Form.

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CONTRACT TIME. Number of days stated in the Contract Documents for completion of the Work.

CONTRACTOR. The individual, partnership, limited liability company, corporation or combination thereof including joint ventures that enter into the Contract with Owner for the performance of the Work.

CONTRACTOR'S PLANT AND EQUIPMENT. Equipment, material, suppliers, and all other items, except labor, brought onto the job Site by Contractor to carry out the Work, but not to be incorporated in the Work.

DAY. Calendar day.

DEFECTIVE. 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 Project Manager's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with the Contract Documents).

DESIGN CONSULTANT. The person(s) so designated in writing by Owner in the Contract Documents and/or during the construction Project.

DIRECT. Action of the Owner or Project Manager by which the Contractor is ordered to perform or refrain from performing Work under the Contract.

DIRECT COSTS. The cost of: (1) materials, including sales tax; (2) delivery; (3) labor, including social security, old age and unemployment insurance, and fringe benefits required by agreement or custom; (4) workers' compensation insurance; (5) project specific insurance; (6) bond premiums; (7) rental cost of equipment and machinery required for execution of the Work; and (8) additional costs of field personnel directly attributable to the Work.

DIRECTIVE or CONSTRUCTION CHANGE DIRECTIVE. Written documentation of the actions of the Owner or Owner's Representative in directing Contractor. Each "Directive" will only be issued by way of a written document with the title "Directive" or "Construction Change Directive."

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DRAWINGS. Also referred to as “Plans.” That part of the Contract Documents consisting of the graphical and technical requirements of the Contract as included on the plan sheets. Drawings, or reproductions thereof, show the location, character, dimensions and details of the Work to be done. Shop drawings and other Contractor submittals are not Drawings as so defined.

ENGINEER. The term Engineer means Design Consultant.

FIELD REPRESENTATIVE. The Field Representative shall be the person(s) so designated in writing by the Owner at the pre-construction meeting and/or during the construction Project.

FINAL COMPLETION. Occurs upon issuance, by the Project Manager, of the written Notice of Final Completion, which confirms completion of all Project Work.

FIRST-TIER SUBCONTRACTOR. Those Subcontractors that will be contracting directly with the Contractor.

FURNISH. To deliver to the job Site or other specified location any item, equipment or material.

HOLIDAYS. Legal holidays designated by the State of Oregon or specifically identified in the Special Provisions.

INSTALL. Placing, erecting, or constructing complete in place, any item, equipment or material.

LIQUIDATED DAMAGES: Specified monetary damages assessed against the Contractor for certain damages to the Owner. See Part 6.B.4.c of these General Conditions.

MAY. Refers to permissive actions or that a party is authorize to take an action or forbear from action.

MILESTONE. A principal event specified in the Contract Documents relating to an intermediate completion date of a separately identifiable part of the Work or a period of time within which the separately identifiable part of the Work should be performed prior to Substantial Completion of all the Work.

MWMC. Refers to the Metropolitan Wastewater Management Commission.

NOTICE OF AWARD. A written notice issued by the Owner stating that the Contract has been awarded to Contractor.

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NOTICE OF FINAL COMPLETION. A written notice issued by the Project Manager for the signature of the Contractor and the Owner's Representative, that confirms completion of all Project Work.

NOTICE OF INTENT TO AWARD. A written notice issued by the Owner stating that Owner intends to award the Contract to Contractor.

NOTICE TO PROCEED. A written notice issued by the Owner stating that the Contractor shall commence Work on the Project.

OVERHEAD. Those items which may be included in the Contractor's markup (general and administrative expenses and profit) and that shall not be charged as Direct Cost of the Work, including without limitation such Overhead expenses as wages or salary of personnel above the level of foreman (i.e. superintendents and project managers) and expenses of Contractor's offices at the job Site (e.g. job trailer) including expenses of personnel staffing the job Site office.

OWNER. The Metropolitan Wastewater Management Commission located at Springfield City Hall, 225 Fifth Street, Springfield, Oregon 97477.

OWNER'S REPRESENTATIVE. Any agent, employee, or representative of the OWNER acting with actual authority on behalf of the OWNER during the performance of the Work. This includes, but is not limited to, the Project Manager, Field Representative, or Design Consultant.

PERSON. Firms, companies, corporations, partnerships and joint ventures.

PROJECT. The undertaking to be performed under the provisions of the Contract.

PROJECT MANAGER. The Project Manager shall be the person(s) so designated in writing by the Owner. The Owner initially designates Matt Dapkus of the City of Springfield as the Project Manager.

PROVIDE. Furnish and install complete in place, any item, equipment or material.

PUBLIC WORKS. Those projects as set forth in Oregon Revised Statutes 279C.800 (6).

PUNCH LIST. List of incomplete items of Work, incomplete administrative requirements and items of Work which are not in conformance with the Contract, prepared by the Project Manager and issued to the Contractor as an attachment to the Certificate of Substantial Completion.

REQUEST FOR INFORMATION. Also referred to as "Request for Clarification". A Request for Information (RFI) or Contractor RFI (CRFI) requests additional

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information necessary to clarify or amplify an item in the Contract Documents that is believed to not be clearly shown or called for in the Drawings or Specifications or other portions of the Contract Documents, or to address problems which have arisen under field conditions. An RFI is not to be used for request for materials/equipment substitutions or value Project Managing/cost reduction incentive proposals.

RESPONSIBLE. Means meeting the standards set forth in MWMC Rule 137-046-0110 or 137-049-0390(2), and not debarred or disqualified by the Contracting Agency under MWMC Rule 137-047-0575 or 137-049-0370.

RESPONSIVE. Means having the characteristic of substantial compliance in all material respects with applicable solicitation requirements.

SHALL. Means a mandatory obligation or duty the assigned party must perform.

SHOWN. Refers to information presented on the Drawings, with or without references to the Drawings.

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 for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.

SPECIFICATIONS. That part of the Contract Documents consisting of written descriptions of the technical features of materials, equipment, construction systems, standards and workmanship.

SUBCONTRACTOR. A subcontractor is a person or entity who has a direct contract with the Contractor or a sub-tier subcontractor who has a direct contract with a subcontractor to perform any of the Work associated with the Project. The term subcontractor means a subcontractor or subcontractor's authorized representative. The term subcontractor does not include any separate contractor or any separate contractor's subcontractors.

SUBMITTALS. The information which is specified for submission to the Owner's Representative in accordance with Specification Section 01 33 00 Submittal Procedures, and Part 3.D of these General Conditions of the Contract.

SUBSTANTIAL COMPLETION. Substantial Completion establishes the change of ownership from the Contractor to the Owner as follows: That degree of completion of the Project, or portion of the Project sufficient to provide the Owner the full-time use of the Project, or portion of the Project, for the purpose for which it was intended. Determination of Substantial Completion is solely at the discretion of the Project Manager and is evidenced by Project Manager's written notice of Substantial Completion. Substantial Completion does not mean complete in accordance with the

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Contract nor shall Substantial Completion of all or any part of the Project entitle the Contractor to Acceptance under the Contract. The criteria the Project Manager may use in exercising his/her discretion in determining Substantial Completion includes, but is not limited to, the completion of all equipment contained in the Project, or portion of the Project, and all other components necessary to enable the Owner to operate the facility in the manner that was intended, and all items in the following table as they relate to the Project or portion thereof:

Specification section	Description
Drawings, various specifications	Completion of construction of all structures; equipment; piping; electrical, instrumentation, and control systems necessary for the new facilities to be operational, accessible, maintainable, and controllable from the Owner's Distributed Control System (DCS) Final approval of project permits (occupancy, environmental, etc.)
01 33 00	Submission and approval of all submittals
01 43 00	Submission and approval of all operation and maintenance information
01 43 33	Completion of all training
01 45 16	Submission of all Field Quality Control Forms
01 61 10	Submission and approval of all submittals
01 70 00	Submission of required informational submittals
01 75 16	Submission and approval of all submittals
01 78 23	Submission and approval of all submittals
01 88 15	Submission and approval of all submittals
03 01 32	Completion of Performance Acceptance Testing
03 63 00	Completion of Performance Acceptance Testing
03 64 23	Completion of Performance Acceptance Testing
03 64 25	Completion of Performance Requirements
05 05 13	Completion of Performance Requirements
09 90 00	Completion of Performance Acceptance Testing
09 96 35	Completion of Performance Acceptance Testing
40 05 15	Submission and approval of all submittals
40 27 00	Completion of Performance Acceptance Testing
40 80 01	Completion of Performance Acceptance Testing
Various	Installation of all safety facilities, including handrail, grating, hatches, ventilation systems, signs, alarms, and sensors. Provide spare parts, tools, extra materials, etc. as specified.

SUBSTANTIAL COMPLETION DATE. Date indicated on the Project Manager's Certificate of Substantial Completion.

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SUPPLIER. A manufacturer, fabricator, supplier, distributor, material man, 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 any Subcontractor.

WORK. All material, labor, tools and all appliances, machinery, transportation and appurtenances necessary to perform and complete the Contract, and such additional items not specifically indicated or described that can be reasonably inferred as belonging to the item described or indicated and as required by good practice to provide a complete and satisfactory system or structure.

WPCF. Refers to the Water Pollution Control Facility.

1.B. STANDARD ABBREVIATIONS

In accordance with specification Section 01 42 13 Abbreviations and Acronyms.

1.C. CONTRACTOR STATUS

1.C.1. JOINT VENTURE CONTRACTOR

In the event the Contractor is a joint venture, all grants, covenants, provisos and claims, rights, powers, privileges and liabilities of the Contract are several as well as joint. Any notice, order, or other communication required to or that may be given by the Owner or Project Manager to the Contractor under this Contract, are effective as to all entities being the Contractor if given to any one or more of such entities. Any notice, request or other communication given by any one of such entities to the Owner or the Project Manager under this Contract is effective as to all entities being the Contractor.

1.C.2. INDEPENDENT CONTRACTOR STATUS

The services to be performed under this Contract are those of an independent contractor as defined in in state and federal law, including but not limited to the definition set forth in ORS 670.600. Contractor represents and warrants that it is not an officer, employee, or agent of the Owner.

1.C.3. RETIREMENT SYSTEM STATUS AND TAXES

Contractor represents and warrants that it is not a contributing member of the Public Employees' Retirement System and that Contractor shall be responsible for any federal or state taxes applicable to payment received under this Contract. Contractor will not be eligible for any benefits from these Contract payments of federal Social Security, employment insurance, workers' compensation or Public Employees' Retirement System, except as a self-employed individual. Unless the Contractor is

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subject to backup withholding, Owner will not withhold from such payments any amount(s) to cover Contractor's federal or state tax obligations.

1.C.4. GOVERNMENT EMPLOYMENT STATUS

If this payment is to be charged against federal funds, Contractor represents and warrants that is not currently employed by the Federal Government.

Contractor represents and warrants that it is not an employee of Owner for purposes of performing Work under this Contract.

1.C.5. DUAL PAYMENT SOURCES

Contractor shall not be compensated for Work performed under this Contract from any agency other than the agency that is a party to this Contract.

1.D. CONTRACT REQUIREMENTS

1.D.1. SUCCESSOR'S OBLIGATIONS

All grants, covenants, provisos and claims, rights, powers, privileges and liabilities contained in the Contract Documents shall be read and held as made by and with, and granted to and imposed upon, the Contractor and the Owner and their respective heirs, executors, administrators, successors and assigns.

1.D.2. ASSIGNMENT OF CONTRACT

Contractor shall not assign the Contract in whole or in part without the written consent of the Owner. Involuntary assignment of the Contract as caused by the Contractor being adjudged bankrupt, assignment of the Contract for the benefit of the Contractor's creditors or appointment of a receiver on account of the Contractor's insolvency constitutes failure to comply with the provisions of the Contract and subjects the Contractor to the dismissal provisions contained herein.

1.D.3. WAIVER OF RIGHTS

Except as herein provided, no action or want of action on the part of the Contractor, Owner, or Project Manager at any time with respect to the exercise of any right or remedies conferred upon them under this Contract constitutes a waiver on the part of the Contractor or Owner of any of their rights or remedies. No waiver is effective except in writing by the party to be charged. No waiver of one right or remedy acts as a waiver of any other right or remedy or as a subsequent waiver of the same right or remedy.

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1.D.4. AMENDMENT OF CONTRACT

The Contract may be amended only by mutual consent of the Owner and the Contractor expressed in writing and executed by the Owner and the Contractor.

1.D.5. SEVERABILITY

If any provision of this Contract is declared by a court to be illegal or in conflict with any law, the validity of the remaining terms and provisions shall not be affected and the rights and obligations of the parties shall be construed as enforced as if the Contract did not contain the particular provision held to be invalid.

1.D.6. GOVERNING LAW

This Contract shall be governed and construed in accordance with the laws of the State of Oregon, without regard to principles of conflict of laws.

1.D.7. SURVIVAL

All warranty and indemnification provisions of this Contract, and all of Contractor's other obligations under this Contract that are not fully performed by the time of Acceptance or by termination, shall survive Final Completion or any termination of this Contract.

1.D.8. NO THIRD PARTY BENEFICIARIES

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

1.D.9 LEGAL COSTS

In the event an arbitration award confirmed or vacated by a court is appealed, or in the event the arbitration provision in Part 2.E.7.c. is held by a court to be invalid, does not apply, or is waived by the parties, and a legal action relating to the Contract, or the breach thereof, is brought by either party, the prevailing party shall be entitled to recover from the other party reasonable attorney's fees and costs therein and in any appeal there from.

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1.E. LABOR STANDARDS

1.E.1. WAGES

The Secretary of Labor has ascertained the general prevailing rate of wages in the vicinity of the Work to be performed under this Contract. These wage rates are set forth in the PREVAILING WAGE RATES FOR PUBLIC WORKS CONTRACTS IN OREGON, which is bound in this document and spells out labor wage rules to be complied within this Contract. The Contractor and each Subcontractor engaged in the Work shall pay each employee an amount not less than the rate set opposite each trade or occupation listed regardless of any contractual relationship that may be alleged to exist between the Contractor or any Subcontractor and such employee. Any employee whose type of work is not covered by any of the classified wage rates shall be paid not less than the rate of wage listed for the classification which most nearly corresponds to the type of work to be performed.

Contractor shall comply fully with the provisions of ORS 279C.800 through 279C.870. Documents establishing those conditions, as determined by the Commissioner of the Bureau of Labor and Industries (BOLI), are included in the Contract. The Contractor shall pay workers at no less than the specified minimum hourly rate of wage, and shall include that requirement in all subcontracts.

Contractor and Subcontractors shall preserve certified statements required by ORS 279C.845 for a period of six (6) years from the date of Final Completion.

Federally funded projects, including but not limited to CWSRF projects, equal to/or greater than \$25,000 are subject to both the BOLI "Prevailing Wage Rates for Public Works Projects in Oregon" requirements established under ORS 279.348 – 279.380, and the requirements of the federal Davis-Bacon Act. There are differing wage rates reflected in BOLI and the Davis-Bacon Act, and the higher minimum wage amount reflected in these differences from each authority in each specific classification must be met. The term "Public Works" refers to the construction, reconstruction and/or major renovation done by or for a Borrower.

BOLI sets prevailing wage rates based on contractor surveys covering defined regions in the state and various worker classifications. BOLI publishes the prevailing wage rates twice each year (Jan. 1st and July 1st) and periodically updates them to reflect recent changes.

Additional information regarding Borrower responsibility and current wage rates can be found at BOLI's website:

http://egov.oregon.gov/BOLI/WHD/PWR/W_PWR_Pwrbk.shtml

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In addition to required performance bonds which may be used for unpaid wages, all contractors who work on Public Works projects subject to the PWR law must file a \$30,000 "public works bond" with the Construction Contractor's Board to be used exclusively for unpaid wages determined to be due by BOLI. Pursuant to ORS 279C.836 the Contractor will verify that Subcontractors have filed a public works bond before permitting those Subcontractors to start work.

As required in ORS 279C.845 (7) Owner will retain 25% of any amount earned by the Contractor on the Project until the Contractor has filed the certified statements required by ORS 279C.845 or in FHWA Form 1273. Owner will pay to the Contractor the amount retained within days after Contractor files the required certified statements, regardless of whether a Subcontractor has failed to file certified statements.

As required in ORS 279C.845(8) the Contractor shall retain 25% of any amount earned by a First-tier Subcontractor on the Project until the first tier subcontractor has filed with the Owner the certified statements required in ORS 279C.845 or in FHWA Form 1273. Before paying any amount retained, the Contractor shall verify that the First-tier Subcontractor has filed the certified statement. Within 14 calendar days after the First-tier Subcontractor files the required certified statement the Contractor shall pay the First-tier Subcontractor any amount retained.

1.E.2. PREFERENCE FOR RESIDENT LABOR

In the employment of labor for performance of the Work, the Contractor shall give preference to qualified persons residing within the general area of the Work.

1.E.3. HOURS OF LABOR

The Contractor shall comply with ORS 279C.540 and ORS 279C.520 in all matters regarding hours of labor.

Failure of the Contractor to perform the Work in accordance with this policy of the State of Oregon shall be deemed a failure on its part to comply with the provisions of this Contract. Contractor and Owner agree that such failure makes the Contractor subject to the termination provisions set forth in the Contract Documents.

1.E.4. OVERTIME WORK

The Contractor and Subcontractor(s) shall work a regular coincident 8-hour day. If the Contractor desires to work outside the regular work hours, the prior written approval of the Project Manager shall be obtained. No work other than overtime and shift work established as a regular procedure shall be performed between the hours of 6:00 p.m. and 7:00 a.m., nor on Saturdays, Sundays or holidays, except such work as

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is necessary for the proper care and protection of the work already performed, or in case of an emergency.

Claims for overtime pay will be foreclosed if not filed with the Contractor within 90 calendar days from the Substantial Completion Date, provided the Contractor has complied with ORS 279C.545(1) and (2). The Contractor shall make payment promptly, as due, to all persons furnishing labor or materials to the Contractor under this Contract.

1.E.5. INDUSTRIAL ACCIDENT FUND

Except as provided hereinafter in Part 5, C.1. CONTRACTOR'S INSURANCE, the Contractor shall pay all contributions or amounts due the Industrial Accident Fund from the Contractor or Subcontractor incurred in the performance of the Work under this Contract.

1.E.6. LIENS AND CLAIMS AGAINST CONTRACTOR

The Contractor shall not permit any lien or claim to be filed or prosecuted against the Owner, City of Eugene, City of Springfield, Lane County, or Lane County Metropolitan Wastewater Service District on account of any labor or material furnished under this Contract whether the same be furnished by the Contractor or any Subcontractor. If the Contractor fails, neglects or refuses to make prompt payment of any claim for labor or services furnished to the Contractor or a Subcontractor by any person in connection with the Contract as such claim becomes due, the Owner may pay such claim to the person furnishing the labor or services and charge the amount of the payment against funds due or to become due to the Contractor under this Contract. The payment of a claim in this manner does not relieve the Contractor or its surety from obligation with respect to any unpaid claims.

Any claim, by a person claiming to have supplied labor or materials for the performance of the Work, for payment asserted against the Contractor's payment bond must be asserted in conformity with ORS 279C.600 et seq.

1.E.7. MEDICAL CARE

The Contractor shall promptly, as due, make payment to any person, co-partnership, association or corporation furnishing medical, surgical and hospital care or other needed care and attention, incident to sickness or injury, to the employees of the Contractor, of all sums that the Contractor agrees to pay for such services and all monies and sums that the Contractor collected or deducted from the wages of employees for the purpose of providing or paying such service.

All employers working under the Contract are subject employers and must comply with ORS 656.017 or be exempt pursuant to ORS 656.126.

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1.E.8. WITHHOLDING

The Contractor shall pay to the Department of Revenue all sums withheld from employees pursuant to ORS 316.167.

1.E.9. OVERTIME PAY

9.1 Oregon overtime rules apply to all Public Works construction contracts funded in the State of Oregon. In all cases where labor is employed through a contractor, no person shall be required or permitted to labor 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, in which event, the person or persons so employed for excessive hours shall receive at least time and a half pay:

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

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

9.4 For all work performed on Saturday and on certain legal holidays.

The following BOLI webpage provides more details about overtime calculations:

http://egov.oregon.gov/BOLI/WHD/PWR/W_PWR_Calculating.shtml

1.E.10. MINIMUM WAGE VIOLATIONS

In the event of any violation of the clause set forth in 9.2 above, the Contractor and any Subcontractor responsible therefore are liable to any affected employee for its unpaid wages. In addition, such Contractor and Subcontractor are liable to the United States for liquidated damages. Such liquidated damages are computed with respect to each individual laborer or mechanic employed in violation of the provisions of Subsection 1 above, in the sum of \$10 for each calendar day on which such employee was required or permitted to work in excess of 8 hours or in excess of the standard work week of 40 hours without payment of the overtime wages required by the clause set forth in Subsection 9 above.

1.E.11. WITHHOLDING FOR UNPAID WAGES AND LIQUIDATED DAMAGES

The Owner may withhold, or cause to be withheld, from any monies payable on account of Work performed by the Contractor or Subcontractor, such sums as may administratively be determined to be necessary to satisfy any liabilities of such Contractor or Subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in Subsection 9 above.

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1.E.12. SUBCONTRACTS

Contractor shall insert in any subcontracts the clauses set forth in Subsections 9 through 11 above of this provision and also a clause requiring the Subcontractors to include these clauses in any lower tier subcontracts which they may enter into, together with a clause requiring this insertion in any further subcontracts that may in turn be made.

1.E.13. DRUG TESTING

Contractor must demonstrate to Owner that Contractor has an employee drug testing program in place in compliance with ORS 279C.505(2) at the time of execution of this Contract, and that Contractor will maintain the drug testing program during the term of the Contract. Contractor must make a copy of Contractor's current written employee drug testing policy and make it available for inspection by Owner at any time. Contractor agrees to cooperate with Owner in the event Owner requires certain provisions of Contractor's drug testing policy to be added, removed, or revised.

1.E.14. PROMPT PAYMENT REQUIRED

The Contractor shall make payment promptly, as due, to all persons supplying labor or materials to the Contractor for the prosecution of the Work. If the Contractor or a First-tier Subcontractor fails, neglects, or refuses to make payment to a person furnishing labor or materials in connection with the prosecution of the Work within 30 calendar days after receipt of payment from the Owner or the Contractor, the Contractor or First-tier Subcontractor shall pay 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 and ending upon final payment unless payment is subject to a good faith dispute as defined in ORS 279C.580(5)(b). The rate of interest charged to the Contractor or First-tier Subcontractor on the amount due will be 9% per annum from the Owner or from the Contractor, but the rate of interest shall not exceed 30%. The amount of interest may not be waived.

If the Contractor or First-tier Subcontractor fails, neglects, or refuses to make payment to a person furnishing labor or materials in connection with the prosecution of the Work, 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(5)(b).

1.F. LAWS, REGULATIONS AND PERMITS

1.F.1. GENERAL

The Contractor shall give all notices required by law and comply with all laws, ordinances, rules and regulations pertaining to the conduct of the Work. The

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Contractor is liable for all violations thereof in connection with Work provided by the Contractor. If the Contractor observes that the Drawings, Specifications or any other portion of the Contract Documents are at variance with any law, ordinance, rule or regulation, they shall promptly notify the Project Manager in writing of such variance. The Owner shall promptly review the matter and, if necessary, shall issue a Change Order or take any other action necessary to bring about compliance with the law, ordinance, rule or regulation in question. The Contractor agrees not to perform any Work knowing it to be contrary to any law, ordinance, rule or regulation.

1.F.2. PERMITS AND LICENSES

Unless otherwise specified in the Contract Documents, permits and licenses that are necessary only for and during the prosecution of the Work and the subsequent guarantee period must be secured by the Contractor and issued in the Owner's name, unless the Contract Documents otherwise require. Copies of all permits and licenses prepared or obtained by the Contractor shall be submitted to the Project Manager and the Owner prior to commencement of construction. Owner shall make available to the Contractor on request copies of all permits and licenses obtained by Owner. The Owner will pay for system development fees charged by local units of government. The Owner will pay the initial fee for the building permit for the Work. All re-inspection fees, together with any other fees that are not part of the normal building permit process, shall be paid by the Contractor. The Contractor shall pick up the building permits, and identify Subcontractors as required by the permitting authority. Upon request from a Bidder, the Owner will provide a status report relating to Project permits and this information will also be available at a pre-bid meeting. Notwithstanding the above, at the time Contractor submits its Bid, Contractor and all Subcontractors Contractor intends to use for the Project, must hold valid, current professional licenses and/or certifications as required by law for the Contractor's and/or Subcontractors' profession.

1.F.3. PATENTS AND ROYALTIES

Contractor shall pay all costs, fees, royalties or claims for any patented invention, article, process, method, material, plan or appliance that may be used upon or in any manner connected with the Work under this Contract or with the use of completed Work by the Owner. The Contractor and its sureties shall protect and hold the Owner, together with all of its officers, agents, servants and employees, harmless against any and all demands made for such costs, fees, royalties or claims brought or made by the holder of any patented invention, article, process, method, material, plan or appliance. Before final payment is made on account of this Contract, the Contractor shall, if requested by the Owner, furnish acceptable proof of a proper release from all such costs, fees, royalties or claims.

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Should Contractor, its agent, or employee, or any of them be enjoined from furnishing or using any invention, article, process, method, material, plan or appliance supplied or required to be supplied or used under this Contract, Contractor shall promptly pay such costs, fees, royalties or claims as are necessary to secure the requisite licenses; or, subject to agreement by the Owner, substitute other inventions, articles, processes, materials, methods, plans or appliances in lieu thereof that are of equal efficiency, quality, finish, suitability and market value to those planned for or required under the Contract. Contractor shall submit descriptive information of these substitutions to the Project Manager for determination of general conformance to the design concept and the construction Contract. If Owner refuses the substitution, the Contractor agrees to pay such costs, fees, royalties or claims and secure the requisite licenses for the Owner, its officers, agents, servants and employees or any of them, to use such invention, article, process, method, plan, material or appliance without being disturbed or in any way interfered with by any proceeding in law or equity on account thereof.

1.F.4. ENVIRONMENTAL AND NATURAL RESOURCE REGULATION

In compliance with ORS 279C.525, the following is a list of federal, state and local agencies of which the Owner has knowledge that have enacted ordinances or regulations relating to environmental pollution and the preservation of natural resources that may affect the performance of the Contract. ORS 279C.525 will govern any increases in the scope of Work required as a result of environmental or natural resources laws enacted after the submission of Bids for the Contract.

Federal Agencies:

Agriculture, Department of Forest Service
Soil Conservation Service
Homeland Security, Department of Coast Guard
Defense, Department of Army Corps of Project Managers
Energy, Department of Federal Energy Regulatory Commission
Environmental Protection Agency
Health and Human Services, Department of
Housing and Urban Development, Department of
Solar Energy and Energy Conservation Bank
Interior, Department of
Heritage Conservation and Recreation Service
Bureau of Land Management
Bureau of Indian Affairs
Bureau of Mines
Bureau of Reclamation
Office of Surface Mining, Reclamation, and Enforcement
Geological Survey

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Minerals Management Service
U.S. Fish and Wildlife Service
Labor, Department of
Mine Safety and Health Administration
Occupation Safety and Health Administration
Transportation, Department of
Federal Highway Administration
Water Resources Council
Commerce, Department of
National Oceanic and Atmospheric Administration

State Agencies:

Administrative Services, Department of
Agriculture, Department of
Soil and Water Conservation Commission
Columbia River Gorge Commission
Energy, Department of
Environmental Quality, Department of
Fish and Wildlife, Department of
Forestry, Department of
Geology and Mineral Industries, Department of
Human Resources, Department of
Consumer and Business Services, Department of
Oregon Occupational Safety and Health Division
Insurance Division
Land Conservation and Development Commission
Parks and Recreation, Department of
State Lands, Division of
Water Resources Department of
Bureau of Labor and Industries

Local Agencies:

Eugene and Springfield City Councils
Lane County Courts
Lane County Board of Commissioners
Lane Regional Air Protection Agency (LRAPA)
Design Commissions
Historical Preservation Commissions
Eugene, Springfield and Lane County Planning Commissions

1.G. HEADINGS

Headings to parts, sections, forms, articles and sub articles are inserted for convenience of reference only and shall not affect the interpretation of the Contract Documents.

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1.H. SUBCONTRACTS

1.H.1. GENERAL

The Contractor shall establish terms and conditions with their Subcontractors and suppliers to successfully complete the Project/Contract requirements.

a. APPROVAL OF SUBCONTRACT

At Owner's request, Contractor shall submit to Owner, prior to its execution, either Contractor's form of subcontract, or the subcontract to be executed with any particular Subcontractor. Contractor shall provide such list to Owner so that Owner can verify the proposed Subcontractors are not disqualified pursuant to ORS 279C.440. If Owner does not approve of such form or subcontract, Contractor shall not execute the subcontract until the matter is resolved to Owner's satisfaction. Owner's review, comment upon, or approval of any such form or subcontract shall not relieve Contractor of its obligations under this Contract or be deemed a waiver of such obligation of Contractor. Nothing in this Section relieves Contractor from the obligation to provide a list of first-tier subcontractors to Owner within 2 working hours of the Bid due date (see ORS 279C.370).

1.H.2. SUBCONTRACT PAYMENT PROVISIONS

In accordance with ORS 279C.580, the Contractor shall include in each subcontract with a First-tier Subcontractor for property or services, including material suppliers, for the prosecution of the Work, a payment clause that obligates the Contractor to pay the First-tier Subcontractor for satisfactory performance under its subcontract within 10 calendar days out of such amounts as are paid to the Contractor by the Owner.

The Contractor shall also include in such subcontracts an interest penalty clause that obligates the Contractor, if payment is not made within 30 calendar days after receipt of payment from the Owner, to pay the First-tier Subcontractor an interest penalty on amounts due in the case of each payment not made in accordance with the payment clause included in the subcontract as provided above. The Contractor or First-tier Subcontractor is not obligated to pay an interest penalty if the only reason that the Contractor or First-tier Subcontractor did not make payment when payment was due is that the Contractor or First-tier Subcontractor did not receive payment from the Owner or the Contractor when payment was due. The interest penalty shall be:

- a. For the period beginning on the day after the required payment date and ending on the date on which payment of the amount due is made; and
- b. Computed at the rate specified in ORS 279C.515(2).

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The Contractor shall include in each of its subcontracts, for the purpose of performance of the above condition, a provision requiring the First-tier Subcontractor to include a payment clause and an interest penalty clause conforming to the standards set forth above in each of its subcontracts and to require each of its subcontractors to include such clauses in their subcontracts with each lower-tier subcontractor or supplier.

1.H.3 ARBITRATION PROVISION

Contractor shall include in each of its subcontracts an arbitration provision, similar to the arbitration provision in Part 2, Section E.7.c. requiring Subcontractors to resolve any controversy, claim, or dispute arising out of or relating to the Contract by arbitration in accordance with the Oregon Uniform Arbitration Act.

PART 2 OWNER-CONTRACTOR RELATIONS

2.1. AUTHORITY OF OWNER

2.A.1. GENERAL

The Owner has the authority to act as the sole judge of the Work with respect to both quantity and quality as set forth in the Contract. It is expressly stipulated that the plans, Specifications and other Contract Documents set forth the requirements as to the nature of the completed Work and do not purport to control the method of performing Work except in those instances where the nature of the completed Work is dependent on the method of performance.

2.A.2. AUTHORITY OF PROJECT MANAGER

a. GENERAL

The Project Manager is the representative of the Owner and is employed to act as advisor and consultant to the Owner in matters of project management related to the Contract. The Owner has delegated its authority to the Project Manager to make initial decisions regarding all claims and questions, which may arise as to the quality or acceptability of materials furnished and Work performed and as to the manner of performance and rate of progress of the Work under the Contract. The Project Manager determines the intent and meaning of the Contract and makes initial decisions with respect to the Contractor's fulfillment of the Contract and the Contractor's entitlement to compensation. Should the Contractor disagree with a decision of the Project Manager with respect to the Contract, the Contractor may request that the Owner review the Project Manager's decision and make a determination in the manner provided Part 2.E.7 CLAIMS.

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The Project Manager, with approval in writing from Owner, may designate a Field Representative as an alternate in his capacity on the job Site. Unless otherwise stated herein, all notifications required under the Contract shall be made directly to the Project Manager and the Field Representative.

b. OBSERVATION OF CONSTRUCTION

Contractor shall ensure that the Project Manager, and any other agent, employee or representative of the Owner, have access at all times to the Work and to the job site and to all places where Work is being prepared or where materials, equipment, and machinery are being obtained for the Work. The Contractor shall provide necessary facilities for safe access by the Representatives to inspect the Work of the Project. If Project Manager or any agent, employee or representative of Owner requires access to a confined space and/or area requiring lockout tagout for inspection purposes, the Contractor shall provide that access utilizing the Contractor's confined space entry and/or lockout tagout programs. The Project Manager and Field Representative(s) are not responsible for the acts or omissions of the Contractor, or any Subcontractor, or of their agents, or employees or any other persons at the job Site or otherwise performing the Work. The Project Manager is not required to make comprehensive or continuous observations to check the quality or quantity of the Work. However, such observations as are made by the Project Manager do not relieve the Contractor from any obligation to conduct its own inspections or to otherwise perform the Work strictly in accordance with the terms of the Contract.

c. CHANGE ORDERS

The Project Manager has the authority to initiate or recommend Change Orders in accordance with SPECIFICATIONS and Part 7.C. of this section, CHANGE ORDERS. Such Change Orders are subject to review and approval by the Owner.

2.A.3. USE OF CONTRACTOR'S PLANT AND EQUIPMENT

The Contractor agrees to make available to the Owner its plant and equipment for the performance of any Work at the job Site. The Owner agrees that the use of such plant and equipment shall be considered as Extra Work and paid for accordingly.

2.A.4. RIGHT OF ACCESS

The Owner shall have access at all reasonable times to the Contractor's books, records (including, but not limited to, financial records), documents and other evidence pertinent to the performance of the Work under this Contract. The right of such access includes the right to inspect, audit and/or copy any pertinent materials.

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2.B. RESPONSIBILITIES OF OWNER

2.B.1. ATTENTION TO WORK

The Project Manager is the person(s) so designated in writing by the Owner. The Project Manager can be contacted at the job Site or at their office during normal business hours. During the Project Manager's absence, the Contractor may contact directly a previously designated representative of the Project Manager.

2.B.2. OWNER'S EMPLOYEES

The Owner is responsible at all times for the adequacy, efficiency, and sufficiency of its employees and of any consultant, supplier or Subcontractor employed by the Owner.

2.C. AUTHORITY OF CONTRACTOR

2.C.1. CONTRACTOR'S REPRESENTATIVE

The Contractor shall supervise and direct the Work. The means, methods and appliances adopted by the Contractor shall be planned and executed to produce the highest-grade quality of work and will enable the Contractor to complete the Work in the time agreed upon. The Owner and Design Consultant shall not supervise, direct, or have control over, or be responsible for, Contractor's means, methods and appliances of construction or for the safety precautions and programs incident thereto, or for any failure of Contractor to comply with laws and regulations applicable to the furnishing or performance of Work. However, if at any time the means, methods and appliances appear, in the Owner's sole discretion, inadequate or of inferior quality, the Owner may order the Contractor to improve their character or efficiency, and the Contractor shall conform to such order; failure of the Owner to order such improvement of methods of efficiency will not relieve the Contractor from its obligation to perform satisfactory work and to finish the Work in the time agreed upon.

2.C.2. CONSTRUCTION PROCEDURES

The Contractor will supervise and direct the Work. Contractor has the authority to determine the means, methods, techniques, sequences and procedures of construction, except in those instances where the Owner specifies in the Contract, a means, method, technique, sequence or procedure for construction of that item of Work. Where the Owner specifies in the Contract a means, method, technique, sequence or procedure for construction of that item of Work, the Contractor shall evaluate the job safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, method, technique, sequence or procedure.

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2.C.3. SUBCONTRACTORS

Subcontractors do not have a direct relationship with the Owner. All persons engaged in the Work including employees of Subcontractors and suppliers are considered as employees of the Contractor and their Work is subject to the provisions of the Contract. References in the Contract Documents to actions required of Subcontractors, manufacturers, suppliers or any person other than the Contractor, the Owner, or the Project Manager are interpreted as requiring that the Contractor cause such Subcontractor, manufacturer, supplier or person to perform the specified action.

2.D. RESPONSIBILITIES OF CONTRACTOR

2.D.1. SUBCONTRACTOR, MANUFACTURERS AND SUPPLIERS

The Contractor shall be responsible at all times for the adequacy, efficiency and sufficiency of Subcontractors, manufacturers, suppliers and their employees. All Subcontractors, manufacturers and suppliers shall have sufficient knowledge, skill and experience to perform properly the Work awarded to them.

2.D.2. INDEPENDENT TESTING LABORATORY

Contractor shall employ an independent testing laboratory or testing agency and shall be responsible for arranging and paying for all specified tests, inspections, and approvals required in Contract Documents. Contractor shall submit testing documentation and reports to the Project Manager.

Tests required by Contract Documents to be performed by Contractor that require test certificates to be submitted to Project Manager for approval 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 following applicable requirements:

- “Recommended Requirements for Independent Laboratory Qualification,” published by the American Council of Independent Laboratories.
- Basic requirements of American Society for Testing and Materials E329, “Standard Specifications for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction” as applicable.
- Calibrate testing equipment at reasonable intervals by devices of accuracy traceable to either the National Bureau of Standards or accepted values of natural physical constants.

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2.D.3. CONTRACTOR'S EMPLOYEES

The Contractor shall be responsible at all times for the adequacy, efficiency and sufficiency of its employees. All workers shall have sufficient knowledge, skill and experience to perform properly the Work assigned to them. If Work to be performed by the Contractor will impact a "significant aspect" as defined in the City of Eugene Wastewater Division Environmental Management System Program, the Contractor must complete skills verification of the employees who will be performing the Work.

The Project Manager may determine if any activities identified in the scope of Work of this Contract may create a significant impact on the environment and so notify Contractor. The Contractor must then notify Project Manager of all employees working for, or on behalf of, them to complete Contractor who will perform the identified tasks and describe their competence to perform such Work on the basis of education, training, or experience. This emphasizes competence as an essential factor to maintaining ongoing awareness of the importance of potential environmental consequences.

2.D.4. ATTENTION TO WORK

The Contractor, acting through its superintendent, shall give personal attention to and shall manage the Work to the end that it is prosecuted faithfully. When the superintendent is not personally present at the job Site, its previously designated representative who has the authority to act under the Contract must be available. Contractor shall pursue the Work in a timely manner, shall provide superintendence to assure quality and protection of the Work, and shall protect existing facilities from damage by Contractor during the execution of the Work.

2.D.5. EMPLOYEE SAFETY

The Contractor alone is responsible for conditions at the job Site, including safety of all persons and property during performance of the Work, including safety of employees and Subcontractor's employees. This requirement applies continuously and is not limited to normal working hours. The Contractor shall maintain the job Site and perform the Work in a manner that meets the Owner's and Contractor's responsibility under statutory and common law for the provision of a safe place to work. Safety provisions shall conform to the applicable Federal, State, County and local laws, ordinances, and codes. Where any of these are in conflict, Contractor shall follow the more stringent requirement. The duty of the Project Manager to conduct construction review of Contractor's performance is not intended to include review of the adequacy of the Contractor's safety measures in, on, or near the construction Site, however the Owner retains the right to stop Work or otherwise require conformance with safety requirements when non-conformance with laws are noted by the Project Manager.

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The Contractor shall provide at the Site toilet facilities for maintaining personal cleanliness for the use of employees on the construction Project according to ORS 654.150.

2.D.6. PUBLIC SAFETY AND CONVENIENCE

In accordance with specification Section 01 35 23 Owner Safety Requirements.

2.D.7. SAFETY PROGRAM

In accordance with specification Section 01 35 23 Owner Safety Requirements.

2.D.8. OWNER'S ACCESS TO RECORDS

The Contractor shall maintain: (1) books, records (including but not limited to financial records), and other evidence and documents pertinent to the basis of Bid prices submitted for this Contract and pertinent to the performance of the Work under this Contract in accordance with generally accepted principles and practices; (2) one record copy of the complete Contract Documents in good order and marked currently to record field changes and selections made during construction; and (3) one record copy of Shop Drawings, Product Data, Samples and similar submittals. Upon request, the Contractor shall provide proper facilities to the Owner for access, inspection, and copying of these books and records at all times. Contractor shall maintain the books, records, documents, etc. required to be maintained under this paragraph and made available during performance of the Contract, for six (6) years after completion of the Work, or settlement of any claims arising thereon, whichever is later. If, for any reason, any part of this Contract is subject to litigation, the Owner and/or its agents shall continue to have full access to the records during litigation.

Owner's access to such records is not limited to the required retention periods. Contractor shall permit the Owner and its authorized representative access to such records at any reasonable time for as long as the records are maintained.

2.D.9. GRATUITIES

a. GENERAL

If the Owner finds that the Contractor or any of the Contractor's agents or representatives offered or gave gratuities (in the form of entertainment, gifts, or otherwise) to any official, employee, or agent of the Owner in an attempt to secure a contract or favorable treatment in awarding, amendment, or making any determinations related to the performance of this Contract, the Owner may, by written notice to the Contractor, terminate this Contract. The Owner may also pursue other rights and remedies that the law or this Contract provides.

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b. REMEDIES

In the event this Contract is terminated as provided in Paragraph 9a., the Owner may pursue the same remedies against the Contractor as it could pursue in the event of a breach of the Contract by the Contractor, and, in addition to any other damages to which it may be entitled, the Owner is entitled to exemplary, consequential and incidental damages in an amount as determined by the Owner, but not less than three (3) nor more than 10 times the costs the Contractor incurs in providing any such gratuities.

2.D.10.NOTIFICATION OF UTILITIES

Contractor shall, prior to performing any excavation, have all utilities located and shall notify appropriate utility organizations and otherwise comply with provisions of ORS 757.557.

2.D.11.RECYCLE OR SALVAGE

In accordance with ORS 279C.510 the Contractor shall salvage or recycle construction and demolition debris if feasible and cost effective. See requirements in Division 1.

2.D.12. REIMBURSEMENT OF EXTRAORDINARY COSTS

The Contractor shall reimburse Owner for additional costs incurred by the Owner for the following reasons: (1) Re-inspection or witnessing retesting of corrected or replaced Defective Work; (2) Return visits to manufacturing facilities to witness factory testing or retesting; (3) Submittal review in excess of two reviews of substantially the same submittal to determine whether the submittal complies with the applicable requirements of the Contract Documents; and (4) Other costs for extraordinary items that the Project Manager reasonably deems are within the Contractor's responsibilities and control.

Contractor shall reimburse an amount equal to: (1) The amount paid by the Owner therefore to third parties such as the Design Consultant; and (2) The Direct, and indirect, Costs incurred therefore by the Owner where the Work is performed by the Owner.

2.D.13.OTHER CONTRACTOR RESPONSIBILITIES

The Contractor shall be responsible for returning to the Owner all items issued during construction such as keys, security passes, Site admittance badges, and all other pertinent items.

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2.E. OWNER-CONTRACTOR COORDINATION

2.E.1. SERVICE OF NOTICE

Any notice, order, direction, request or other communication given by the Project Manager or the Owner to the Contractor is effective if left at any office used by the Contractor; delivered to any of its officers, Project superintendent, clerks or servants; posted at the job Site; or mailed to the Contractor at the address given in the Contract Documents or at the Contractor's last know place of business. If mailed by first-class mail, any form of communication is effective five (5) calendar days after the day of mailing.

2.E.2. SUGGESTIONS TO CONTRACTOR

Any plan or method of Work suggested by the Project Manager and/or Owner's Representatives to the Contractor, but not specified or required, if adopted or followed by the Contractor in whole or in part, remains the risk and responsibility of the Contractor. The Project Manager, Owner and Owner's Representative assume no responsibility therefore and are in no way liable for any defects in the Work which may result from or be caused by use of such plan or method of Work.

2.E.3. PRECONSTRUCTION CONFERENCE

Prior to commencing Work or ordering materials, the Contractor shall meet with the Owner and/or Project Manager to discuss materials, equipment, use of the job Site, Owner's regulations and other arrangements necessary for execution of the Work.

2.E.4. EXAMINATION OF PLANS, SPECIFICATIONS AND SITE

It is understood that the Contractor, before submitting a Bid, has made a careful examination of the Contract Documents; has become fully informed as to the quality and quantity of materials and the character of the Work required; and has made a careful examination of the location and conditions of the Work and the sources of supply for materials. The Owner shall not be responsible for any loss or for any unanticipated costs that may be suffered by the Contractor as a result of the Contractor's failure to acquire full information in advance in regard to all conditions pertaining to the Work.

2.E.5. COOPERATION

Owner reserves the right to perform other, or additional, work at or near the Site with other contractors.

The Contractor agrees to permit and facilitate entry to the job Site by the Owner, Project Manager, Field Representative(s) or other contractors performing Work on

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behalf of the Owner. The Contractor shall afford to the Owner, Project Manager, Field Representative(s), other contractors or subcontractors and their employees, all reasonable facilities and cooperation and shall arrange its Work and dispose of its materials in such a manner as to not interfere with the activities of the Owner or others upon the job Site. The Contractor shall promptly make good any injury or damage that may be sustained by other contractors or employees of the Owner due in part or in whole by the Contractor's actions or inactions. The Contractor shall join its Work to that of others and perform its Work in proper sequence in relation to that of others.

If requested by the Contractor, the Owner may arrange meetings with other contractors performing Work on behalf of the Owner to plan coordination of construction activities. The Owner shall keep the Contractor informed of the planned activities of other contractors.

Contractor shall bring to the attention of the Project Manager, for help of the Project Manager or Owner in resolving the matter, any difference or conflict arising between the Contractor and any other contractor employed by the Owner or between the Contractor and the workers of the Owner with regard to the Work that cannot be satisfactorily resolved among the parties. If the Work of the Contractor is affected or delayed because of any act or omission of any other contractor or of the Owner, the Contractor may submit for the Project Manager's consideration, a documented request for a Change Order.

2.E.6. DEVIATION FROM CONTRACT

Neither the Contractor nor the Owner shall make any alteration or variation in or addition to or deviation or omission from the terms of this Contract without the written consent of the other party.

2.E.7. CLAIMS

a. DETERMINATION BY PROJECT MANAGER

Contractor shall refer questions regarding meaning and intent of the Contract Documents in writing to the Project Manager for its decision. The Project Manager shall respond to the Contractor in writing with its decision. If the Contractor disagrees with the Project Manager's decision or considers that the decision requires Extra Work, Contractor may appeal the decision to the Owner by filing an appeal with the Owner's Representative. Any related Work performed by the Contractor prior to the Project Manager's decision is done at Contractor's risk unless authorized by the Project Manager.

The Project Manager will not consider direct questions from Subcontractors, suppliers, manufacturers, or others not a party to this Contract. Contractor

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shall not make any agreement, covenant, or assignment, nor shall Contractor commit any other act that would permit or assist any Subcontractor, supplier, manufacturer, or other to directly or indirectly refer a question to the Project Manager. In the event a question arises involving Work to be completed by Subcontractors, the Contractor shall analyze and evaluate the merits of the question involving the Subcontractor/supplier/manufacturer and shall forward the question, and the analysis of the question, to the Project Manager for consideration in the form of a request for information (RFI).

b. APPEALS TO OWNER

In the event the Contractor disagrees with any such decision of the Project Manager, the Contractor may, within five (5) calendar days of the date of such decision, appeal the decision to the Owner for review. The appeal must be in writing and must set forth the question referred to the Project Manager, the Project Manager's decision and the Contractor's basis for disagreement. Contractor shall deliver a copy of the appeal to the Project Manager at the time it is filed with the Owner's Representative. The Owner shall make all reasonable efforts to review the appeal and deliver its decision in writing to the Contractor within 45 calendar days from the date of receipt of the appeal. Failure of the Contractor to appeal the decision of the Project Manager within said 5 calendar day period constitutes a waiver of the Contractor's right to thereafter assert any claim resulting from such decision. This procedure is not meant to preclude or discourage informal resolution of disagreements between the Project Manager and the Contractor.

In the event the Owner elects to do so, the Owner may establish a "Claims Review Board" either to assist in reviewing appeals hereunder or to consider Contractor appeals directly. Once established, this Review Board will hear all future appeals of claims for this Contract. In the event a Claims Review Board is established, the timeframe for delivering a decision will be set by the Claims Review Board and communicated to the Parties.

Any claims for Extra Work shall be denied unless:

- (1) The Contractor has notified the Project Manager, in writing, that the Contractor considers certain Work as Extra Work, in accordance with Part 3.C.3; and
- (2) The Project Manager approves of and authorizes, in writing, the Work being performed as Extra Work prior to the Extra Work being performed.

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During the pendency of any appeal any Work related to the appeal and performed by the Contractor shall be done at its risk unless authorized in writing by the Project Manager.

c. DISPUTE SETTLEMENT

Except as otherwise provided in the Contract Documents, ANY CONTROVERSY, CLAIM, OR DISPUTE ARISING OUT OF OR RELATING TO THE CONTRACT, OR THE BREACH THEREOF, MUST BE RESOLVED BY ARBITRATION in accordance with the Oregon Uniform Arbitration Act and the terms herein. Where a conflict exists between the terms herein and the Oregon Uniform Arbitration Act, the terms herein supersede to the extent allowed by law. A decision by two of the three arbitrators shall be final and binding, and judgment may be entered thereon.

The Contractor or Subcontractors shall not delay the Work because arbitration or other legal proceedings are pending, unless they have written permission from the Project Manager to do so. Such delay is limited to the time required by the arbitrators or court to determine whether the Work will continue or be suspended pending decision on the dispute by the arbitrators or court. Any request for arbitration must be in writing and must be delivered to the Owner and Project Manager and any adverse party either by personal delivery or by registered mail addressed to the last known address of the parties in dispute.

In the event Owner or Contractor initiates arbitration, the parties shall equally share in the fees and costs associated with such arbitration unless, as set forth below, at the conclusion of the arbitration the arbitrator makes an award of fees and costs in a different ratio.

Each party shall appoint an arbitrator, with the third arbitrator selected by the two party-chosen arbitrators. In the event the two party-chosen arbitrators are unable to select a third arbitrator within fifteen (15) calendar days after the two party-chosen arbitrators have been selected, the two-party chosen arbitrators shall apply to the then-Presiding Judge of Lane County Circuit Court for selection of a third arbitrator who meets the qualifications set forth in this section.

All arbitrators shall be unaffiliated with either party, have experience in construction process shall be an active member in good standing with the Oregon State Bar and either be i) an active or retired judge or ii) have significant experience with the public construction contracting process.

The prevailing party in such arbitration is entitled to recover fees and costs paid to the arbitrator, if any, and the prevailing party's reasonable attorney's fees and costs therein.

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The parties hereby stipulate and consent that venue for all arbitration or other legal actions arising under the Contract is in Lane County, Oregon, and that jurisdiction for all legal actions that are brought in or transferred to court is in the Lane County Circuit Court of the State of Oregon; except, if a claim must be brought in a federal forum, then it must be brought and adjudicated solely and exclusively in the United States District Court for the District of Oregon located in Eugene, Oregon.

The Contractor shall include a similar arbitration provision in each contract with its subcontractors.

THIS ARBITRATION AGREEMENT SUBSTANTIALLY AFFECTS YOUR LEGAL RIGHTS. BY AGREEING TO ARBITRATE, PARTIES GIVE UP THEIR LEGAL RIGHT TO BRING A COURT ACTION AND HAVE A JURY TRIAL.

PART 3 SPECIFICATIONS AND DRAWINGS

3.A. INTERPRETATION OF SPECIFICATIONS AND DRAWINGS

The Specifications and Drawings are intended to be explanatory of each other. Contractor shall execute any Work indicated in the Drawings and not in the Specifications, or vice versa, as if indicated in both. Should any Work or materials be reasonably required or intended for carrying the Project to a satisfactory completion, which is inadvertently omitted on the plans and Specifications, Contractor shall furnish the same as fully as if particularly delineated or described. Should it appear that the Work to be done or any of the matters relative thereto are not sufficiently detailed or explained in the Contract Documents, the Contractor shall apply to the Project Manager for further explanations as may be necessary and shall conform thereto so far as may be consistent with the terms of the Contract. In the event of any doubt or question arising respecting the true meaning of the Specifications or Drawings, Contractor may seek a determination by the Project Manager in accordance with Part 2.E.7.a. Should Contractor disagree with the Project Manager's decision, Contractor may appeal to the Owner in accordance with Part 2.E.7.b.

3.B. DIVISION OF DRAWINGS AND SPECIFICATIONS

Drawings and Specifications are divided into groups for the convenience of the Owner and Project Manager. These divisions are not for the purpose of emphasizing or apportioning Work or responsibility for Work among Subcontractors, suppliers and manufacturers, but are merely for convenience of reference and use.

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3.C. DISCREPANCIES

3.C.1. ERRORS AND OMISSIONS

If the Contractor, in the course of the Work, becomes aware of any claimed or probable error or omission in the Contract Documents or in the Owner's field Work, Contractor shall immediately inform the Project Manager. The Project Manager shall promptly review the matter and if they find an error or omission has been made; the Project Manager shall determine the corrective action and inform the Contractor accordingly. If the corrective Work associated with an error or omission increases or decreases the amount of Work called for in the Contract, the Owner shall issue an appropriate Change Order. Subsurface or latent physical conditions that could have been discovered by the Contractor through careful examination of the Project Site and available records at the time of bidding are not considered errors or omissions for the purposes of this section. After discovery of a claimed or probable error or omission by the Contractor, any related Work performed by the Contractor shall be done at its risk unless authorized by the Project Manager. In the event the Contractor disagrees with the determination of the Project Manager, the Contractor may notify the Project Manager and appeal to the Owner in accordance with Part 2.E.7.b.

3.C.2. DIFFERING SITE CONDITIONS

If the Contractor discovers Project Site conditions differing from those expressed by the Contract Documents, the Contractor shall promptly notify the Owner and the Project Manager, in writing, of the specific differing conditions, and shall not alter the differing conditions or perform any Work in the area of the differing conditions until the Project Manager has inspected such condition.

The following constitute differing Project Site conditions provided such conditions are discovered at the Project Site after commencement of the Work:

- Subsurface or latent physical conditions that could not have been discovered by careful examination of the Project Site, utilities and available records, and
- Which are of an unusual nature that differs materially from those ordinarily encountered and generally recognized as inherent in the Work provided for in the Contract.

The party discovering such a condition shall promptly notify the other party, in writing, of the specific differing conditions before they are disturbed and before the affected Work is performed. The Contractor shall not continue Work in the affected area until the Project Manager has inspected such condition.

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3.C.3. CONFLICTING PROVISIONS

If the Contractor finds a claimed or probable conflict in the Contract Documents, the Contractor shall inform the Project Manager in writing **before** proceeding with the Work affected thereby. The Project Manager shall review the matter to determine whether a conflict exists and, if so, the corrective action to be taken in the same manner as in the event of a claimed or probable error or omission. After discovery of a claimed or probable conflict by the Contractor, any Work related to the claimed or probable conflict performed by the Contractor is at Contractor's risk unless authorized in writing by the Project Manager. In the event the Contractor disagrees with the determination of the Project Manager, Contractor may notify the Project Manager and appeal to the Owner in accordance with Part 2.E.7.b.

If the Contractor believes that a claimed or probable conflict in the Contract Documents requires the Contractor to perform Extra Work, the Contractor shall promptly inform the Project Manager in writing before proceeding with the Work affected thereby. The Project Manager shall review the matter to determine whether the Contract Documents require the Contractor to perform Extra Work, and, if so, the Project Manager shall authorize such Extra Work in writing **prior to the Extra Work being performed.** After discovery of a claimed or probable conflict in the Contract Documents that requires the Contractor to perform Extra Work, any Work related to the Extra Work performed by the Contractor is at Contractor's risk unless authorized in writing by the Project Manager. In the event Contractor disagrees with the determination of the Project Manager, Contractor may notify the Project Manager and appeal to the Owner in accordance with Part 2.E.7.b.

3.C.4. UTILITIES

The Design Consultant has endeavored to determine the existence of utilities at the job Site from the records of the owners of known utilities in the vicinity of the Work. The positions of these utilities as derived from such records are shown on the Drawings. No excavations were made to verify the locations shown for underground utilities. The service connections to these utilities may not be shown on the Drawings. It is the responsibility of the Contractor to determine the exact location of all utilities and service connections thereto. The Contractor shall make its own investigations, including contacting the owners of appropriate utilities and making exploratory excavations to determine the locations and type of existing utilities, including service connections, prior to commencing Work that could result in damage to such utilities. The Contractor shall immediately notify the Project Manager as to any utility discovered by the Contractor that is not shown on the Drawings or that is in a different position than shown on the Drawings.

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In the event it is necessary to remove, relocate, or temporarily maintain a utility because of interference with the Work, the Contractor shall perform the Work on the utility and the Owner shall pay Contractor as follows:

a. When it is necessary to remove, relocate, or temporarily maintain a service connection, the cost of which is not required to be borne by the owner thereof, the Contractor bears all expenses incidental to the Work on the service connection. Contractor shall perform the Work on the service connection in a manner satisfactory to the owner thereof; it being understood that the owner of the service connection has the option of doing such Work with its own forces, or permitting the Work to be done by the Contractor.

b. When it is necessary to remove, relocate, or temporarily maintain a utility or underground obstruction that is in the position shown on the Drawings, the cost of which is not required to be borne by the owner thereof, the Contractor bears all expenses incidental to the Work on the utility. Contractor shall perform the Work on the utility in a manner satisfactory to the owner thereof; it being understood that the owner of the utility has the option of doing such Work with its own forces, or permitting the Work to be done by the Contractor.

c. When it is necessary to remove, relocate, or temporarily maintain a utility or underground obstruction that is not shown on the Drawings or is in a position different from that shown on the Drawings and were it in the position shown on the Drawings would not need to be removed, relocated, or temporarily maintained, the cost of which is not required to be borne by the Owner thereof, the Owner will make arrangements with the owner of the utility for such Work to be done at no cost to the Contractor, or will require the Contractor to do such Work in accordance with the article on changes in the Work or changes in the alignment and grade will be ordered in accordance with Part 7.C. on changes in the work.

No representations are made that the obligations to move or temporarily maintain any utility and to pay the cost thereof, is or is not required to be borne by the owner of such utility, and it is the responsibility of the Contractor to investigate to find out whether or not said cost is required to be borne by the owner of the utility.

Governmental agencies and owners of utilities reserve the right to enter at any time upon any street, alley, right-of-way, or easement for the purpose of making changes in their property made necessary by the Work and for the purpose of maintaining and making repairs to their property.

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3.C.5. GENERAL

a. The laws of the State of Oregon (without giving effect to its conflicts of law principles) govern all matters arising out of or relating to the Contract and Contract Documents, including, without limitation, its validity, interpretation, construction, performance, and enforcement.

b. The intent of the Contract Documents is to describe a functionally complete Project that Contractor shall construct in accordance with the Contract Documents.

c. Contractor shall perform and furnish all Work, materials, and equipment that may be inferred reasonably from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result whether or not specifically called for.

d. References to standard specifications, manuals, or codes of technical societies, organizations or associations, or to laws and regulations of a governmental authority, whether such reference be specific or implied, means the latest standard specification, manual, code, or laws and Regulations in effect at the time the Invitation to Bid was issued, except as may be otherwise specifically stated.

However, no provision of referenced standard specifications, manuals, or codes, whether or not such references be specifically incorporated in the Contract Documents, are effective to change the duties and responsibilities of Owner, Contractor, or Project Manager, or Design Consultant.

3.C.6. ORDER OF PRECEDENCE

In resolving conflicts resulting from errors or discrepancies in any of the Contract Documents, the order of precedence shall be as follows:

1. Permits from other agencies as may be required by law
2. Addenda, Supplemental Agreements and Change Orders, the one dated later having the precedence over another dated earlier.
3. Contract
4. General Conditions
5. Technical Specifications
6. Contract Drawings
7. Reference/Standard Plans
8. Solicitation Documents
9. Accepted Offer

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When interpreting Drawings, the following rules apply:

1. Enumerated dimensions govern over scaled dimensions
2. Detail drawings govern over general drawings
3. Addenda/Change Order drawings govern over any other drawings
4. Contract Drawings govern over standard drawings/plans

The provisions of the Contract Documents shall take precedence over 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 a violation of such Law or Regulation.

3.D. SUBMITTALS

3.D.1. GENERAL

Where required by the specifications regarding materials, equipment or methods of Work, or requested by the Project Manager, the Contractor shall submit descriptive information that will enable the Project Manager to advise the Owner whether the Contractor's proposed materials, equipment or methods of Work are in general conformance to the design concept and in compliance with the Drawings and Specifications. The Project Manager's review and approval of submittals shall not constitute approval of the Work described in the submittals and shall not relieve the Contractor of its obligations under the Contract. The information to be submitted must consist of Drawings, Specifications, descriptive data, certificates, samples, test results and other information in accordance with the Specifications. Submittals must conform to the requirements of specification Section 01 33 00 Submittal Procedures. Where the Contract Documents require the Project Manager's approval of submittals, any related Work performed by the Contractor prior to the Project Manager's approval is done at the Contractor's risk unless authorized in writing by the Project Manager.

3.D.2. CONTRACTOR'S RESPONSIBILITIES

Contractor is responsible for the accuracy and completeness of the information contained in each submittal and shall ensure that any material, equipment or method of Work is as described accurately in each submittal. If the information shows any deviation from the Contract Documents, Contractor shall, by statement in writing accompanying the information, clearly identify the deviation and state the reason, therefore. Contractor shall ensure that there is no conflict with other submittals and notify the Project Manager in any case where its submittal may affect the Work of another Contractor or the Owner. Contractor shall ensure coordination of submittals among all related crafts and all Subcontractors. The cost of reviewing the first submittal and two resubmittals shall be borne by the Owner. If additional resubmittals are necessary for any given submittal, Contractor is responsible for costs

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incurred by the Design Consultant to review the additional resubmittals. These costs shall be deducted from Contractor's final payment.

3.E. INFORMATION PROVIDED BY CONTRACTOR

Contractor shall provide information required for constructing, testing, operating or maintaining any part of the Work when specified. Information to be provided must be as specified and shall include such items as shop drawings, erection drawings, reinforcing steel schedules, testing and adjusting instructions, operations manuals, maintenance procedures, parts lists and record drawings. Such information is to be provided as part of the Work under this Contract and its acceptability determined under normal inspection procedures. It will not be reviewed as submittal material described in Part 3.D (SUBMITTALS). Contractor shall provide five sets of all information or a number agreed upon between Contractor and Owner. Submittal information must reference related specification sections and/or drawings along with providing details as outlined in the Contract Documents to demonstrate compliance. Where applicable, information must be provided in electronic format acceptable to Owner, unless the Contract Documents otherwise require.

As part of the Work, Contractor shall submit one completed operation and maintenance manuals ("O & M Manuals") for review by the Project Manager prior to system/equipment training, unless otherwise required by the Project Manager. The O & M Manuals shall contain a complete set of all submittals, all product data as required by the Specifications, training information, phone list of consultants, manufacturers, installer and suppliers, manufacturer's printed data, record and shop drawings, schematic diagrams of systems, appropriate equipment indices, warranties and bonds. The Project Manager will review and return one O & M Manual for any modifications or additions required. Prior to Acceptance, Contractor shall deliver electronic format and one (1) complete and approved hardcopy set of O & M Manuals to the Owner's Representative.

3.F. CONTRACTOR'S COPIES OF CONTRACT DOCUMENTS

Within ten (10) calendar days of request by Contractor, the Project Manager will supply the Contractor with six (6) sets of Contract Documents and six (6) sets of full-scale Drawings. The Contractor is advised that no revisions incorporating changes by Addendum or Change Order will be incorporated into the full-size Drawings furnished under the provisions of this subpart. Additional copies of the Contract Documents, if required by the Contractor, may be purchased from the Owner at reproduction cost. The Contractor shall keep at the job Site at least one (1) set of the Contract Documents and one (1) full-size set of Drawings which are to be available to the Project Manager and his/her representatives.

3.G. RECORD DRAWINGS

The Contractor shall maintain a neatly marked, full-size set of record drawings showing the final location and layout of all mechanical, electrical and instrumentation equipment; piping and conduits; structure and other facilities. Record drawings must reflect Change Orders,

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accommodations to structures, mechanical, electrical and instrumentation equipment and adjustments in construction. Where necessary, Contractor shall provide supplemental drawings along with other specified requirements. Drawings must be kept current and shall be made available at all times for inspection by the Project Manager. Prior to Acceptance of the Project, Contractor shall deliver to the Project Manager, one (1) complete set of neatly marked record drawings showing the information required above. Additional requirements are found in Specification Sections 01 33 00 Submittal Procedures and 01 70 00 Closeout Requirements.

PART 4 MATERIAL, EQUIPMENT AND WORKMANSHIP

4.A. GENERAL QUALITY

Unless otherwise specifically stated in the Contract Documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, supervision, and temporary construction of any nature, and all other services and facilities of any nature whatsoever, necessary to execute, complete and deliver the Work within the specified time. Material and equipment must be new and of a quality equal to that specified or accepted. All material and equipment must be the products of manufacturers of established good reputations, and regularly engaged in the fabrication of such equipment. Unless otherwise noted, any equipment offered must include all current modifications that have been in successful regular operation under comparable conditions. Pursuant to ORS 279A.120, the Contractor shall give preference to goods or services produced in Oregon if price, fitness, availability, and quality are equal. Pursuant to ORS 279A.010, ORS 279A.125, ORS 279A.145, ORS 279A.150, and ORS 279A.155, and subject to the approval of the Project Manager, the Contractor shall use recycled products to the maximum extent economically feasible. Construction Work must be executed in conformity with the best-accepted standard practice of the trade.

4.B. QUALITY OF WORK IN THE ABSENCE OF DETAILED SPECIFICATIONS

Where the Contract requires that materials or equipment be provided or that construction Work be performed, and detailed specifications of such materials, equipment or construction Work are not set forth, the Contractor shall perform the Work using materials and equipment of the best grade in quality and workmanship obtainable in the market, from firms of established good reputation, and shall follow the best accepted standard practices in the performance of construction Work. All Work performed shall be in full conformity with the intent to secure the best standard of construction and equipment of Work as a whole and in part.

4.C. MATERIAL AND EQUIPMENT SPECIFIED BY NAME

Unless otherwise stated in the specification, whenever any material or equipment is specified by reference to two or more patents, brand names or catalog numbers, this reference is for the purpose of defining the performance or other salient requirements, and that other materials or

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equipment, of equal capacity, quality and function may be considered by Owner approval following Contract execution.

Contractor may offer material or equipment of equal or better quality and performance in substitution for those specified which the Contractor considers would be in the Owner's interest to accept. Owner will consider offers for substitution only from Contractor and will not acknowledge or consider such offers from suppliers, distributors, manufacturers or Subcontractors.

Contractor shall make offers of substitution in writing to Owner, with a copy to the Design Consultant, and shall include sufficient data to enable Owner and/or Design Consultant to assess the acceptability of the material or equipment for the particular application and requirements. The Contractor must review related Specifications and substitution requirements included in the Contract Documents. If the offered substitution necessitates changes to or coordination with any other portion of the Work, the data submitted must include drawings and details showing all such changes. Contractor agrees to perform these changes as part of the substitution of material or equipment. Within twenty (20) calendar days after receipt of the offer of substitution, the Project Manager shall determine its acceptability or unacceptability and reply to the Contractor. Acceptance by the Project Manager does not relieve the Contractor from full responsibility for the level of efficiency, sufficiency, quality and utility of the material or equipment specified by name. Any cost differential associated with a substitution must be reflected in the Contract Sum and the Contract Documents must be appropriately modified by a Change Order. Any costs incurred by the Owner for adapting the engineering of the Project or for engineering review necessitated by the substitution proposed by the Contractor are the responsibility of the Contractor as part of the calculation of cost differential to be included in a Change Order.

Unless otherwise stated in the Contract Documents, if any material or equipment is specified by only one patent or proprietary name, or by the name of only manufacturer, it is for the purpose of standardization, or because the Project Manager, Design Consultant, and Owner know of no equal. If standardization is the reason for using one name to specify any material or equipment, the Specifications will state, and substitutions will not be considered. In other cases, the Contractor may offer substitutes of products it considers to be equal to that specified.

4.D. DEMONSTRATION OF COMPLIANCE WITH CONTRACT REQUIREMENTS

4.D.1. INSPECTION

To demonstrate its compliance with the Contract requirements, the Contractor shall assist the Project Manager in its inspection of the Work. The Contractor shall, at all times, grant the Project Manager access to the Work and to the job Site, and to all places where Work is being performed, or whence materials, equipment or machinery are being obtained for the Work. The Contractor shall furnish adequate facilities, as

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required, for the Project Manager to have safe access to the Work, including, without limitation, walkways, railings, ladders, tunnels and platforms. The Contractor shall cause producers, suppliers and fabricators to also provide proper facilities for access to the Work. The Contractor shall provide all information requested by the Project Manager in connection with inspection of the Work.

If the Contract Documents, laws, ordinance, or any public regulatory authority requires any part of the Work to be specially inspected, tested or approved, Contractor shall complete or obtain such inspection, testing or approval. Contractor shall give the Project Manager written notice fourteen (14) days in advance so that the Project Manager can monitor such inspection, testing, or approval.

If any parts of the Work are covered in contravention of the Project Manager's directive, the cost of exposing the Work for inspection and closing are the responsibility of the Contractor regardless of whether or not the Work is found to be in compliance with the Contract.

If any Work is covered in the absence of the Project Manager's directive to the contrary, the Contractor will, if directed by the Project Manager, uncover, expose or otherwise make available for inspection, any portion of covered Work. If it is found that such Work is Defective, the Contractor will bear all expenses of uncovering and reconstructing. If the Work is found to be in compliance with the Contract, the Contractor will be allowed an increase in the Contract Sum, or an extension in the Contract Time, or both as necessary to compensate the Contractor for the additional expense or delay, if any. An appropriate Change Order must be issued.

4.D.2. SAMPLES OF MATERIALS

In cases where compliance with Contract requirements for materials to be incorporated in the Work requires laboratory examination or special testing, the Contractor shall provide samples or specimens as requested by the Project Manager. Contractor shall submit such samples or specimens in ample time to permit making proper test analysis and examinations before the time at which it is desired to incorporate the material into the Work. All tests of material will be made in accordance with recognized standard practice. Sample submission documentation must conform to the requirements described herein and in Section 01 33 00 Submittal Procedures.

4.D.3. CERTIFICATION

In cases where compliance of materials or equipment to Contract requirements is not readily determinable through inspection and tests, the Project Manager shall request that the Contractor provide properly authenticated documents, certificates or other satisfactory proof of compliance. These documents, certifications and proofs must

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cover performance characteristics, materials or construction and the physical or chemical characteristics of materials.

4.D.4. OFFSITE INSPECTION AND TESTING

If the Specifications require or the Contractor's request is approved by the Project Manager, inspection or testing may take place away from the job Site. The additional cost to the Owner for such remote inspection or testing includes travel and subsistence expenses and will be paid by the Contractor through a reduction in payment to the Contractor equal to the travel and subsistence expenses. In the event the remote inspection or testing is not specified and is required by the Owner, the required travel and subsistence expense will be paid by the Owner.

4.D.5. THIRD PARTY RIGHT TO INSPECT

When the United States government participates in the cost of the Work, or the Owner has an agreement with other public or private organizations, or if any portion of the Work is being performed for a third party or in close proximity to third party facilities, representatives of these organizations have the right to inspect the Work affecting their interests or property. Their right to inspect shall not make them a party to the Contract and shall not interfere with the rights of the parties to the Contract. The Project Manager will forward instructions or orders of such organizations to the Contractor.

4.E. STORAGE OF MATERIALS AND EQUIPMENT

Contractor shall store all materials and equipment so as to ensure the preservation of their quality and fitness for the Work and to facilitate inspection and inventory. The Contractor is responsible for all damages that occur in connection with the care and protection of all materials and equipment until final Acceptance of the Work by the Owner.

The Contractor shall store material and equipment in accordance with the Contract Documents, laws, regulations, ordinances, permits, directions of the Project Manager and the manufacturer's recommendations unless specified to the contrary. Contractor shall provide copies of the manufacturer's storage inspections and procedures to the Project Manager promptly upon their receipt from the manufacturer. Contractor shall provide temporary storage buildings required to comply with the manufacturer's storage recommendations and procedures or otherwise necessary for the proper protection of material and equipment. When such buildings are no longer necessary, Contractor shall remove them from the job Site at the Project Manager's direction and remain the property of the Contractor.

Contractor shall store material to be used for backfill in such a manner as to prevent the material from eroding and being washed onto adjacent property or into waterways. Contractor shall separate stockpiled backfill material to avoid contamination or mixing of different types of fill. Stockpiled backfill material must not obstruct traffic or create hazards.

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Activities should be conducted to avoid the potential for land, groundwater, or stormwater contamination that might result from a spill. Any spills on Site should be reported immediately to the Project Manager or the WPCF operations console at 541-682-8620. The Contractor is responsible for clean-up of any spills. All spill materials must be properly disposed of according to all local, state and federal rules.

Contractor shall store combustible materials (paint, solvents, fuels, etc.) in well-ventilated structures removed from other buildings as approved by the Project Manager.

4.F. INSTALLATION

Manufactured articles, material and equipment must be applied, installed, connected, erected, adjusted, tested, operated and maintained as recommended by the manufacturer, unless specified to the contrary. Copies of manufacturer's installation instructions and procedures shall be provided to the Project Manager by the Contractor prior to installation of the manufactured articles, material and equipment.

4.G. DEFECTIVE WORK

4.G.1. CORRECTION OF DEFECTIVE WORK

When, and as often as the Project Manager, in his/her sole discretion, determines through its inspection procedures, material, equipment or workmanship incorporated in the Project do not meet the requirements of the Contract, the Project Manager may give notice of the noncompliance to the Contractor in writing. Within five (5) calendar days of receipt of such notice, the Contractor shall undertake all Work necessary to correct the deficiency and to comply with the Contract. The Contractor agrees to pay all costs of correcting the Defective Work, including: (1) wages and overhead charges for inspection; and (2) compensation for Project Manager and Design Consultant's services and expenses. If the Contractor disagrees with the Project Manager's determination and believes that the corrective Work should be covered by a Change Order, the Contractor shall immediately notify the Owner, in writing, setting forth the basis for its position. The Owner will review the matter and use its best effort to notify the Contractor, in writing, of its determination, within forty five (45) calendar days after receipt of the Contractor's notification. If the Owner determines that the corrective Work is required to comply with the Contract, the Contractor shall proceed with such Work.

As a condition precedent to the Contractor's claim for either additional compensation or time extension or both resulting from the performance of such corrective Work, the Contractor shall, within fifteen (15) calendar days after receipt of the Owner's determination, notify the Owner in writing of its intent to claim additional compensation, time or both. The Contractor shall document all cost information associated with the corrective Work and shall submit such information to the Project Manager on a monthly basis. Receipt of the cost data by the Project Manager does

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not constitute an Acceptance of the corrective Work or an authorization for a Change Order to cover the corrective Work.

4.G.2. RETENTION OF DEFECTIVE WORK

At any time prior to expiration of the guarantee/warranty period, the Owner may, at its option, retain Work that is not in compliance with the Contract if the Owner determines that such Defective Work is not of sufficient magnitude or importance to make the Work dangerous or undesirable.

The Owner also may retain Defective Work, if in the opinion of the Project Manager; removal of such Work is impractical or will create conditions that are dangerous or undesirable. Just and reasonable value for such Defective Work will be determined by the Project Manager, and the Owner will make appropriate deductions in the payments due or to become due to the Contractor. Neither Acceptance, final payment, nor any other provision of the Contract Documents shall: (1) relieve the Contractor from its responsibility for Defective Work; or (2) act as a waiver of the Owner's right to recover from the Contractor an amount representing the damages caused by the Defective Work.

4.G.3. OWNER'S RIGHT TO CORRECT DEFECTIVE WORK

If the Contractor, in the opinion of the Project Manager, neglects to execute the Work properly or neglects or refuses at its own cost to take up and replace Defective Work that has been rejected by the Project Manager, then the Owner will notify the Surety of the condition. After ten (10) calendar days written notice to the Contractor and the Surety, and without prejudice to any other right that the Owner may have under the Contract, the Owner may take over that portion of the Work that has been improperly executed and make good the deficiencies and deduct the cost thereof from the payments then or thereafter due to the Contractor.

4.H. MATERIALS AND EQUIPMENT FURNISHED BY OWNER

4.H.1. INSTALLATION. Contractor shall install all materials and equipment specified to be furnished by the Owner. If the Contractor discovers any defect in material or equipment furnished by the Owner, Contractor shall notify the Project Manager immediately. After such discovery, the Contractor shall not proceed with any Work involving those Owner-furnished materials and equipment unless authorized by the Project Manager. Unless otherwise noted or specifically stated, materials and equipment furnished by the Owner, which are not of local origin, are considered to be f.o.b. (free on board) the job site, 410 River Avenue, Eugene, Oregon. Contractor shall, if specified herein or requested by the Project Manager, unload, store, protect and record the receipt of such material and equipment. If performance of the duty to unload such material and equipment materially increases the Contractor's cost of performance under this Contract, the Owner will issue an

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appropriate Change Order. After receipt by the Contractor, at the point of delivery, Owner-furnished material and equipment become part of the Work, for all purposes of the Contract as if it had been supplied and stored by the Contractor itself, with the exception that all Owner-furnished materials or equipment not incorporated into the Work must be returned to the Owner as property of the Owner. The Contractor bears the risk of loss relating to Owner-furnished material and equipment upon receipt of the material and equipment.

The Contractor agrees that upon request of the Project Manager, the Contractor will unload material or equipment that the Owner has furnished for installation by another contractor. If performance of this duty materially increases the Contractor's cost of performance under the Contract, the Owner will issue an appropriate Change Order. If the Contractor unloads material or equipment furnished by the Owner for another contractor, the Contractor's risk of loss shifts to the contractor for which the material or equipment was furnished when the unloading is properly completed.

4.I. ONE YEAR MAINTENANCE AND WARRANTY

4.I.1. The Contractor shall fully warrant all Work for at least one (1) full year from Substantial Completion of the Project, regardless of the length of manufacturers' or installers' warranties, except that Contractor shall warrant latent defects at any time they become apparent. This provision does not negate guarantees or warranties for periods longer than one year, including but not limited to, such guarantees or warranties required by other sections of the Contract Documents for specific installations, materials, processes, equipment or fixtures. Nothing contained in this Section shall be construed to establish a period of limitation with respect to other obligations which the Contractor might have under the Contract Documents.

4.I.2. In addition to any other warranties that are required, the Contractor shall make all necessary repairs and replacements to remedy any and all defects, breaks, or failures of the Work occurring within one (1) year following the date of Substantial Completion due to faulty or inadequate materials or workmanship. Such repairs and replacements must conform to the Contract Specifications under which the Contractor originally performed the Work.

4.I.3. In the event of a dispute regarding any portion of the Work, the Contractor shall nonetheless provide any warranty service, repairs or replacements as described in Paragraph 1 and 2 above, for that portion of the Work that is not in dispute. In the event that a dispute delays Acceptance of the Work, the warranty for portions of the Work not in dispute runs from the date of Substantial Completion of the remaining portions of the Work.

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4.I.4. The Contractor shall also repair any damage or remedy any disturbance to other publicly owned property or improvements thereon if caused by the Contractor's Work and if the damage or remedy occurs during the warranty period.

4.I.5. If the Contractor performs warranty Work, then the warranty Work for repetitive defects in materials, workmanship or equipment also shall have a one (1) year warranty period from the date of its completion and Acceptance by Owner. The Contractor shall continue to provide warranty Work pursuant to the terms of this Contract until the defects are completed and Accepted by Owner.

4.I.6. The Owner shall provide the Contractor with written notice of the need to perform warranty Work unless it is determined that an emergency exists, that delay would cause serious additional loss or damage, or if any delay in performing the Work might cause injury to any member of the public. If the Contractor, after written Notice, fails within 10 calendar days to comply with the Owner's request, the Owner has the right to perform the warranty Work either by hiring another Contractor or by using its own forces. In that event, the Contractor and its Surety remain liable to the Owner for the cost of the Work performed and any additional damage suffered by the Owner.

4.I.7. The Contractor shall provide a bond during the one-year warranty period to guarantee the Contractor's performance of warranty Work. The Contractor shall provide to the Owner a bond in the amount of 20% of the final Contract Amount in one of the following ways:

- a. Continuance of the Contract performance and payment bond;
- b. Any new performance and payment bond, acceptable to Owner, which covers the Contractor's warranty obligations imposed by the Contract Documents.
- c. Depositing a cashier's check or certified check to the City of Springfield Treasury. A receipt from the Treasurer constitutes proof of the deposit.
- d. Other arrangements proposed by the Contractor that the Owner finds acceptable.

4.I.8. In addition to Contractor's warranty, any manufacturer's warranties shall pass to the Owner and shall not take effect until affected Work has been Accepted in writing by the Project Manager.

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PART 5 LIABILITY AND INSURANCE

5.A. LIABILITY OF CONTRACTOR-INDEMNITY

The Contractor is liable for any and all losses or damages from whatever cause that may occur on or to any part of the Work prior to final Acceptance, except to the extent said losses or damages are caused in whole or in part by the negligence of the Owner, City of Springfield, City of Eugene, Lane County, Project Manager or Design Consultant acting individually or collectively.

The obligations of the Contractor set forth below are limited to the extent necessary to comply with ORS 30.140.

The Contractor is liable for all damages or injury caused to persons owning property, on or in the vicinity of the Work, or that occur to any person or persons or property whatsoever, including Owner's property, arising out of the Contractor's performance for this Contract; whether or not such damage or injury is caused by the negligence of the Contractor, and whether or not such damage or injury is caused by the inherent nature of the Work as specified. As used in this subsection, the term "damage" includes, without limitation, soiling or staining of surfaces by tracking or splashing mud or construction materials, deterioration of road or parking surfaces as a result of equipment movement or parking, damage to surrounding landscaping, structures or equipment, as well as damage of a more serious nature. The Contractor shall provide protection of all Work from vandalism until Acceptance of the Work.

To the maximum extent permitted by law, the Contractor shall defend, indemnify, and hold harmless the Owner, City of Springfield, City of Eugene, Lane County, the Project Manager, the Design Consultant, the individual MWMC Commissioners, and all of their officers, principals, agents, and employees, from any and all loss, expense, claim, demand or liability whatsoever, including attorney fees and litigation costs, for any injury to persons including but not limited to claims by the Contractor, its Subcontractors of any tier, and their employees, agents or invitees for health, safety, personal injury or death claims, or injury to property arising out of the performance of this Contract.

In case any suit or legal proceeding is brought against the Owner, City of Springfield, City of Eugene, Lane County, the Owner's Representative, the Project Manager or the Design Consultant, the MWMC's individual Commissioners, or any of their officers, principals, agents or employees, alleging loss or damage sustained by any person or property as a result of the performance of the Work covered by this Contract; the Contractor agrees to assume the defense thereof, and to pay costs and expenses connected therewith, and judgments that may be obtained against the Owner, City of Springfield, City of Eugene, Lane County, the Owner's Representative, the Project Manager, the MWMC's individual Commissioners or the Design Consultant, or any of their officers, principals, agents, or employees, in such suits. In the event a lien is placed against the property of the Owner, City of Springfield, City of

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Eugene, Lane County, the Owner's Representative, the Project Manager, the MWMC's individual Commissioners, or the Design Consultant, or any of their officers, principals, agents, or employees, as a result of such suits, the Contractor agrees to at once, and not less than seven (7) calendar days cause the same to be dissolved and discharged by giving bond or otherwise. Except as otherwise provided by law, the Contractor's agreement to defend and to pay all related expenses exists whether or not such injuries or damage are caused by the inherent nature of the Work, as specified.

If there are insufficient insurance proceeds and assets of the Contractor to fully indemnify the Owner, City of Springfield, City of Eugene, Lane County, Owner's Representative, Project Manager, the MWMC's individual Commissioners, and Design Consultant, then the Owner will be indemnified in full first, with any remaining insurance proceeds and assets to be used to indemnify the City of Springfield, City of Eugene, Lane County, the Owner's Representative, the Project Manager, the MWMC's individual Commissioners, or the Design Consultant, prorata.

The mention of any specific duty or liability imposed on the Contractor is not a limitation or restriction of any general liability or duty imposed upon the Contractor by the Contract. Reference to any specific duty or liability is made herein merely for the purpose of explanation.

5.B. BONDS

Where the Contract Sum is \$100,000 or more, or when the Contract Documents otherwise require, the Contractor shall provide, prior to the execution of the Contract, performance and payment bonds in the amount of 100 percent of the Contract Sum. The bonds serve as security for the faithful performance of the Work and as security for the faithful payment and satisfaction of all persons furnishing materials and performing labor on the Work. The bonds must be issued by a corporation duly and legally licensed to transact surety business in the State of Oregon. The bonds remain in force throughout the period required to complete the Work and thereafter for a period of 365 days after Acceptance of the Work. Bond forms furnished by Owner and notarized by Contractor's surety company are the only acceptable forms of performance and payment security, unless otherwise specified in the Contract Documents.

The surety company must be listed in the latest Circular 570 of the United States Treasury Department as being acceptable as a Surety on Federal Bonds. Contractor shall not use a surety where the amount bonded exceeds the underwriting limitations for the respective Surety specified in Circular 570. The scope of the bonds or the forms thereof prescribed in these Contract Documents in no way affect or alter the liabilities of the Contractor to the Owner as set forth herein.

Before starting Work, the Contractor shall file with the Construction Contractors Board, and maintain in full force and effect, the separate public works bond required by Oregon Laws

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2005, Chapter 360, and MWMC Rule 137-049-0815, unless otherwise exempt from those provisions. The Contractor shall also include in every subcontract a provision requiring the Subcontractor to have a public works bond filed with the Construction Contractors Board before starting Work, unless otherwise exempt. The Contractor shall verify that the Subcontractor has filed a public works bond before permitting the Subcontractor to start Work.

5.C. INSURANCE

5.C.1. CONTRACTOR'S INSURANCE

a. GENERAL

The Contractor shall provide, at its expense, until two (2) years after the date of Acceptance of all of the Work, pursuant to Part 7.D., commercial general liability insurance sufficient to protect the Contractor in performing the Work covered by the Contract from claims for bodily and personal injury and property damage that may arise because of the nature of the Work or from operations under these Contract Documents. Such operations include, but are not limited to, use of owned, non-owned and hired automobiles (including aircraft and watercraft if an exposure exists) whether such operations are by the Contractor or by any Subcontractor of any tier or anyone directly or indirectly employed by the Contractor or any Subcontractor of any tier. The coverage must include completed operations coverage, which must also be maintained until two (2) years after Acceptance of all of the Work, pursuant to Part 7.D.

If any of the aforementioned liability insurance is arranged on a "claims made" basis, "tail" coverage will be required at the completion of the Contract for a duration of 24 months, or the maximum time period the Contractor's insurer will provide such if less than 24 months. The Contractor shall furnish certification of "tail" coverage as described, or continuous "claims made" liability coverage, for 24 months following Contract completion. Continuous "claims made" coverage will be acceptable in lieu of "tail" coverage provided its retroactive date is on or before the effective date of the Contract.

b. INSURANCE FOR OTHERS

The Contractor shall include as additional insured's under the above commercial general liability policy or policies and the Contractor's automobile policy, the Owner, City of Springfield, City of Eugene, Lane County, the Project Manager, the Design Consultant, and all of their directors, officers, principals, agents and employees by the Endorsement CG2010 "Additional Insured - Owners, Lessees, or Contractors Scheduled person or Organization," or the equivalent thereof, and the fully completed Endorsement

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CG2037 “Additional Insured – Owners, Lessees, or Contractors – Completed Operations,” or the equivalent thereof to the above policy or policies.

Furthermore, the Contractor shall include as additional insured’s for both ongoing and completed operations under the Contractor’s automobile policy or policies, the Owner, City of Springfield, City of Eugene, Lane County, the Project Manager, the Design Consultant and all of their directors, officers, principals, agents and employees by providing the fully completed Endorsement CA 2048, or the equivalent thereof, to the automobile policy or policies.

Unless otherwise authorized by the Owner, Contractor shall secure such insurance on an occurrence basis and include “cross-liability” coverage as provided under standard ISO Forms “Separation of Insured’s” clause.

c. POLICY LIMITS

Minimum policy limits of liability for the above required policy or policies of insurance are as follows: \$2,000,000 for each occurrence with a \$3,000,000 general aggregate with dedicated limits per Project Site; \$2,000,000 product and completed operations aggregate. Contractor shall carry and maintain a Pollution Liability type insurance policy with limits of not less than \$1,000,000 for each occurrence (or each claim if coverage is afforded on claims made basis) and \$1,000,000 in the annual aggregate. The Contractor shall also provide proof of automobile liability coverage, including owned, non-owned and hired automobiles, in an amount not less than a combined single limit of \$1,000,000 for each occurrence. The Contractor shall maintain umbrella or other excess liability insurance which is at least as broad as each and every underlying policy with minimum limits of \$5,000,000 combined single limit and aggregate limit. If the Contractor hires or operates any aircraft or watercraft, the Contractor shall provide proof of aircraft and/or watercraft liability coverage for bodily injury, and property damage in an amount not less than a combined single limit of \$1,000,000 for each occurrence.

d. WORKERS’ COMPENSATION/EMPLOYER’S LIABILITY INSURANCE

All employers, including Contractor that employ workers who work under this Contract in the State of Oregon shall comply with ORS 656.017 and provide 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. The Contractor shall provide, at its expense, until one (1) year after the date of Acceptance of all of the Work

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pursuant to Part 7.E., statutory workers' compensation insurance and employer's liability insurance with limits of not less than \$500,000 each accident for bodily injury by accident, \$500,000 each employee for bodily injury by disease, \$500,000 policy limit for bodily injury by disease. If the Contractor fails to maintain such insurance, the Owner may obtain workers' compensation insurance to cover any amount which the Owner might be liable to pay by reason of any employee of the Contractor being injured or killed, and may deduct the amount of the premium for such insurance plus any related expenses incurred by the Owner from any sums due or to become due to the Contractor. Furthermore, if the Owner pays any amount due to the Contractor's failure or the failure of any of the Contractor's subcontractors of any tier to comply herewith, the Owner may deduct the amount of the payment plus any related expenses incurred by the Owner.

If an injury occurs to any employee of the Contractor or the Contractor's Subcontractors of any tier for which compensation is claimed from the Owner, to the extent that the claim is not covered by insurance, the Owner may retain sums due or to become due to the Contractor under this Contract in an amount sufficient to cover such claim or claims, plus related expenses incurred by the Owner. If it is finally determined that no compensation is due to such employee, the retained amount, less any related expenses incurred by the Owner, will be paid to the Contractor. If it is finally determined that compensation is due to such employee, the retained amount will be deducted from any sums due or to become due to the Contractor.

e. FORMS OF POLICIES AND OTHER INSURANCE REQUIREMENTS

In addition to providing the Owner with two (2) insurance certificates evidencing the insurance required of the Contractor under these Contract Documents, the Contractor shall, upon written request of the Owner within fifteen (15) calendar days following Notice of Final Award of Contract, provide to the Owner two (2) copies of the policies of insurance. The Contractor shall not commence Work until it has provided the Owner with the required insurance certificates and policies.

Contractor shall obtain Owner's approval of all policies of insurance and certificates of insurance. Owner's approval of the insurance does not relieve or decrease the extent to which the Contractor or the Contractor's Subcontractors and Suppliers may be held responsible for payment of any and all damages arising from or related to the performance of the Work.

The words "endeavor to" and "but failure to mail such notice shall impose no obligation or liability of any kind upon the company, its agents or

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representatives” should be deleted from the certificate form’s cancellation provision.

Each such policy and certificate of insurance should bear an endorsement precluding its cancellation, lapse, or material reduction in its coverage without the insurer providing Owner with at least sixty (60) calendar day’s prior written notice. Contractor shall be responsible for obtaining and delivering to Owner, prior to the execution of this Contract, written confirmation from its insurer(s) that the insurer(s) will comply with this provision. If the insurer is unable to provide such notice directly to Owner, then the Contractor specifically agrees it has the affirmative duty to immediately notify Owner of any such cancellation, lapse or material reduction in Contractor’s coverage. Contractor further specifically agrees it has the affirmative duty to immediately notify Owner prior to: (1) any reduction in the aggregate limit of insurance that would result in the aggregate limit falling below the required limit, or (2) any lapse of coverage. The Contractor further agrees to provide the Owner with an updated certificate of insurance six (6) months after the date of the original certificate and every six (6) months thereafter until the Contractor is no longer required to carry insurance for the Project.

If the Contractor fails to obtain or maintain any required insurance or to deliver the required policy or policies, certificates and receipts to the Owner, then the Owner may obtain and maintain such insurance. The Contractor appoints the Owner its true and lawful attorney, to do all things necessary to obtain and maintain such insurance. All expenses incurred by the Owner related to such insurance may be charged to the Contractor and deducted from any sums due or to become due to the Contractor. Failure of the Owner to obtain or maintain such insurance does not relieve the Contractor of any of its responsibilities under this Contract.

The Contractor’s failure to maintain any of the required insurance constitutes sufficient cause for termination or suspension of this Contract.

Contractor shall obtain all insurance required through a company or companies having a policyholders’ Best’s rating of “A” or higher. Such company or companies must be duly authorized to transact business in the State of Oregon and must be acceptable to the Owner. All insurance carried by the Contractor must be primary to any insurance or self-insurance of the Owner.

The remedies provided to the Owner hereunder are cumulative and not exclusive and may be exercised at the Owner’s option. The Owner may also pursue any other right or remedy the Owner may have either under this Contract or at law.

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5.C.2. LIABILITY INSURANCE FOR SUBCONTRACTORS

Notwithstanding any other provisions in the Contract Documents related to obligations of Subcontractors to provide insurance, the commercial general liability insurance provided by the Contractor must provide coverage for acts and omissions of the Contractor's subcontractors and sub-subcontractors for which coverage would be required if the acts or omissions were those of the Contractor. The Contractor may satisfy this obligation by ensuring that any Subcontractor or sub-subcontractor provides such insurance through the Subcontractor's or sub-subcontractor's own insurance program.

The Subcontractor's policies must include as additional insured under the commercial general liability policy or policies, the Owner, City of Springfield, City of Eugene, Lane County, the Project Manager, the MWMC's individual Commissioners, the Design Consultant, and all of their directors, officers, principals, agents and employees by providing the fully completed Endorsement CG2010 (11/85) "Additional Insured - Owners, Lessees, or Contractors – Scheduled Person or Organization," or its equivalent, and the fully completed Endorsement CG2037 "Additional Insured – Owners, Lessees, or Contractors – Completed Operations," or the equivalent thereof, to the above policy or policies. This insurance is primary to and non-contributory with any insurance carried by the Owner.

Furthermore, the Subcontractor shall include as additional insureds for both ongoing and completed operations under the Subcontractors automobile policy or policies, the Owner, City of Springfield, City of Eugene, Lane County, the Project Manager, the MWMC's individual Commissioners, the Design Consultant and all of their directors, officers, principals, agents and employees by providing the fully completed Endorsement CA 2048, or the equivalent thereof, to the automobile policy or policies.

Such insurance must be an occurrence basis policy and include "cross-liability" coverage as provided under standard ISO Forms "Separation of Insureds" clause.

In the event any Subcontractor of any tier fails to comply with the liability insurance requirements set forth herein, the Contractor shall be responsible for any loss caused by any Subcontractor of any tier regardless of the Contractor's own negligence or liability.

5.C.3. BUILDER'S RISK INSURANCE

The Contractor shall secure and maintain during the life of this Contract, an All Risk or equivalent Builder's Risk Insurance Policy (also known as Course of Construction) in an amount equal to the full value of the Project under construction, unless otherwise specified in the Contract Documents. Such insurance shall include coverage for the Contractor, Subcontractors of all tiers, Owner, Owner's Representative, Project Manager and Design Consultant, as their interests may

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appear. The Contractor is responsible for payment of all deductibles. Any deductible shall not exceed \$250,000 for each loss, except the earthquake and flood deductible shall not exceed two percent (2%) of each loss, or \$100,000, whichever is greater. The Owner will hold the proceeds of all amounts paid by the insurer in trust for distribution to the Contractors. If more than one (1) Contractor incurs a loss in one (1) occurrence, the deductible will be shared by the Contractors in direct proportion as their loss is to the entire loss.

For other than new construction, the Contractor shall obtain, at the Contractor's expense, and keep in effect during the term of this Contract, a Builder's Risk Installation Floater for coverage of the Contractor's labor, materials and equipment to be used for completion of the Work performed under this Contract. The minimum amount of coverage to be carried shall be equal to the full amount of the Contract. Such insurance shall include coverage for the Contractor, Subcontractors of all tiers, Owner, Project Manager and Design Consultant, as their interests may appear.

The Owner and Contractor waive all rights against: (1) each other; and (2) any of their Subcontractors, agents and employees for damages caused by fire or other causes of loss to the extent covered by Builder's Risk Insurance obtained pursuant to this Section, except such rights as they have to proceeds of such insurance held by Owner as fiduciary. The Owner or Contractor may require similar waivers executed by the other parties enumerated herein. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

Nothing herein is intended to prevent Owner from obtaining its own Builder's Risk Insurance Policy (also known as Course of Construction). Any Builder's Risk insurance obtained by the Owner shall not cover any tools, apparatus, machinery, scaffolding, hoists, forms, staging, shoring and other similar items commonly referred to as construction equipment that may be on Site and the capital value which is not included in the Work. The Contractor shall make its own arrangements for any insurance it may require on such construction equipment.

The Contractor shall notify the Project Manager of the intent to conduct startup testing before beginning so that the Project Manager may notify the insurance company.

5.C.4. NO PERSONAL LIABILITY OF PUBLIC OFFICIALS

In carrying out any of the provisions hereof in exercising any authority granted by the Contract, there will be no personal liability upon any public official.

PART 6 PROGRESS AND COMPLETION

6.A. EXECUTION OF CONTRACT BY THE OWNER

Execution of the Contract by the Owner does not constitute Notice to Proceed with Work under this Contract. A separate written Notice to Proceed will be issued by the Owner and Contractor shall not start Work until receiving this written Notice to Proceed. Notwithstanding any other provisions of the Contract, the Contractor is not obligated to perform any Work and the Owner is not obligated to accept or pay for any Work performed by the Contractor prior to issuance of Notice to Proceed on the Contract by the Owner. The Owner's knowledge of Work being performed prior to execution of the Contract or issuance of Notice to Proceed by the Owner does not obligate the Owner to accept or pay for such Work.

6.B. CONTRACT TIME

6.B.1. GENERAL

Time is of the essence in Contractor's performance of the Contract. The Contractor shall start the Work as soon as possible after issuance of Notice to Proceed by the Owner, and in no event more than fifteen (15) days after issuance of Notice to Proceed by the Owner. The Contractor shall prosecute the Work so that the entire Project is complete and ready for Acceptance within the time specified. During periods when weather or other conditions are unfavorable for construction, the Contractor shall pursue only such portions of the Work that will not be damaged thereby. Contractor shall not construct any portion of the Work during the time unfavorable conditions exist that are likely to adversely affect the quality or efficiency of the Work. It is expressly understood and agreed by and between the Contractor and the Owner that the Contract Time specified for completion of the Work described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the Work.

6.B.2. CONSTRUCTION SCHEDULE

Within 30 calendar days of issuance of notice to proceed on the Contract, the Contractor shall prepare a construction schedule and submit it to the Project Manager for review. The Contractor must update the construction schedule when change occur. See additional requirements for construction schedule in Division 1.

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6.B.3. DELAYS

a. NOTICE OF DELAYS

Whenever the Contractor foresees any delay in the prosecution of the Work, and, in any event, immediately upon the occurrence of any delay which the Contractor regards as unavoidable, Contractor shall notify the Project Manager in writing of the probability of the occurrence of such delays, its probable duration and its cause. The Contractor shall take immediate steps to prevent the occurrence or continuance of the delay. If this cannot be done, the Project Manager shall determine how long the delay will probably continue and to what extent the prosecution and completion of the Work are being delayed thereby. The Project Manager shall also determine whether the delay is to be considered avoidable or unavoidable and shall notify the Contractor of its determination. The Contractor shall not make a claim for delays that are not called to the attention of the Project Manager at the time of their occurrence.

b. AVOIDABLE DELAYS

Avoidable delays in the prosecution or completion of the Work include:

- 1) All delays that could have been avoided by the exercise of care, prudence, foresight and diligence on the part of the Contractor or its Subcontractors;
- 2) Delays that do not necessarily prevent or delay the prosecution of other parts of the Work or the completion of the whole Work within the time specified;
- 3) Reasonable delays resulting from time required by the Owner and Project Manager for approval of plans submitted by the Contractor and for the making of surveys, measurements and inspections; and,
- 4) Delays arising from interruptions occurring in the prosecution of the Work on account of the reasonable interference from other contractors employed by the Owner which do not necessarily prevent the completion of the whole Work within the time specified.

c. UNAVOIDABLE DELAYS

Unavoidable delays in the prosecution or completion of the Work include all delays (other than avoidable delays as defined above) that result from causes beyond the control of the Contractor and that could not have been avoided by the exercise of care, prudence, foresight and diligence on the part of the

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Contractor or its Subcontractors. Delays caused by other contractors employed by the Owner will be considered unavoidable delays only insofar as they interfere with the Contractor's completion of the Work. Delays due to normal weather conditions are not regarded as unavoidable delays insofar as they interfere with the Contractor's completion of the Work. If the Project Manager determines that the Contractor has experienced an unavoidable delay, and further that such delay has affected the controlling operations of the Work, the Owner shall grant to the Contractor an extension of time for Contract performance, not to exceed the number of days of unavoidable delay experienced by the Contractor. The Contractor has no remedy for unavoidable delay except as provided in this paragraph. Delays due to normal weather conditions are not regarded as unavoidable as the Contractor agrees to plan its Work with prudent allowances for interference by normal weather conditions. Delays caused by acts of God, fire, unusual storms, floods, earthquakes, epidemics, quarantine restrictions, strikes, labor disputes, and freight embargoes are considered as unavoidable delays insofar as they interfere with the Contractor's completion of the Work. Delays caused by shortages of materials are considered unavoidable providing the Contractor can prove to the Owner that the Contractor has made reasonable and timely attempts to secure the material.

A rainstorm, windstorm, high water, or other natural phenomenon for the specific locality of the Work, which might reasonably have been anticipated from historical records of the general locality of the Work, do not constitute unusually severe weather. For the purposes of this Contract, rainfall data are assumed to be the same as that measured at the Eugene Airport by the Environmental Data Service of the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce.

6.B.4. EXTENSION OF TIME

a. AVOIDABLE DELAYS

In case the Work is not completed in the time specified, including extensions of time as may have been granted for unavoidable delays, the Contractor will be assessed damages for those costs incurred by the Owner that are attributable to the fact that the Work was not completed on schedule. The Owner may grant an extension of time for avoidable delay if it deems it in its best interest. Contractor shall compensate the Owner, in exchange for granting an extension of time for avoidable delay, for the actual costs to the Owner of managing the Project, inspection, general supervision and overhead expenses which are directly chargeable to the Work and that accrue during the period of such extension. The actual costs do not include charges for final inspection and preparation of the final estimate by the Owner.

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b. UNAVOIDABLE DELAYS

For delays that the Contractor considers unavoidable, Contractor shall submit to the Project Manager complete information demonstrating the effect of the delay on the controlling operation in its construction schedule. The submission must be made within fifteen (15) calendar days of the beginning of the occurrence which is claimed to be responsible for the unavoidable delay. The Project Manager shall review the Contractor's submittal and determine the number of days of unavoidable delay, if any, and the effect of such delay on the controlling operations of the Work. If the Project Manager determines the Contractor has experienced an unavoidable delay, and further that such delay has affected the controlling operations of the Work, the Owner shall grant to the Contractor an extension of time for Contract performance, not to exceed the number of days of unavoidable delay experienced by the Contractor. The Contractor has no remedy for unavoidable delay except as provided in this paragraph. During such extension of time, neither charges for inspection nor administration nor damages for delay will be assessed against the Contractor. It is understood and agreed by the Contractor and Owner that time extensions due to unavoidable delays will be granted only if such delays involve controlling operations that would prevent completion of the whole Work within the specified time.

If the Contractor disagrees with the Project Manager's determination, Contractor may appeal such determination to the Owner in accordance with Part 2.E.7.

c. LIQUIDATED DAMAGES

If the Contractor fails to complete the Work, or any part thereof, in the time agreed upon in the Contract or within such extra time as may have been allowed for delays by extensions granted as provided in the Contract, the Contractor shall reimburse the Owner for the additional expense and damage for each day, Saturdays, Sundays, and any other Oregon legal holidays excluded, that the Contract remains uncompleted after the Contract completion date. It is agreed that the amount of such additional expense and damage incurred by reason of failure to complete the Contract is the per diem rate as stipulated in the Bid. The amounts are hereby agreed upon as Liquidated Damages for the loss to the Owner.

It is expressly understood and agreed that this amount is not to be considered in the nature of a penalty but as damages for delay which have accrued against the Contractor. The exact amount of damage that would be sustained by the Owner due to delay is difficult, if not impossible, to accurately ascertain, but the parties believe the specified amount of Liquidated Damages to be a

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reasonable forecast of the damage for delay that the Owner would sustain. Such Liquidated Damages are in addition to any other ascertainable damage, other than for delays that the Owner sustains for Contractor's breach of this Contract. The Owner may deduct such damages from any amount due, or that may become due the Contractor, or the amount of such damages becomes due and may be collected from the Contractor or its Surety.

6.B.5. SUBSTANTIAL COMPLETION

'Substantial Completion' shall have the meaning set forth in Part 1.A Definitions of this General Conditions Contract.

Upon consideration by the Contractor that a determination of Substantial Completion of the Project, or a designated portion thereof, is completed, the Contractor shall so notify the Project Manager, with a copy to the Design Consultant, in writing. This notice shall include the Contractor's list of any minor incomplete contract Work items to finish the Project as well as the responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance. Upon receipt of the written notification, the Project Manager will promptly, by personal inspection, determine the actual status of the Work in accordance with the terms of the Contract. If the Project Manager finds that the terms of Substantial Completion of the Contract have not yet been met, the Project Manager will so inform the Contractor. If, instead, the Project Manager determines from his/her inspection that the Work, or the designated portion thereof, has met the terms of Substantial Completion, the Project Manager will issue a Certificate of Substantial Completion, along with a Punch List of any deficient Work needing repair or correction, both of which shall be signed by the Contractor. The Contractor agrees to complete all such corrective Work within thirty (30) calendar days after the submission of the Punch List to the Contractor by the Project Manager. If the Contractor fails to complete the corrective Work within the thirty (30) calendar days, the Contractor is liable to the Owner in the amount stated in the Liquidated Damages for failing to achieve Final Completion section of the Contract for each day thereafter until all corrective Work is completed. The Owner shall be entitled to deduct liquidated damages from Final Payment. Nothing herein is intended to prevent the Project Manager from delegating his/her authority to the Design Consultant to: (1) determine the actual status of the Work; or (2) to issue the Certificate of Substantial Completion for the Project Manager's signature. The Design Consultant shall not have authority to sign the Certificate of Substantial Completion.

As stated in Part 4.I, the terms of the guarantee commence on the date the Project Manager issues the Certificate of Substantial Completion.

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6.B.6. FINAL COMPLETION

The Contractor shall notify the Project Manager in writing requesting a designation of Final Completion at the completion of the Punch List items related to the Substantial Completion designation, and at the completion of any other items necessary to the completion of the Project. The Project Manager (or, if the Project Manager designates this responsibility to the Design Consultant, the Design Consultant) will inspect these remaining items, and upon satisfactory completion, will issue a written Notice of Final Completion, for the signature of Owner's Representative, which shall be subject to the Owner's Acceptance.

6. C. SUSPENSION PROCEDURES

6.C.1. GENERAL

The Owner may order the Contractor in writing to suspend, delay, or interrupt all or any part of the Work for such period of time as the Owner may determine to be appropriate for the convenience of the Owner.

6.C.2. PRICE ADJUSTMENT

If the performance of all or any part of the Work is suspended, delayed, or interrupted for an unreasonable period of time by an act of the Owner in administration of this Contract, or by the Owner's failure to act within a reasonable time, the Owner shall make an adjustment for any increase in the cost of performance of this Contract (excluding profit or loss of other work) necessarily caused by such unreasonable suspension, delay, or interruption and modify the Contract in writing. However, no adjustment is authorized for any suspension, delay, or interruption to the extent (1) that performance would have been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of the Contractor, or (2) for which an equitable adjustment is provided for or excluded under any other provision of this Contract.

6.C.3. NOTICE OF CLAIM REQUIRED

Contractor is not entitled to a price adjustment (1) for any costs incurred more than 20 calendar days before the Contractor notified the Owner in writing of the act or failure to act, involved (this requirement does not apply to a claim resulting from a suspension order), and (2) unless the amount claimed is asserted in writing as soon as practicable after the termination of such suspension, delay, or interruption, but not later than the date of final payment under the Contract.

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6.C.4. REASONABLE TIME

An Owner-requested suspension, delay, or interruption of 90 calendar days or less is not considered an unreasonable period of time and in such event the Owner is not obligated to make an adjustment in the Contract Sum.

6.C.5. CONTRACTOR'S RESPONSIBILITIES

During a suspension, delay, or interruption in Work, the Contractor shall be responsible for continued maintenance of the Project, as if the Work were in progress. This includes, but is not limited to, protection of completed Work, maintenance of access, protection of stored materials, temporary facilities, and clean-up.

When the Work is recommenced after a suspension, delay, or interruption in Work, the Contractor shall replace or renew any Work damaged during the suspension, delay or interruption in Work, remove any materials or facilities used as part of temporary maintenance, and complete the Project as set forth in the Contract Documents.

6.D. TERMINATION PROCEDURES

6.D.1. TERMINATION BY OWNER

a. TERMINATION FOR DEFAULT

The Owner may terminate the Contract for default upon the occurrence of any one or more of the following events:

- 1) If the Contractor abandons the Work in whole or in part,
- 2) If the Contractor is adjudged bankrupt or insolvent,
- 3) If the Contractor makes a general assignment for the benefit of creditors without the Owner's prior written approval,
- 4) If a trustee or receiver is appointed for the Contractor or for any of the Contractor's property,
- 5) If the Contractor files a petition to take advantage of any debtors act, or to recognize under the bankruptcy or similar laws,
- 6) If the Contractor fails to supply sufficient skilled workers or suitable materials or equipment,
- 7) If the Contractor fails to make prompt payments to Subcontractors or others for labor, materials, or equipment,

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- 8) If the Contractor disregards laws, ordinances, rules, regulations, or orders of any public body having jurisdiction,
- 9) If the Contractor disregards the authority of the Project Manager, or
- 10) If the Contractor otherwise violates in any way any provision of the Contract Documents.

In the event Owner terminates the Contract because of any of the above reasons then Owner may, after giving the Contractor and the Surety seven (7) calendar days written notice, terminate the services of the Contractor, exclude the Contractor from the Site and take possession of the Work and of all the Contractor's tools, appliances, construction equipment, and machinery at the Site and use the same to the full extent they could be used by the Contractor (without any liability to the Contractor for having done so), incorporate in the Work all materials and equipment stored at the Site or for which the Owner has paid the Contractor but which are stored elsewhere, and finish the Work as the Owner may deem expedient. The Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Sum exceeds the Direct and indirect Costs of completing the Work and consequential damages, including compensation for additional professional services, Owner shall pay such excess to the Contractor. If such costs exceed such unpaid balance, the Contractor shall pay the difference to the Owner immediately upon demand. In finishing the Work, the Owner is not required to obtain the lowest price for the Work performed.

Where the Contractor's services have been so terminated by the Owner, the termination does not affect any rights of the Owner against the Contractor then existing or which any thereafter accrue. Any retention or payment of monies by the Owner due the Contractor will not release the Contractor from liability.

b. TERMINATION WITHOUT DEFAULT

The Owner may, without prejudice to any other remedy it may have under the provisions of the Contract, terminate this Contract, in whole or in part, at any time by giving seven (7) calendar days written notice to the Contractor. Termination is effective upon receipt of such notice by the Contractor. The Contractor shall immediately discontinue Work and take all reasonable steps with its suppliers and Subcontractors to minimize cancellation charges and other costs.

In the event of termination for reasons other than default of the Contractor, the Contractor is entitled to recover all reasonable costs incurred in connection with performance of the Work, plus any cost and expense reasonably and

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necessarily incurred in connection with such termination, plus a percentage of the profit based on the percentage of completion of the Work. In no circumstance shall Contractor be entitled to lost profits for Work not performed due to termination.

6.D.2. TERMINATION BY CONTRACTOR

If, through no act or fault of the Contractor, the Work is suspended for a period of more than 90 calendar days by the Owner or under an order of court or other public authority, or the Project Manager fails to act on any application for payment within 60 calendar days after it is submitted, or the Owner fails for 60 calendar days to pay the Contractor any sum after it is finally determined to be due, then the Contractor may, upon ten (10) calendar days written notice to the Owner and the Project Manager, terminate the Contract and recover from the Owner all reasonable costs incurred in connection with performance of the Work, plus any cost and expense reasonably and necessarily incurred in connection with such termination, plus a percentage of the profit based on the percentage of completion of the Work. In addition and in lieu of terminating the Contract, if the Project Manager has failed to make any payment as aforesaid, the Contractor may, upon ten (10) calendar days prior written notice to the Owner and the Project Manager, stop the Work until payment of all amounts then due. The provisions of this paragraph do not relieve the Contractor of its obligation to carry on the Work in accordance with the progress schedule and without delay during disputes and disagreements with the Owner.

6.E. USE OF COMPLETED PORTIONS OF THE WORK

The Owner has the right to take possession of and use any completed or partially completed portions of the Work notwithstanding the time for completing the Work or such portions may not have expired. Such taking possession and use does not constitute substantial completion or Acceptance of any part of the Work. If such prior possession or use increases the cost of the Work, the Contractor is entitled to extra compensation within five (5) calendar days of each occurrence in an amount determined in accordance with the procedures given herein for determination of Change Order cost. Contractor is not entitled to extra compensation if such early possession or use is specifically required by the Contract or is required because it is necessary to the continued orderly progress of the Work under the Contract Documents.

Prior possession or use under this provision does not constitute a takeover of equipment so as to cause the commencement of the guarantee pursuant to Part 4.I., ONE YEAR MAINTENANCE AND WARRANTY, unless it is to put the equipment into routine service on a permanent basis.

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PART 7 MEASUREMENT AND PAYMENT

7.A. MEASUREMENT

In accordance with Specification Section 01 29 76 Progress Payment Procedures.

7.A.1. INCIDENTAL ITEMS. Unless otherwise specified in the Contract Documents or shown in the Bid for separate payment, the following items, where applicable, are considered incidental Work for which no separate payment will be made:

- Dewatering
- Restoration and Cleanup
- Mobilization
- Dust, Noise, Erosion, and Pollution Control
- Clearing and Grubbing
- Driveway and Sidewalk Excavation
- Trenching for Piping

7.B. PAYMENTS TO CONTRACTOR

7.B.1. GENERAL

Nothing contained in this Part affects the right of the Owner to reject the whole or any part of the Work found to be Defective. All estimated quantities of Work for which partial payments have been made are subject to review and correction prior to final payment. Payment by the Owner and acceptance by the Contractor or partial payments based on periodic estimates of quantities of Work executed do not, in any way, constitute Acceptance of the estimated quantities used as the basis for computing the amounts of the partial payments.

Within fifteen (15) calendar days of execution of the Contract, and at least fifteen (15) calendar days prior to submitting the first application for progress payment, unless the Project Manager otherwise extends this timeline in writing, Contractor shall prepare and submit to the Project Manager for approval, a cost breakdown of the total Work under this Contract. The cost breakdown must include sufficient detail to serve as a basis for making partial payment during construction. If the cost breakdown is considered by the Project Manager to be front-loaded or unbalanced in any respect, the Project Manager has the authority to make equitable adjustments to

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the cost breakdown. Upon approval of the cost breakdown by the Project Manager, Contractor shall incorporate such breakdown into all applications for payments.

Owner reasonably believes at the time of entering into this Contract that sufficient funds are available and authorized for expenditure to finance the cost of this Contract within the Owner's appropriation or limitation. Contractor understands and agrees that, to the extent that sufficient funds are not available and authorized for expenditure to finance the cost of this Contract, Owner's payment of amounts under this Contract attributable to Work performed is contingent on Owner having such funds available, as determined in Owner's sole discretion.

7.B.2. ESTIMATE FOR PARTIAL PAYMENT

Not later than the 25th day of each month, the Contractor shall submit to the Project Manager a payment request estimate, based on the approved cost breakdown of the amount earned for the separate portions of the Work. The payment request estimate shall include a certificate in substantially the following form:

I, the undersigned, hereby certify that the above bill is true and correct, and the payment therefore, has not been received.

Signed: _____

As used in this Part, the words "amount earned" mean the value, on the date of the estimate for partial payment, of the Work completed in accordance with the Contract Documents, including the value of approved materials delivered to the job Site suitably stored and protected prior to incorporation into the Work. If the Contractor's estimate of amount earned conforms to the Project Manager's evaluation, the Project Manager will make recommendations to the Owner for payment.

Within ten (10) calendar days after submission of request for payment by the Contractor, the Project Manager will:

Transmit it to the Owner with a recommendation for payment; or

Return the request for payment to the Contractor with revisions or corrections indicated. (Errors or omissions in the original submittal that are not revised or corrected within 7 calendar days may result in a 30 calendar day delay in payment.)

Partial payments under this section, including interest thereon, if any, will be calculated and paid in conformity with ORS 279C.570.

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7.B.3. RETAINAGE

Retainage from the estimates of the amounts earned will be as described below:

For Contracts with a Contract Sum greater than \$100,000, or as otherwise required by the Contract Documents, the Owner shall retain five percent (5%) of the amount of each such estimate. After issuance of the Certificate of Substantial Completion, an additional amount of monies previously retained may be paid to the Contractor, if the remainder of the Work has also been completed, except for Work that cannot be completed because of weather conditions, lack of materials, or other reasons which in the sole judgment of the Owner are valid reasons for noncompliance. The Owner shall, however, retain at all times an amount sufficient to cover the estimated cost of the Work still to be completed.

In lieu of the retainage above, Contractor may submit, and Owner shall accept either approved bonds or securities of value equal to the retainage as provided for in ORS 279C.560(6), or a surety bond in accordance with ORS 279C.560(7), the latter executed by a surety bonding company authorized to transact surety business in the State of Oregon and substantially in the form as provided in ORS 701.435(4). In this event, Contractor must accept like bonds from subcontractors and suppliers on the Project from which Contractor has required retainage pursuant to ORS 279C.560(8). Owner reserves the right to reject bonds, securities or other instruments, or a surety bond that Contractor submits under this subsection if Owner first finds, and provides in writing, good cause for the rejection based on unique project circumstances pursuant to ORS 279C.560(1)(c).

For the purposes of this Part, estimates may include the actual invoice cost of any fabricated or manufactured materials and specified components previously paid for by the Contractor and delivered to the job Site or properly stored and suitable for incorporation in the Work embraced in the Contract.

Pursuant to ORS 279C.570, Owner has the right to reduce retainage upon written application of the Contractor.

In addition to any other rights the Owner may have to withhold payments under other provisions of the Contract, the Project Manager may withhold such amounts from progress payments or final payment as may reasonably protect the Owner's interests until the Contractor has:

- Complied with all orders issued by the Project Manager according to the Specifications; and
- Satisfied all legal actions filed against the Owner, the Owner's governing body and its members, and Owner employees that the Contractor is obliged to defend.

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7.B.4. QUALIFICATION FOR PARTIAL PAYMENT FOR MATERIALS DELIVERED

Qualification for partial payment for materials delivered but not yet incorporated into the Work is as described below:

Materials, as used herein, mean fabricated and manufactured material and equipment. Only those materials for which the Contractor can transfer clear title to the Owner qualify for partial payment.

To receive partial payment for materials delivered to the job Site, but not incorporated in the Work, the Contractor shall submit to the Project Manager, at the time of requesting partial payments, a list of such materials. At its sole discretion, the Project Manager will approve items for which partial payment is to be made. The Contractor's actual net cost for the materials must be supported by invoices of suppliers. Final payment will be made only for materials actually incorporated in the Work upon Acceptance of the Work; the cost of all unused materials for which advance payments had been made will be deducted from the final payment for the Work.

a. NONPAYMENT FOR REJECTED OR UNUSED PRODUCTS

i. Payment will not be made for following:

- 1) Loading, hauling, and disposing of rejected material.
- 2) Quantities of material wasted or disposed of in a manner not called for under Contract Documents.
- 3) Rejected loads of material, including material rejected because Contractor failed to conform to provisions of Contract Documents.
- 4) Material not unloaded from transporting vehicle.
- 5) Defective Work not accepted by Owner.
- 6) Material remaining on hand after completion of Work.

b. PARTIAL PAYMENT FOR STORED MATERIALS AND EQUIPMENT

Partial Payment: No partial payments will be made for materials and equipment delivered or stored unless shop drawings or preliminary operation and maintenance manuals are acceptable to Project Manager. Maximum allowed payment for stored materials onsite will be no greater than two-thirds of the schedule of value amount, not including shipping and handling charges.

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Final Payment: Will be made only for products incorporated in the Work; remaining products, for which partial payments have been made, shall revert to the Contractor unless otherwise agreed, and partial payments made for those items will be deducted from the final payment.

7.B.5. PAYMENT

The amount earned as of the 25th day of the month in which payment is requested will be made payable to the Contractor by the Owner not later than the 25th day of the following month, provided Owner has received a recommendation for payment from the Project Manager, less retainages and the amount of all previous partial payments made to the Contractor.

APPLICATION FOR PAYMENT

In making its Application for Payment to Owner, Contractor shall follow the procedure as follows:

- A. Provide Pay Application(s) as an upload to the software specified in Section 01 31 23 Project Software.
- B. Transmittal Summary Form: Attach one Summary Form with each detailed Application for Payment for each schedule and include Request for Payment of Materials and Equipment on Hand as applicable. Execute certification by authorized officer of Contractor.
- C. Use the detailed Application for Payment Form provided by Owner.
- D. Provide a separate form for each schedule as applicable.
- E. Include accepted Schedule of Values/Cost Loaded Schedule for each schedule or portion of lump sum Work and the unit price breakdown for the Work to be paid on a unit priced basis.
- F. Include separate line item for each Change Order executed prior to date of submission. Provide further breakdown of such as requested by Project Manager.
- G. Preparation:
 1. Round values to nearest dollar.
 2. Submit Application for Payment, including a Transmittal Summary Form and detailed Application for Payment Form(s) for each schedule as

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applicable, a listing of materials on hand for each schedule as applicable,
and such supporting data as may be requested by Project Manager.

7.B.6. RELEASE OF LIENS OR CLAIMS

The Contractor shall defend (with counsel of Owner's choice), indemnify, and hold harmless the Owner from all claims for labor and materials furnished under this Contract. Before the Owner pays the Contractor its final payment for the Work, the Contractor shall submit satisfactory evidence that: (1) all persons, firms, or corporations who have done Work or furnished materials under this Contract, for which the Owner may become liable under the laws of the State, have been fully paid or satisfactorily secured; (2) all disputes with property owners have been resolved; (3) all obligations on the Project have been satisfied; (4) all monetary claims and indebtedness have been paid; and (5) to the best of Contractor's knowledge, there are no claims of any kind outstanding against the Project. If evidence is not furnished or is not satisfactory, the Owner shall retain an amount from monies due the Contractor which, in addition to any other sums that may be retained, will be sufficient, in the opinion of the Owner, to meet all liens or claims. Such sum or sums will be retained until the liens or claims are fully discharged or satisfactorily secured. If any lien or claim remains unsatisfied after all payments to the Contractor are made, the Contractor shall refund to the Owner all monies that the latter may be compelled to pay in discharging such a lien or claim, including all costs and attorneys' fees.

7.B.7. FINAL PAYMENT

Upon completion of all of the Work under this Contract, the Contractor shall notify the Project Manager, in writing, that Contractor has completed the Work and made application for final payment. The Contractor shall submit its written application for final payment within ninety (90) days after Substantial Completion, unless a written extension is granted by Owner. The Owner shall pay to the Contractor all monies due them under the provisions of the Contract Documents after the following conditions have been met:

- a. The Owner has approved the Project Manager's recommendation for Acceptance of the Work;
- b. Owner's Acceptance of Contractor's Work has occurred;
- c. Contractor has complied with provisions of Part 7.B.6, RELEASE OF LIENS OR CLAIMS;
- d. Surety has approved final payment; and
- e. The Contractor has complied with all other provisions of the Contract Documents.

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If Contractor fails to submit its application for final payment within ninety (90) calendar days after Substantial Completion, and Contractor has not obtained a written extension by Owner, all requests or claims for additional costs or any extension of time of the Contract shall be waived.

7.B.8. NO WAIVER OF RIGHTS

Neither the field observations nor inspections by the Owner, through the Project Manager, Field Representative(s), or any of its employees, nor any order by the Owner for payment of money, nor any payment for, or acceptance of, the whole or any part of the Work by the Owner or Project Manager, nor any extension of time, nor any possession taken by the Owner or its employees, operates as a waiver of any provision of this Contract, or any power herein reserved to the Owner, or any right to damages herein provided, nor does any waiver of any breach of this Contract be held to be a waiver of any other or subsequent breach.

7.B.9. ACCEPTANCE OF FINAL PAYMENT CONSTITUTES RELEASE

Contractor's acceptance of the final payment releases the Owner, the Owner's Representative, the Project Manager, and the Design Consultant, as agent of the Owner, from all claims and all liability to the Contractor for all things done or furnished in connection with the Work, and every act of the Owner and others relating to or arising out of the Work. No payment, however, final or otherwise, operates to release the Contractor or its Sureties from obligations under this Contract and the performance bond, payment bond, and other bonds and warranties, as herein provided.

7.B.10. CASH ALLOWANCES

Cash allowances are indicated on the Bid.

Consult with the Project Manager in selection of products or services. Obtain proposals from Suppliers and offer recommendations.

Allowance for "Unknown Utilities and Underground Obstructions:" This allowance is not a ceiling and is used only to provide a figure in the Contract Sum. It does not limit payment to the Contractor to this as a maximum amount or entitle the Contractor to this as a lump sum amount for the event of such occurrence. Cash allowances are intended to cover the cost of Work that they are specified for as pursuant to the relevant Contract Documents. All Work done under the cash allowance provisions will be done pursuant to Part 7.C.6.

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7.C. CHANGE ORDERS (Also see Specification Section 00 94 00 Contract Document Modifications)

7.C.1. GENERAL

a. DESIGNATED CHANGE ORDER

The Owner may at any time, and for any reason without notice to any surety, by written order designed or indicated to be a Change Order, make any change in the Work within the general scope of the Contract, including but not limited to changes:

- 1) In the Specifications (including Drawings and designs);
- 2) In the time, method, or manner of performance of the Work;
- 3) In the Owner-furnished facilities, equipment, materials, services, or Site; or
- 4) Directing acceleration in the performance of the Work.

b. CONSTRUCTIVE CHANGE ORDER

A Change Order is also any other written order (including direction, instruction, interpretation or determination) from Owner that causes any change in the Work, provided the Contractor gives the Owner, within 20 calendar days of receipt of Owner's order, written notice stating the date, circumstances and source of the order and that Contractor regards the order as a Change Order.

c. NO ORAL CHANGE ORDERS

No oral order, statement or conduct of the Owner constitutes a Change Order or entitles the Contractor to an equitable adjustment.

d. PRICE ADJUSTMENT

If any change under this Part 7.C causes an increase or decrease in the Contractor's cost or the time required to perform any part of the Work under this Contract, whether or not changed by any order, the Owner shall make an equitable adjustment and modify the Contract in writing. Contractor is not entitled to an equitable adjustment under this Part 7.C. for any costs incurred more than 20 calendar days before the Contractor gives the written notice required in Paragraph b.

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e. COST REDUCTION PROPOSAL

Contractor may submit written proposals to the Project Manager that modify plans, Specifications, or other Contract Documents for the purpose of reducing the total cost of construction, operation, or maintenance.

(1) Proposal Requirements – Neither the Project Manager nor Owner will adopt a cost reduction proposal that impairs essential functions of characteristics of the Project including, but not limited to, service life, economy of operation, ease of maintenance, designed appearance, or design and safety standards.

To conserve time and funds, Contractor may first submit a written request for a feasibility review by the Project Manager. The request should contain a description of the proposal together with a rough estimate of anticipated dollar and time savings. The Project Manager will advise Contractor in writing whether or not the proposal would be considered by the Project Manager, should Contractor elect to submit a detailed cost reduction proposal.

A detailed cost reduction proposal must include, at a minimum, the following information:

- A description of existing Contract requirements for performing the Work and the proposed change;
- The Contract items of Work affected by the proposed change, including any quantity variation caused by the proposed change;
- A detailed cost estimate for performing the Work under the existing Contract, and under the proposed change. Cost savings estimates must be based solely on Contractor's scope of Work;
- Cost of preparing the cost reduction proposal; and
- A date by which the Project Manager must accept the proposal to not impact the Contract Time or cost reduction amount.

(2) Continuing to Perform Work – The Contractor shall continue to perform the Work according to Contract requirements unless and until the Project Manager issues a Change Order incorporating the cost reduction proposal. If the Project Manager fails to issue a Change Order by the date specified in the proposal, the proposal is deemed rejected.

(3) Consideration of Proposal – The Project Manager is not obligated to consider any cost reduction proposal, and neither the Owner nor the Project

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Manager are liable to the Contractor for failure to accept or act upon any cost reduction proposal submitted.

The Project Manager will determine, in Project Manager's sole discretion, whether to accept a cost reduction proposal, as well as the estimated net savings from the adoption of all or any part of the proposal. In determining the estimated net savings, the Project Manager will apply the following:

- Estimated impacts to the Owner's operation and maintenance costs;
- Costs of investigating the proposal; and
- Estimated cost of re-design.

As a condition for considering Contractor's cost reduction proposal, Owner reserves the right to require Contractor to share in Owner's costs of investigating the proposal. If Owner exercises this right, Contractor shall provide written acceptance of the condition to the Project Manager. Such acceptance will authorize Owner to deduct its share of investigation costs from payments due or that may become due to Contractor under the Contract.

(4) Response to Proposal – If Project Manager accepts Contractor's detailed cost reduction proposal; acceptance must be within twenty (20) calendar days of the proposal date. If rejected, the proposal may be returned with a brief explanation as to the reasons for denial. If the Contractor's proposal is accepted in whole or in part, acceptance will be made by a Change Order that must include, at a minimum, the following:

- Statement that the Change Order is made in accordance with Part 7.B of the General Conditions;
- Any modifications to the estimated net savings, after consideration of the Owner's impacts, investigation, or re-design costs;
- Any conditions upon which the Project Manager's approval is subject;
- Revised plans and Specifications that reflect all modifications necessary to implement the approved cost reduction measures; and
- A payment provision pursuant to which the Contractor will be paid 50% of the estimated net savings amount as full and adequate consideration for performance of the Work of the Change Order.

If the Project Manager's acceptance of the cost reduction proposal causes an increase or decrease in the Contractor's time required to perform any part of

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the Work under this contract, the Change Order that authorizes the cost reduction measures will also make an equitable adjustment to the Contract Time.

(5) Right to General Use – Once submitted, the cost reduction proposal becomes the property of the Owner. The Owner reserves the right to adopt the cost reduction proposal for general use without additional compensation to the Contractor when it determines that a proposal is suitable for application to other contracts.

f. NOTICE OF CLAIM

If the Contractor intends to assert a claim for an equitable adjustment under this Part 7.C, Contractor must, within 30 calendar days after receipt of a written Change Order under Paragraph a., or the furnishing of a written notice under Paragraph b., submit a written statement to the Owner setting forth the general nature and monetary extent of such claim. The Owner may, in Owner's sole discretion, extend the 30 calendar day period. The Contractor may include the statement of claim in the notice under Paragraph b.

The Owner will not consider claims for an equitable adjustment under this Part 7.C. from Subcontractors, suppliers, manufacturers, or others not a party to this Contract. Contractor shall not make any agreement, covenant, or assignment, nor shall Contractor commit any other act that would permit or assist any Subcontractor, supplier, manufacturer, or other to directly or indirectly assert a claim for an equitable adjustment to Owner. In the event any change under this Part 7.C. involves Work to be completed by Subcontractors, or materials to be furnished by suppliers, manufacturers, or others not a party to this Contract, such requests shall be submitted to Contractor in writing. The Contractor shall analyze and evaluate the merits of the claim involving the Subcontractor, supplier, manufacturer, or other and shall forward the claim, and the analysis of the claim, to the Owner for consideration. Failure of Subcontractors, suppliers, manufacturers, or others to submit their requests to Contractor within the time period set forth in this paragraph f constitute a waiver of these Subcontractor, manufacturer, supplier or others' claims.

g. FINAL PAYMENT

The Contractor is not entitled to an equitable adjustment with respect to any claim that is made after final payment under the Contract.

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7.C.2. PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA

a. ACCURATE INFORMATION REQUIRED

The Contractor and Subcontractors, where appropriate, assure that the cost and pricing data submitted for evaluation with respect to negotiation of the prices for Change Orders is based on current, accurate, and complete data supported by their books and records. If the Owner determines that any price (including profit) negotiated in connection with this Contract, lower tier sub-agreement, or amendment thereunder was increased by any significant sums because the data provided was incomplete, inaccurate or not current at the time of submission, then such price or cost or profit will be reduced accordingly and the Owner shall modify the Contract in writing to reflect such action.

b. REMEDIES

If Contractor and Owner fail to agree on the amount of a reduction, the dispute is subject to Part 2.E.7.c.

NOTE: Because the Contract is subject to reduction under this Part 7.C.2 by reason of defective cost or pricing data submitted in connection with lower tier sub-agreements, the Contractor may wish to include a clause in each lower tier sub-agreement requiring the lower tier Subcontractor to appropriately indemnify the Contractor. It is also expected that any lower tier Subcontractor subject to such indemnification will generally require substantially similar indemnification for defective cost or pricing data submitted by lower tier contractors.

7.C.3. EXTRA WORK

“Extra Work” means the providing of materials and equipment and the performing of Work not directly or by implication called for in the Contract. Owner is not liable for payment for Extra Work provided by the Contractor that has not been previously authorized by the Project Manager or Owner in writing. Changes in quantity under a unit price Contract or item are not considered Extra Work. If the Owner requires Extra Work the Owner may:

- a. Do the Extra Work itself;
- b. Employ others to do it;
- c. Direct the Contractor to perform the Extra Work at a mutually agreed-upon sum; or

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- d. Direct the Contractor to perform the Extra Work on a time and materials basis.

7.C.4. WORK DELETED

The Owner may, by written order to the Contractor, delete Work, equipment, or material to be provided under the Contract and the value of the deleted Work, equipment, or material will be deducted from the Contract Sum. The deducted value will be a lump sum or unit price agreed upon in writing by the Contractor and Owner based on breakdown and cost information submitted by the Contractor or other pricing or cost information, books or records related to the pricing for that Work in the possession of or provided by the Contractor or Owner.

7.C.5. LUMP SUM CHANGE ORDERS

Whenever practicable, changes in Contract Sum resulting from Extra Work will be determined by a mutually agreed-upon lump sum price. The Contractor's proposal for such changes must include a detailed breakdown of all labor and materials to be performed by its forces and by the forces of its Subcontractors and material suppliers.

Direct Costs for labor, material, rentals, approved services, and for Overhead and profit for the Contractor, Subcontractor, and material suppliers must be calculated as specified under Part 7.C.6., TIME AND MATERIAL CHANGE ORDERS.

When the Owner desires a price quotation from the Contractor for a proposed change to the Contract, the Project Manager will issue a Change Request describing the proposed changes. The Contractor shall respond with a price quote within 15 calendar days of the issuance of the Change Request. In responding to a Change Request, the Contractor may include reasonable costs associated with preparing the price quotation requested. Such costs must be identified separately in the Contractor's proposal. The Owner shall pay for reasonable charges for Change Order preparation, even if the Change Order proposal is rejected by the Owner. The Owner will not pay any Change Order preparation charges if the proposal is rejected due to the Contractor's failure to submit prompt and complete information as required by the Owner.

Contractor's quotations for Change Orders must be in writing and firm for a period of 30 calendar days. Any compensation paid in conjunction with the terms of a Change Order comprises the total compensation due the Contractor for the modification defined in the Change Order. By signing the Change Order, the Contractor acknowledges that the stipulated compensation includes payment for the modification plus all payment for the interruption of

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schedules, extended Overhead, delay or any other impact claim or ripple effect, and by such signing specifically waives any reservation or claim for additional compensation or claim for Contract Time extension in respect to the subject Change Order.

The Owner's request for quotations on modifications to the Work is not considered authorization to proceed with the Work prior to the issuance of a formal Change Order, and such request does not justify any delay in existing Work.

When the Change Order involves Work deleted, the reduction of the Contract Sum is based on all Direct Costs as listed in the detailed proposal submitted by the Contractor. An additional reduction will be made when an amount can be identified as reduced Overhead costs attributable to the Work deleted. No reduction will be made for profit originally attributable to the deleted Work.

7.C.6. TIME AND MATERIAL CHANGE ORDERS

Whenever the Contractor is directed by written notice from the Project Manager to perform Extra Work on a time and material basis, the Contractor shall furnish labor, equipment, and materials necessary to complete the Work in a satisfactory manner and within a reasonable period of time. For the Work performed, payment will be made for the documented actual necessary expense of the following:

- a. Field and office labor, including estimating and procurement personnel and foremen, who are directly assigned to the time and materials Work (actual payroll cost, including wages, fringe benefits as established by negotiated labor agreements, and labor taxes as established by law). The cost of labor includes any employer payments to or on behalf of the worker for health and welfare, pension, vacation and similar purposes. Where subsistence and travel allowances are required for performance of Extra Work, the charges consist of the actual amount paid to each worker. No other fixed labor burdens will be considered unless approved in writing by the Owner.
- b. Material delivered and used on the designated Work, including sales tax, if paid by the Contractor or its Subcontractor.
- c. Rental, or equivalent rental cost of equipment, including necessary transportation, for items having a value in excess of \$100. When equipment is not rented, the equivalent rental cost of equipment is based on the standard rental rates for Contractor-owned equipment, but in no event exceeds the rental rates set forth in the most current edition of the "Equipment Watch Rental Rate Blue Book, published by

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Penton Media. For equipment not listed in the Blue Book, the rental rate is as listed by the local section of the Associated General Contractors. If the equipment is not listed by the Associated General Contractors, the rental rate will be mutually agreed upon in writing between the Contractor and Owner prior to the use of the unlisted equipment. The reasonable cost of moving equipment onto and off the job Site may be included, but equipment rental will not be paid when the equipment is inoperative due to breakdowns. Individual pieces of equipment or small tools having a replacement value of \$100 or less are considered as included in the overhead allowance and no additional payment therefore will be made.

When equipment is used on the Extra Work for less than five (5) calendar days, hourly rates will be used. Less than thirty (30) minutes of operation are considered 1/2 hour of operation. When equipment is used on the Extra Work for more than five (5) calendar days, weekly rates apply. In this case, less than four (4) hours of operation is considered to be 1/2 day of operation.

Rental or equivalent rental cost will be allowed for only those days or hours during which the equipment is in actual use. Rental and transportation allowances must not exceed the current rental rates prevailing in the locality. The rentals allowed for equipment are understood to cover all fuel, supplies, repairs, and renewals.

The Owner reserves the right to furnish such materials and equipment as it deems expedient, and the Contractor has no claim for profit or added fees on the cost of such materials and equipment.

- d. One percent (1%) for additional bond, when required and approved by the Owner.
- e. Additional insurance (other than labor insurance as required and approved by the Owner).
- f. Professional services are included in "actual necessary expense" only when the Owner has determined that such services are necessary and the provision of such services has been authorized in advance in writing by the Project Manager.

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Owner shall add to the preceding actual necessary expenses the following fixed fees for either the Contractor or Subcontractor actually executing the Work:

- a. A fixed fee of 10 percent (10%) of the cost of Item a, b, and c (paragraphs listed above).
- b. An additional fixed fee of 5 percent (5%) allowed the Contractor for the administrative handling of portions of the Work that are executed by an approved Subcontractor. No additional fixed fee will be allowed for the administrative handling of Work executed by a subcontractor of a Subcontractor, unless by written permission from the Project Manager.

The added fixed fees constitute full compensation for the cost of general supervision, overhead, profit, and any other general expense.

If a dispute occurs over payment for Work provided on a time and material basis, the dispute is not cause for stopping Work.

The Contractor shall maintain accurate and detailed records for all Work performed on a time and materials basis. These records must reflect all the actual necessary expenses pertaining to the Extra Work and must at all times be available for audit by the Owner.

The Contractor shall make clear distinction in its records between the Direct Costs of Work paid for on a time and materials basis and the costs of other Work. The Contractor shall furnish the Project Manager report sheets in duplicate of each day's Work that itemize the labor, materials and equipment used, and shall make the report sheets available for Owner's review. The daily report sheets must provide names or identifications and classifications of workers, the hours worked, the sizes, types, and identification numbers of equipment, and hours operated. Daily report sheets must be signed by the Contractor or its authorized agent and verified by the Project Manager.

To receive partial payments and final payment for time and materials Work, the Contractor shall submit to the Project Manager in a manner approved by the Project Manager, detailed and complete documented verification of the Contractor's and any of its Subcontractor's actual costs incurred. Material and rental charges must be substantiated by copies of vendors' invoices. Such costs must be submitted within thirty (30) calendar days after said Work has been satisfactorily completed.

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7.D. CHARGES TO CONTRACTOR

Everything charged to the Contractor under the terms of the Contract shall be paid by the Contractor to the Owner on demand. Such charges may be deducted by the Owner from any money due or to become due to the Contractor including retainage under the Contract. The Owner may recover such charges from the Contractor or from its Surety.

7.E. ACCEPTANCE OF WORK

Following the issuance of the written Notice of Final Completion, the Project Manager shall notify the Owner that the Project has been completed in accordance with the Contract. Following Project Manager's approval, the Project Manager shall notify Contractor of Owner's Acceptance in accordance with the terms of the Contract Documents.

END OF SECTION

SECTION 00 73 16
INSURANCE, ACCESS, INDEMNITY AND RELEASE AGREEMENT

POTENTIAL BIDDER: _____

OWNER: Metropolitan Wastewater Management Commission

SITE: _____

PROJECT: _____

In consideration of the Owner permitting the undersigned potential bidder ("Bidder") to have access to, and to conduct investigations, tests and/or inspections on the Site, the Bidder hereby agrees as follows:

1. To the greatest extent permitted by law, Bidder hereby releases, and shall defend, indemnify and hold harmless the Owner and its respective officers, employees, consultants, representatives, and agents, and all other parties having any other interest in the Site, against any claim or liability, including attorney's fees, arising from or relating to any Site-related access, investigation, test, inspection and/or other activity conducted by Bidder or any of Bidder's officers, employees, consultants, representatives, and/or agents, regardless of whether claim or liability is caused in part by the negligence of Owner or by any released and indemnified party.
2. Bidder must repair any damage to the Site or adjacent property resulting from activities authorized hereunder, and comply with and be subject to all other requirements and obligations described or referenced in the Contract Documents, state, federal and/or local law.
3. Attached hereto (or to be delivered separately to Owner before Bidder's visit to the Site) is a certificate for comprehensive general liability insurance satisfying the requirements in Part 5 of specification Section 00 72 00 General Conditions of the Contract.
4. Although this Access, Indemnity and Release Agreement is not a Contract Document, it shall be fully effective and binding regardless of whether Bidder submits a Bid for the subject Project, is awarded a contract for the Project, or otherwise.

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INDEMNITY AND RELEASE AGREEMENT (continued)

Name of Bidder: _____

Signed By: _____

Name: _____

Title: _____

Note: If a Corporation, this Indemnity Agreement must be signed
by either the Corporation's Chairman, President or Vice-President.

Address: _____

Telephone: _____

Oregon Contractors License #: _____

END OF SECTION

SECTION 00 91 15
PROCUREMENT PROTEST PROCEDURES

GENERAL

A party with an adversely affected direct financial interest may file a protest against the Metropolitan Wastewater Management Commission (“MWMC”) for an alleged violation of the procurement requirements set forth in the Public Contracting Code, ORS Chapters 279A and 279C, arising from a procurement action by MWMC. Any such protest must be received by MWMC at the e-mail address specified in the Invitation to Bid within the time period specified in Paragraph TIME LIMITATIONS.

TIME LIMITATIONS

A protest of the Contract terms or Specifications must be filed as early as possible during the procurement process to avoid disruption of or unnecessary delay to the procurement process. A protest must be received by MWMC within 7 days after the basis for the protest is known or should have been known, but in no event later than 10 days prior to bid closing.

A protest of MWMC’s intent to award a Contract must be filed within 7 days after issuance of the notice of intent

All documents transmitted in accordance with these procedures must be delivered in a manner that objectively establishes the date of receipt. Initiation of protest actions may be made by telephonic notice accompanied by prompt written delivery of a more detailed statement of the basis for the protest. Telephonic protests alone will not be considered.

OTHER INITIAL REQUIREMENTS

The initial protest document must briefly state the basis for the protest, and:

Comply with the protest content requirements of MWMC Rule 137-049-0260(3) for protest of Contract terms or Specifications, or MWMC Rule 137-049-0450(4) for protest of intent to award.

Refer to the specific section(s) of the Public Contracting Code or MWMC Rule that allegedly prohibits the procurement action.

Specifically request a determination pursuant to these procedures.

Identify the specific procurement document(s) or portion(s) of them in issue.

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Include the name, telephone number, and address of the person representing the protesting party.

The party filing the protest must concurrently transmit a copy of the protest document and any supporting documentation to all other parties with a direct financial interest that may be adversely affected by the determination of the protest (generally, all bidders who appear to have a substantial and reasonable prospect of receiving an award if the protest is denied or sustained).

MWMC DETERMINATION

MWMC is responsible for the resolution of protests based upon alleged violations of the procurement requirements of the Public Contracting Code.

When MWMC receives a timely written protest, it will defer the protested procurement action (see Paragraph DEFERRAL OF PROCUREMENT ACTION) and:

Afford the complainant and interested parties an opportunity to present arguments in support of their views in writing, verbally or both, at MWMC's discretion.

Inform the complainant and other interested parties of any special procedures that MWMC will observe for resolution of the protest.

Request an appropriate extension of the period for acceptance of the bid and bid bond of each interested party. Failure to agree to a suitable extension of such bid and bid bond by the party that initiated the protest is cause for summary dismissal of the protest by MWMC.

Decide the protest as promptly as possible--generally within 8 weeks after receipt of a protest, unless extenuating circumstances require a longer period of time for proper resolution of the protest.

Promptly prepare and deliver a written determination of the protest to the complainant and to each other participating party.

MWMC's determination may be accompanied by a report and recommendation of legal counsel.

PROCEDURES

MWMC's legal counsel may establish additional procedural requirements or deadlines for the submission of materials by parties or for the accomplishment of other procedures. Where time limitations are established by these procedures or by MWMC's legal counsel, participants must comply with them.

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A party who submits a document subsequent to initiation of a protest proceeding under Paragraph MWMC DETERMINATION must simultaneously furnish each other party with a copy of such document.

These procedures are not intended to preclude informal resolution or voluntary withdrawal of protests. A complainant may withdraw its protest at any time, and the protest proceeding shall there upon be terminated.

BURDEN OF PROOF

The party initiating the protest will bear the burden of proof in the protest proceedings.

DEFERRAL OF PROCUREMENT ACTION

Upon receipt of a protest, MWMC will defer the protested procurement action (for example, defer the issuance of solicitation, contract award, or issuance of notice to proceed under a contract) until 10 days after delivery of its determination to the participating parties. (MWMC may receive or open bids, if it considers this to be in its best interest.)

LIMITATION

A protest may not be filed under this section with respect to the following:

Issues not arising under the Public Contracting Code or MWMC Contracting Rules;

Provisions of federal regulations applicable to direct federal contracts or federally assisted contracts;

Basic project design determinations (for example, the selection of incineration versus other methods of disposal of sludge); or

Award of subcontracts or issuance of purchase orders under a formally advertised, competitively bid, lump sum construction contract.

SUMMARY DISPOSITION

MWMC may summarily dismiss a protest at any time if it determines that the protest is untimely, frivolous or fails to comply with these protest procedures or additional procedures established by MWMC's legal counsel. Any such determination must refer briefly to the facts substantiating the basis for the determination.

END OF SECTION

SECTION 00 94 00
CONTRACT DOCUMENT MODIFICATIONS

PART 1 GENERAL

1.01 RELATED SECTIONS

- A. Section 00 72 00, General Conditions of the Contract.

1.02 PROPOSAL REQUESTS

- A. Pursuant to MWMC Rule 137-049-0910, Owner may, in anticipation of ordering an addition, deletion, or revision to the Work, request Contractor to prepare a detailed proposal of cost and times to perform contemplated change.
- B. Proposal request will include reference number for tracking purposes and detailed description of and reason for proposed change, and such additional information as appropriate and as may be required for Contractor to accurately estimate cost and time impact on Project.
- C. Proposal request is for information only; Contractor is neither authorized to execute proposed change nor to stop Work in progress as result of such request.
- D. Transmit proposal to Owner not less than fourteen (14) days after Contractor's receipt of Owner's written request. Proposal must remain firm for a minimum period of forty-five (45) days after receipt by Owner.
- E. Owner's request for proposal or Contractor's failure to submit such proposal within the required period will not justify a Claim for an adjustment in Contract Sum or Contract Time.

1.03 CLAIMS

- A. Include, at a minimum:
 - 1. Specific references including (i) Drawing numbers, (ii) Specification section and article/paragraph number, and (iii) Submittal type, Submittal number, date reviewed, Owner's and Design Consultant's comments, as applicable, with appropriate attachments.
 - 2. Stipulated facts and pertinent documents, including photographs and statements.
 - 3. Interpretations relied upon.
 - 4. Description of (i) nature and extent of Claim, (ii) who or what caused the situation, (iii) impact to the Work and work of others, and

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- (iv) discussion of claimant's justification for requesting a change to price or times or both.
- 5. Estimated adjustment in price claimant believes it is entitled to with full documentation and justification.
- 6. Requested Change in Contract Time: Include at least (i) Progress Schedule documentation showing logic diagram for request, (ii) documentation that float times available for Work have been used, and (iii) revised activity logic with durations including sub-network logic revisions, duration changes, and other interrelated schedule impacts, as appropriate.
- 7. Documentation as may be necessary as set forth below for Work Change Directive, and as Owner may otherwise require.

1.04 WORK CHANGE DIRECTIVES

A. Procedures:

- 1. Owner will:
 - a. Initiate, including a description of the Work involved and any attachments.
 - b. Affix signature, demonstrating Owner's recommendation.
 - c. Transmit electronic copy to Owner for authorization.
- 2. Owner will:
 - a. Affix signature, demonstrating approval of the changes involved.
 - b. Return to Owner and forward to Contractor
- 3. Upon completion of Work covered by the Work Change Directive or when final Contract Time and Contract Sum is determined, submit documentation for inclusion in a Change Order.
- 4. At a minimum include the following:
 - a. Appropriately detailed records of Work performed to enable determination of value of the Work.
 - b. Full information required to substantiate resulting change in Contract Time and Contract Sum for Work. On request of Owner, provide additional data necessary to support documentation.
 - c. Support data for Work performed on a unit price or Cost of the Work basis with additional information such as:
 - 1) Dates Work was performed, and by whom.
 - 2) Time records, wage rates paid, and equipment rental rates.
 - 3) Invoices and receipts for materials, equipment, and subcontracts, all similarly documented.

- B. Effective Date of Work Change Directive: Date of signature by Owner, unless otherwise indicated thereon.

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1.05 CHANGE ORDERS

A. Procedure:

1. Owner will prepare proposed Change Order and transmit such with Owner's written recommendation and request to Contractor.
2. Within seven (7) days of receipt, Contractor must either: (i) sign and return to Owner for execution, or (ii) return unsigned with written justification for not signing Change Order.
3. Upon receipt of Contractor-signed Change Order, Owner will promptly either:
 - a. Execute the Change Order and provide to Contractor; or
 - b. Promptly notify Contractor and return un-executed copies with written justification for not executing Change Order.
4. Upon receipt of executed Change Order, Contractor must:
 - a. Perform Work covered by Change Order.
 - b. Revise Schedule of Values to adjust Contract Sum and submit with next Application for Payment.
 - c. Revise Progress Schedule to reflect changes in Contract Time, if any, and to adjust times for other items of Work affected by change.
 - d. Enter changes in Project record documents after completion of change-related Work.

B. In signing a Change Order, Owner and Contractor acknowledge and agree that:

1. Stipulated compensation (Contract Sum or Contract Time, or both) set forth 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 Schedule, (iv) delay and impact, including cumulative impact, on other Work under the Contract Documents, and (v) extended overheads.
2. Change Order constitutes full mutual accord and satisfaction for the change to the Work;
3. Unless otherwise stated in the Change Order, all requirements of the original Contract Documents apply to the Work covered by the Change Order.

1.06 COST OF THE WORK

- A. Supplemental costs for rental equipment include 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, and the cost of transportation, loading, unloading, assembly,

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dismantling, and removal thereof. All such costs must be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the work.

- B. Rental of construction equipment and machinery and the parts thereof having a replacement value exceeding \$1,000, whether owned by Contractor or rented or leased from others, must meet the following requirements:
1. Full rental costs for leased equipment must not exceed rates listed in the Rental Rate Blue Book published by Primedia Information, Inc., San Jose, California, as adjusted to the regional area of the Project. Owned equipment costs must not exceed the single shift rates established in the Contractors' Equipment Cost Guide (CECG) for Construction Equipment also published by Primedia Information, Inc. The most recent published edition in effect at commencement of actual equipment use must be used.
 2. Equipment must be in good working condition. Equipment not in good condition, or larger than required, may be rejected by Owner or accepted at reduced rates.
 3. Leased Equipment:
 - a. For equipment leased or rented in arm's length transactions from outside vendors, maximum rates must be determined by the following actual usage/Blue Book Payment Category:
 - 1) Less than 8 hours: Hourly Rate.
 - 2) 8 or more hours but less than 7 days: Daily Rate.
 - 3) 7 or more days but less than 30 days: Weekly Rate.
 - 4) 30 days or more: Monthly Rate.
 4. Arm's length rental and lease transactions are those in which the firm involved in the rental or lease of equipment is not associated with, owned by, have common management, directorship, facilities and/or stockholders with the firm renting the equipment.
 5. Leased Equipment in Use: Actual equipment use time documented by Owner must be the basis that equipment was on, and utilized at, the Project Site. In addition to the leasing rate above, equipment operational costs must be paid at the estimated hourly operating cost rate set forth in the Blue Book if not already included in the lease rate. Hours of operation must be based upon actual equipment usage to the nearest quarter hour, as recorded by Owner.
 6. Leased Equipment, When Idle (Standby): Idle or standby equipment is equipment onsite or in transit to and from the Work Site and necessary to perform the Work under the modification, but not in actual use. Idle equipment time, as documented by Owner, shall be paid at the leasing rate determined above, excluding operational costs.

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7. Owned and Other Equipment in Use: Equipment rates for owned equipment or equipment provided in other than arm's length transaction must not exceed the single shift total hourly costs rate developed in accordance with the CECG and as modified herein for multiple shifts. This total hourly rate will be paid for each hour the equipment actually performs work. Hours of operation must be based upon actual equipment usage as recorded by Owner. This rate must represent payment in full for Contractor's direct costs.
8. Owned and Other Equipment, When Idle (Standby): Equipment necessary to be onsite to perform the Work on single shift operations, but not utilized, are paid for at the ownership hourly expense rate developed in accordance with the CECG, provided its presence and necessity onsite has been documented by Owner. Payment for idle time of portions of a normal workday, in conjunction with original contract Work, will not be allowed. Idle time claimed in a day for a particular piece of equipment must not exceed the normal Work or shift schedule established for the Project. This rate represents payment in full for Contractor's direct costs. When Owner determines that the equipment is not needed to continuously remain at the Work Site, payment will be limited to actual hours in use.
9. Owned and Other Equipment, Multiple Shifts: For multiple shift operations, the CECG single shift total hourly costs rate applies to the operating equipment during the first shift. For up to two (2) subsequent shifts in a 24-hour day, operating rate is the total hourly CECG operating cost plus 60 percent of the CECG ownership and overhaul expense. Payment for idle or standby time for second and third shifts is 20 percent of the CECG ownership and overhaul expense.
10. When necessary to obtain owned equipment from sources beyond the Project limits, the actual cost to transfer equipment to the Work Site and return it to its original location is allowed as an additional item of expense. Move-in and move-out allowances will not be made for equipment brought to the Project if the equipment is also used on original Contract or related Work.
11. If the move-out destination is not to the original location, payment for move-out will not exceed payment for move-in.
12. If move is made by common carrier, the allowance will be the amount paid for the freight. If equipment is hauled with Contractor's own forces, rental will be allowed for the hauling unit plus the hauling unit operator's wage. If equipment is transferred under its own power, the rental will be 75 percent of the appropriate total hourly costs for the equipment, without attachments, plus the equipment operator's wage.
13. Charges for time utilized in servicing equipment to ready it for use prior to moving and similar charges will not be allowed.
14. When a breakdown occurs on any piece of owned equipment, payment must cease for that equipment and any other owned equipment idled by the breakdown.

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15. If any part of the Work is shut down by Owner, standby time will be paid during non-operating hours if diversion of equipment to other Work is not practicable. Owner reserves the right to cease standby time payment when an extended shutdown is anticipated.
16. If a rate has not been established in the CECG for owned equipment, Contractor may:
 - a. If approved by Owner, use the rate of the most similar model found, considering such characteristics as manufacturer, capacity, horsepower, age, and fuel type, or
 - b. Request Primedia Information Inc. to furnish a written response for a rate on the equipment which must be presented to Owner for approval; or
 - c. Request Owner to negotiate a rate.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

PART 3

SPECIFICATIONS

**SECTION 01 11 00
SUMMARY OF WORK**

PART 1 GENERAL

1.01 GENERAL

- A. The Work to be performed under this Contract includes furnishing all tools, equipment, materials, supplies, and manufactured articles and furnishing all labor, transportation, services, including fuel, power, water, and essential communications, and performing all work, or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents. The Work shall be complete, and all work, materials, and services not expressly indicated or called for in the Contract Documents which may be necessary for the complete and proper construction of the Work in good faith shall be provided by the Contractor as though originally so indicated, at no increase in cost to the Owner.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

- A. The completed work shall provide Owner with construction of new facilities and modifications to existing facilities as and includes:
1. Primary Clarifiers:
 - a. Repair existing covered primary clarifier launders walls and floors by removing concrete surfaces and providing new concrete repair products and new epoxy coating in the launder.
 - b. Replace W2 piping in existing covered primary clarifiers.
 - c. Failed coatings must be removed and replaced on existing scum lines within the launder.
 2. Final Treatment:
 - a. Clean/repair/replace existing concrete joints and sealants in chlorine contact basins.
 - b. Repair existing chlorine contact basins walls by removing concrete surfaces and providing new concrete repair product.
 - c. Replace W2, Chlorine solution, and bisulfite piping and spray nozzles in existing contact basins
 - d. Clean/repair/replace existing concrete joints and sealants in final treatment effluent channel. Provide Contractor-designed bypass pumping system as specified to accommodate Work to match plant flows for minimum and maximum treatment capacity during construction.

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- e. Clean/repair/replace existing W2 pump station screens in final treatment effluent channel. Provide Contractor-designed bypass pumping system as specified to accommodate Work while maintaining minimum treatment capacity during construction.

B. Alternates:

- 1. Only those alternates that were selected by the Owner, as evidenced in the Agreement, are made a part of this Contract.
- 2. Alternates that were Bid are as described below:
 - a. Additive Alternate No. 1: Alternate includes chemical resistant coating in chlorine contact basins as specified in Section 01 23 00, Alternates.
 - b. Additive Alternate No. 2: Alternate includes polyurethane injection for leak prevention on external wall of primary clarifiers as specified in Section 01 23 00, Alternates.

1.03 PROVISIONS FOR FUTURE WORK

- A. Provisions for future construction as shown on the Drawings.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 14 13
ACCESS TO SITE

PART 1 GENERAL

1.01 PROJECT LOCATION

- A. The project is located at the Regional Water Pollution Control Facility (WPCF), 410 River Avenue, Eugene, Oregon, 97404.

1.02 SITE ACCESS AND SECURITY

- A. Access to the site will be from along existing roads through the main gate located at the northwest side of the WPCF off of River Avenue. Additional access to the site may be granted at Owner's discretion. Contractor will develop an access plan and request alternative access consideration 10 days ahead of desired access from an alternate gate.
- B. The site requires check-in/out by all individuals entering the plant. Proceed to Operations Building for check in/out.
- C. Additional site access information may be found on the Drawings.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

**SECTION 01 23 00
ALTERNATES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Schedule of Alternates: Documentation of changes to Contract Sum/Price and Contract Time/Duration.

1.02 RELATED SECTIONS

- A. Section 00 41 00, Bid Form: Incorporating monetary value of accepted Alternates.
- B. Section 00 73 00, Supplementary Conditions.
- C. Section 01 32 16, Construction Progress Schedule.
 - 1. Work schedule affected by Alternates.
- D. All Divisions affected by Alternates.

1.03 INTENT

- A. Each Alternate is intended to result in a complete, integrated, operational system or assembly.
- B. Coordinate related work and modify surrounding work to integrate the work of each Alternate.
- C. Alternates will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Contract or will be incorporated into the Contract by Change Order within 60 days of award of Contract.

1.04 SELECTION AND AWARD OF ALTERNATES

- A. Indicate Price for Alternates described below and list in Bid Form document or any supplement to it, which requests a "difference" in the Not to Exceed value by adding to or deducting from the base price.
- B. Alternates will be evaluated on Not to Exceed price.

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1.05 CONTRACT ADJUSTMENTS

- A. Work Adjustments.
1. Adjust Work required by the Contract for each Alternate accepted by the Owner.
 2. Include changes in material, equipment, and fabrication.
 3. Include changes in erection, installation, and finishing.
 4. Adjust Work to achieve the intended result as indicated on the Drawings and specified in related technical Specifications for each Alternate selected by Owner.
- B. Contractor Sum Adjustments: Owner will adjust the Contract NTE value as indicated in the Contractor's price for Alternates, which the Owner incorporates into the signed Contract form.
- C. Contractor's Requirements.
1. Review Contract documents for the Scope of Work required by each Alternate.
 2. State NTE value, the deduction from or addition to base NTE value for each Alternate listed in this Specification.
 3. Alternate Work is outlined in this Specification and specified in detail in the technical Specifications referenced in this Specification.
 4. Minor adjustments to exposed finished surfaces or concealed Work by the incorporation of the selected Alternates may or may not be indicated on the Drawings or the referenced Specifications.
 5. Include adjustments in Work as required to achieve the intended and indicated result, consistent with requirements in Contract documents.
 6. Coordinate Work modified by incorporation of Alternates.
- D. Owner's Rights.
1. The Owner reserves the right to accept or reject any or all Alternates, except that rejection of the NTE price constitutes rejection of all Alternates.
 2. The Owner reserves the right to reinstate Alternates at any time within 60 days after Contract Award by Change Order at the value indicated on the Contractor's Price Form for each Alternate.

1.06 SCHEDULE OF ALTERNATES

- A. Alternate No 1: Chemical Resistant Coating in Chlorine Contact Basins.
1. Base Bid: Repair mortar installation in chlorine contact basins as shown in Contract Documents.

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2. Alternate: Chemical Resistant Coating in Chlorine Contact Basins meeting Specification Section 09 90 00, Painting and Coatings.
- B. Alternate No 2: Polyurethan Injection for leak prevention on external wall of Primary Clarifiers.
1. Base Bid: No polyurethan injection for leak prevention.
 2. Alternate: Polyurethan Injection Grouting for leak prevention on external wall of Primary Clarifiers meeting specification Section 03 64 24, Polyurethane Injection Grouting.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 29 76
PROGRESS PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SUBMITTALS

- A. Action Submittals submitted in accordance with Specification Section 01 33 00, Submittal Procedures:
 - 1. Schedule of Values: Submit SOV based on Progress Schedule work breakdown structure in accordance with Specification Section 01 32 16, Construction Progress Schedule.
 - 2. Application for Payment.
 - 3. Final Application for Payment.

1.02 SCHEDULE OF VALUES

- A. Prepare a separate Schedule of Values for each schedule of the Work under the Agreement.
- B. Schedule of Values shall be developed from the Construction Schedule as specified in Specification Section 01 32 16, Construction Progress Schedule.
- C. Upon request of Project Manager, provide documentation to support the accuracy of the Schedule of Values.
- D. Unit Price Work: Reflect unit price quantity and price breakdown from conformed Bid Form.
- E. Lump Sum Work:
 - 1. Reflect specified cash and contingency allowances and alternates, as applicable.
 - 2. List separately, at a minimum:
 - a. Bonds and insurance premiums.
 - b. Mobilization.
 - c. Demobilization.
 - d. Preliminary and detailed progress schedule preparation.
 - e. Facility startup.
 - f. Contract Closeout.
 - g. Milestones, as indicated in Section 01 31 13, Project Coordination.
 - 3. Breakdown by Division 02 through Division 49 for each Project facility.

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- F. An unbalanced or front-end loaded schedule will not be acceptable. Mobilization should be held to less than 3 percent of the total lump sum contract amount. Excessive mobilization, as determined by the Owner, will be held in retainage.
- G. Summation of the complete Schedule of Values representing all the Work shall equal the Contract Price.
- H. Submit Schedule of Values via VPM, in a spreadsheet format compatible with latest version of Microsoft Excel.

1.03 SCHEDULE OF ESTIMATED PROGRESS PAYMENTS

- A. Show estimated payment requests throughout Contract Times aggregating initial Contract Price.
- B. Base estimated progress payments on initially acceptable progress schedule. Adjust to reflect subsequent adjustments in progress schedule and Contract Price as reflected by modifications to the Contract Documents.
- C. Submit schedule of estimated progress payments through VPM.

1.04 APPLICATION FOR PAYMENT

- A. Transmittal Summary Form: Attach one Summary Form with each detailed Application for Payment for each schedule and include Request for Payment of Materials and Equipment on Hand as applicable. Execute certification by authorized officer of Contractor.
- B. Use detailed Application for Payment Form provided by Owner.
- C. Provide separate form for each schedule as applicable.
- D. Include accepted Schedule of Values/Cost Loaded Schedule for each schedule or portion of lump sum Work and the unit price breakdown for the Work to be paid on a unit priced basis.
- E. Include separate line item for each Change Order and Work Change Directive executed prior to date of submission. Provide further breakdown of such as requested by Project Manager.

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F. Preparation:

1. Round values to nearest dollar.
2. Submit Application for Payment, including a Transmittal Summary Form and detailed Application for Payment Form(s) for each schedule as applicable, a listing of materials on hand for each schedule as applicable, such supporting data as may be requested by Project Manager.

G. Submit applications for payment through VPM.

1.05 MEASUREMENT—GENERAL

- A. Unit price work for repair and replacement of concrete at existing chlorine contact basins and primary clarifier launders shall be determined by measuring the square foot area of repair mortar material placed, installed, and finished in accordance with the Contract Documents, by average thickness of the repair mortar material placed. Measurement and payment shall be on a square foot basis.
- B. Units of measure shown in Bid Form shall be as follows, unless specified otherwise.

Item	Method of Measurement
AC	Acre—Field Measure by Engineer
CY	Cubic Yard—Field Measure by Engineer within limits specified or shown
CY-VM	Cubic Yard—Measured in Vehicle by Volume
EA	Each—Field Count by Engineer
GAL	Gallon—Field Measure by Engineer
HR	Hour
LB	Pound(s)—Weight Measure by Scale
LF	Linear Foot—Field Measure by Engineer
MFBM	Thousand Foot Board Measure—Field Measure by Engineer
SF	Square Foot— Field Measure by Engineer
SY	Square Yard— Field Measure by Engineer
TON	Ton—Weight Measure by Scale (2,000 pounds)

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1.06 PAYMENT

- A. Payment for all Lump Sum Work shown or specified in Contract Documents is included in the Contract Price. Payment will be based on a percentage complete basis for each line item of the accepted Schedule of Values.
- B. Payment for unit price items covers all the labor, materials, and services necessary to furnish and install the following items.

Item	Description
Removal, Disposal and Replacement of Concrete and Repair Mortar Installation (Various Depths)	<p>Concrete Removal: Includes necessary equipment specified for removal of concrete from surface in accordance with specified materials, equipment, and procedures, loading, hauling, and disposal of waste material.</p> <p>Repair mortar: Includes surface cleaning, surface preparation, placement of bonding materials, placement and finishing of final grout layer, and curing in accordance with the specified materials and equipment.</p> <p>No payment will be made for removal of materials and repair mortar installation beyond requirements in Section 03 01 32, Repair of Vertical and Overhead Concrete Surfaces.</p>

1.07 NONPAYMENT FOR REJECTED OR UNUSED PRODUCTS

- A. Payment will not be made for following:
 - 1. Loading, hauling, and disposing of rejected material.
 - 2. Quantities of material wasted or disposed of in manner not called for under Contract Documents.
 - 3. Rejected loads of material, including material rejected after it has been placed by reason of failure of Contractor to conform to provisions of Contract Documents.
 - 4. Material not unloaded from transporting vehicle.
 - 5. Defective Work not accepted by Owner.
 - 6. Material remaining on hand after completion of Work.

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1.08 PARTIAL PAYMENT FOR STORED MATERIALS AND EQUIPMENT

- A. Partial Payment: No partial payments will be made for materials and equipment delivered or stored unless Shop Drawings or preliminary operation and maintenance manuals are acceptable to Project Manager. Partial payment will not be made without prior arrangement with and approval by the Engineer.
- B. Final Payment: Will be made only for products incorporated in Work; remaining products, for which partial payments have been made, shall revert to Contractor unless otherwise agreed, and partial payments made for those items will be deducted from final payment.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 31 13
PROJECT COORDINATION

PART 1 GENERAL

1.01 SUBMITTALS

- A. Work Sequence Plan: Submit within 30 days of Notice to Proceed.
- B. Photographs 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.
- C. A complete set of all photographs and survey data of the post construction conditions shall be completed and submitted prior to final inspection by the Owner and Engineer.
- D. Shutdown Request Forms.

1.02 RELATED WORK AT SITE

- A. General:
 - 1. Other work that is either directly or indirectly related to scheduled performance of the Work under these Contract Documents, listed henceforth, is anticipated to be performed at Site by others.
 - 2. Coordinate the Work of these Contract Documents with work of others as specified in General Conditions.
 - 3. Include sequencing constraints and shutdown requests specified herein as a part of Progress Schedule.
- B. Other Concurrent Work:
 - 1. The Owner and Owner's contractors may be performing the following work during a period concurrent with the Work:
 - a. Aeration Systems Upgrades.
 - b. Admin Building Improvements.
 - c. Electrical Switchgear and transformer replacement.
 - d. Secondary clarifier mechanism recoating.
- C. Contractor must comply with the use of VPM software for specified communications. Owner will pay all software and licensing costs for the collaboration software and provide Contractor two User Accounts to use. Owner will provide Contractor with one VPM training session for Contractor's employees.

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1.03 UTILITY NOTIFICATION AND COORDINATION

- A. Coordinate the Work with various utilities within Project limits. Notify applicable utilities prior to commencing Work, if damage occurs, or if conflicts or emergencies arise during Work.
1. Electricity Company: Eugene Water and Electric Board.
 - a. Telephone: (541) 484-6016.
 2. Telephone Company: Qwest.
 - a. Telephone: (800) 603-6000.
 3. Water Department: Eugene Water and Electric Board.
 - a. Telephone: (541) 484-6016.
 4. Northwest Natural Gas.
 - a. Telephone: (541) 342-3661.
 5. Cable Company: Comcast.
 - a. Telephone: (888) 824-8264.
 6. Oregon Utility Notification Center.
 - a. Telephone: (800) 332-2344.

1.04 PROJECT MILESTONES

- A. Include the Milestones specified herein as a part of the Progress Schedule required under Section 01 32 16 Construction Progress Schedule.
- B. Project Milestones:
1. Generally described in the Agreement Form. Following is a detailed description of each:

No.	Milestone	Substantial Completion (Calendar Days from Notice to Proceed)
1	Substantial Completion of Entire Contract	In accordance with Specification Section 00 52 00, Contract
2	Structural rehab and associated work for one chlorine contact basin and one covered primary clarifier	In accordance with Specification Section 00 52 00, Contract
3	Structural rehab and associated work for one chlorine contact basin and one covered primary clarifier	In accordance with Specification Section 00 52 00, Contract
4	Structural rehab and associated work for one chlorine contact basin and final treatment effluent channel	In accordance with Specification Section 00 52 00, Contract

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No.	Milestone	Substantial Completion (Calendar Days from Notice to Proceed)
5	Structural rehab and associated work for one chlorine contact basin.	In accordance with Specification Section 00 52 00, Contract
6	Final Completion of Entire Contract	In accordance with Specification Section 00 52 00, Contract

1.05 WORK SEQUENCE AND CONSTRAINTS

- A. For the purposes of this article, and Subsection 1.05(C) and 1.06 of this Specification Section, terms such as "... work ... must be completed" and "... completed and in operation," and "... in successful operation" are defined as meeting the terms of "Substantial Completion" and "Partial Substantial Completion" as defined in the General Conditions.
- B. Include the following work sequencing constraints in Progress Schedule:
1. Concrete rehabilitation work is anticipated to occur over four consecutive dry-weather construction seasons.
 2. Contractor must coordinate all work with Owner and Engineer to accommodate activities described in the Scope of Work.
 3. Do not proceed with any work affecting facility operations without prior approval from Owner and Engineer regarding the need and duration of such work.
 4. Conduct a pre-activity coordination meeting with Owner and Engineer at least 2 weeks prior to mobilization and any shutdowns impacting operations.
 5. Perform work continuously during critical connections and changeovers to prevent operational interruptions.
 6. All primary clarifiers, chlorine contact basins and final treatment effluent channel must remain in service from the period of October 1 to May 31.
 7. A maximum of one primary clarifiers may be out of service concurrently except as noted below.
 8. Provide and size pumps to transfer primary clarifier effluent to and from the primary effluent conduit within an 8-hour period. Wash down and clean the chlorine contact basins and associated equipment as necessary to complete Work. Coordinate with Owner personnel on removal of chlorine contact basins from service and return to service.

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9. Work requiring chlorine contact basins to be out of service must occur in dry season between June 1, and September 30 annually unless approved by Owner.
10. A maximum of one chlorine contact basin may be out of service concurrently except as noted below.
11. Provide and size pumps to transfer disinfected effluent to and from a chlorine contact basin to the final treatment effluent channel within an 8-hour period. Wash down and clean the chlorine contact basins and associated equipment as necessary to complete Work. Coordinate with Owner personnel on removal of chlorine contact basins from service and return to service.
12. Site civil work and plant utility work will be conducted throughout the overall construction schedule, integrated into the Project elements described above as specific areas of the Site are impacted.
13. More detailed constraints are given in Facility Operations below.

C. Work Sequence:

1. To meet the overall objectives of the Project, certain tasks and task elements must be generally performed, completed, or substantially completed in the herein-specified sequences. However, two or more of the tasks or task elements may be pursued simultaneously when consistent with the requirements of this Specification section and specification Section 01 32 16, Construction Progress Schedule.
2. The specified sequences and tasks are not all-inclusive. They are intended to convey overall constraints and suggested construction sequences. Contractor must plan the Work, relocate facilities, reroute utilities, and provide for temporary connections and terminations as necessary in an appropriate sequence of operation to perform the Work, while minimizing interferences with and providing for continuous operation of the Owner's existing wastewater facilities.
3. Task headings and descriptions set forth below are descriptive only and are not intended to define the scope of Work included therein.
4. Major tasks and sequences have been identified for Owner's purposes. Tasks listed herein include all accompanying tasks such as, but not limited to, Site Work, interconnecting utilities associated infrastructure, and applicable temporary provisions necessary to sequence the Work. Temporary provisions must include pipeline endcaps, other utility terminations, and temporary utilities as necessary to allow operation of portions of the Work prior to completion of other portions of the Work, consistent with Contractor's sequence of operations, although such provisions are not shown.
5. All existing Owner facilities must remain in continuous operation except as specified herein.

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6. Required Constraints and Suggested Task Sequencing:
- a. Initial Sitework:
 - 1) Install erosion control measures.
 - 2) Install staging areas, separate Contractor entrance gates, and other Site security measures.
 - b. Chlorine Contact Basins Improvements:
 - 1) Coordinate with Owner to complete taking basin offline and lockout/tag out procedure.
 - 2) Transfer disinfected effluent, dewater and wash down chlorine contact basin.
 - 3) Mobilize and install scaffolding and concrete removal equipment.
 - 4) Remove conflicting process piping.
 - 5) Perform concrete removal and expansion joint material removal.
 - 6) Perform crack repair, controlled concrete surface rehabilitation, concrete joint cleaning and resealing. This structural repair Work may be performed as a separate chlorine basin removal from service, or concurrently with mechanical, associated with the basins, provided the basins are returned to service within the timeframe provided herein.
 - 7) Install and test repair mortar.
 - 8) Replace process piping as required.
 - 9) Demobilize and remove equipment; return basin to service in coordination with Owner.
 - 10) Once each basin meets Substantial Completion requirements, Owner will operate those facilities.
 - c. Final Treatment Effluent Improvements:
 - 1) Coordinate with Owner to complete taking basin offline and lockout/tag out procedure.
 - 2) Install temporary and quickly removable bulkheads in chlorine contact basin to isolate and allow Contractor dewatering of channel.
 - 3) Install and commission temporary bypass pumping system as required to support final treatment influent channel rehabilitation.
 - 4) Transfer disinfected effluent, dewater and wash down effluent channel.
 - 5) Mobilize and install scaffolding and concrete removal equipment.
 - 6) Perform concrete removal and expansion joint material removal and replacement.
 - 7) Replace W2 pump station screens as required.

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- 8) Demobilize and remove equipment; return basin to service in coordination with Owner.
- 9) Once the channel meets Substantial Completion requirements, Owner will operate those facilities.
- d. Primary Clarifier Launder Improvements:
 - 1) Coordinate with Owner to complete taking basin offline and lockout/tag out procedure.
 - 2) Transfer clarifier effluent, dewater and wash down clarifier launder.
 - 3) Remove clarifier cover as needed in coordination with Owner and operations staff.
 - 4) Mobilize and install scaffolding and concrete removal equipment.
 - 5) Remove conflicting process piping.
 - 6) Perform concrete removal and expansion joint material removal.
 - 7) Perform crack repair, controlled concrete surface rehabilitation, concrete joint cleaning and resealing. This structural repair Work may be performed as a separate chlorine basin removal from service, or concurrently with mechanical, associated with the clarifiers, provided the clarifiers are returned to service within the timeframe provided herein.
 - 8) Install and test repair mortar.
 - 9) Apply epoxy coating.
 - 10) Replace and recoat process piping.
 - 11) Replace process piping as required.
 - 12) Reinstall clarifier cover.
 - 13) Demobilize and remove equipment; return basin to service in coordination with Owner.
 - 14) Once each primary clarifier meets Substantial Completion requirements, Owner will operate those facilities.

1.06 FACILITY OPERATIONS

- A. Continuous operation of Owner's facilities is of critical importance. Schedule and conduct activities such that the existing plant remains in continuous satisfactory operation during the entire construction period, unless otherwise specified.
- B. Perform Work continuously during critical connections and changeovers, and as required to prevent interruption of Owner's operations.
- C. Overnight sleeping on the Water Pollution Control Facility (WPCF) grounds will not allowed without written approval.

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- D. The Plant has specific safety procedures that require all workers to attend a 1-hour (or less) orientation and training session. Topics will include: accessing the Site during off-hours, designated work areas, plant safety. Contractor's Superintendent(s) and Foremen must attend this training prior to work commencing onsite. Contractor must review this information with all subcontractors and new workers prior to the commencement of their work. Contractor must confirm with written documentation that subcontractors have reviewed the onsite rules. Annual refresher training is required.
- E. When necessary, plan, design, and provide various temporary services, utilities, connections, temporary piping and heating, access, and similar items to maintain continuous operations of Owner's facility.
- F. Do not close lines, open or close valves, or take other action which would affect the operation of existing systems, except as specifically required by the Contract Documents and after authorization by Owner. Such authorization will be considered within 48 hours after receipt of Contractor's written request.
- G. Spills:
1. Spills of untreated or partially treated sewage to surface waters or drainage courses are prohibited during construction. In the event accidental spill is caused by Contractor's operations, Owner shall immediately be entitled to employ others to stop the spill without giving written notice to Contractor.
 2. Penalties imposed on Owner as a result of any bypass caused by actions of the Contractor, his employees, or subcontractors, shall be borne in full by Contractor, including legal fees and other expenses to Owner resulting directly or indirectly from the bypass. Under the terms of discharge permits issued to Owner, in the event accidental bypassing occurs, Owner is liable for the following civil penalties:
 - a. NPDES Permit No. 102486.
 - b. 32,500 dollars per day.
 3. A spill is defined as 1-gallon or more of any wastewater process stream, except disinfected plant effluent.
 4. In the event of a spill or sanitary sewer overflow which could result in land, ground water, storm water, waterway, or other exposure to the public, Contractor must notify Owner immediately. The following information shall be provided by Contractor:
 - a. Date/Time the spill started.
 - b. Date/Time the spill stopped.
 - c. Estimated total volume released.
 - d. What caused or led to the release.
 - e. What will prevent reoccurrences.

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5. Owner will endeavor to assist Contractor to stop the spill to extent possible. However, all labor, materials, equipment, fines incurred by Owner will be deducted from the next pay request or retainage of Contractor.
6. Any cleanup and restoration deemed necessary by Owner will be performed by Contractor at Contractor's expense.

H. Contractor must provide Owner with advance written notifications prior to starting work as described below:

Description	Advance Notice, working days
Taking any process unit out of service	20
Taking any equipment out of service	10
Taking portions of power, water or air systems out of service	5
Creating temporary onsite traffic restrictions	10
Starting groundwater dewatering operations	20
Performing tank or channel dewatering	10
Potholing to locate subsurface utilities and obstructions	3
Bypassing treatment units	20
Conducting training	21
Conducting testing	10
Requesting special inspections	1

I. Process or Facility Shutdown:

1. The following will require shutdown at some time during the Work:
Final Effluent channel improvements.
2. No more than one process outage per week, for all active projects, will occur, unless otherwise approved by Owner. To clarify, each Contractor onsite will not be granted one shutdown per week. Rather, one shutdown per week will be accommodated for all projects onsite. Contractor is encouraged to coordinate outage needs with Owner to coincide with other Project activities.

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3. When required, process outages shall be performed, as best as possible, during low flow periods. Low flows are between 4:00 a.m. and 7:00 a.m. Process outages shall be a maximum of four hours in duration, of which typically the first 45 minutes is required for flow to actually stop, leaving just over 3 hours of work time.
4. Approval of shutdown may be contingent upon flow or some other factor outside of Owner's control. Owner reserves the right to cancel any scheduled outage if, in their best professional judgment, the outage will cause a violation of the National Pollutant Discharge Elimination System (NPDES) permit.
5. Provide a completed Shutdown Request form in advance to Owner in accordance with Subsection 1.06(H) of this specification section, or, if not listed, 10 working days.
6. For each shutdown, Contractor will identify a Safety Representative who will perform the following:
 - a. Verify, and then notify, the operations console when Contractor's crew and equipment are "all clear" from the shutdown area, and that it is safe to put the equipment back in operation.
 - b. Be onsite throughout the shutdown.
7. 1 week prior to scheduled shutdown, Contractor must meet with the Owner to perform the following:
 - a. Communicate any modifications to the Shutdown Request form.
 - b. Discuss likelihood of shutdown occurring on schedule.
 - c. Will verify that all equipment, tools, temporary power, working platforms, and components necessary for the outage are onsite.
 - d. Clarify roles of Contractor, and Owner's personnel during the shutdown.
8. 24 hours prior to scheduled shutdown, assist Owner with the following:
 - a. Owner will confirm Contractor is ready to proceed with the shutdown as described on the Shutdown Request form.
 - b. Owner will confirm that prefabrication of all piping and other assemblies are completed, to the greatest degree possible.
9. Provide adequate numbers of personnel for each shutdown, so that the work shall be accomplished within the specified time frame.
10. Install and maintain bypass facilities and temporary connections required to keep WPCF operations on line. Provide temporary provisions for continuous power supply to critical facility components. Sequences other than those specified will be considered upon written request to Owner, provided they afford equivalent continuity of operations.
11. Do not proceed with Work affecting a facility's operation without obtaining Owner's advance written approval of the need for and duration of such Work.
12. Unscheduled shutdown and/or interruptions of continued safe and satisfactory operation of the facility that results in any fines levied shall

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be the responsibility of Contractor if it is demonstrated that Contractor was negligent in their work or did not exercise proper precautions in the conduct of their work.

13. Whenever possible, combine discrete shutdown procedures into a single shutdown when the duration of the shutdowns or the Work requirements allows such combining to occur on a process unit or work area. The intent of combining procedures is to minimize the impacts upon plant operations and processes by limiting the number of shutdowns required.
14. Contractor must contact Greg Watkins (541) 682-8610, Greg.A.Watkins@ci.eugene.or.us) or Owner's Project Manager when shutdowns of existing piping, structures, equipment, electrical, or control systems are required. Contractor must provide the following information.
 - a. Where the work will take place.
 - b. What process piping and/or equipment need to be locked-out.
 - c. When Contractor would like to have the piping and/or equipment locked-out.
 - d. How long the lock-out will be in place.
15. Owner will schedule a time to conduct the lock-out. An Owner representative must be present during any lock-out of Owner's facilities.
16. Owner will endeavor to comply with Contractor requests in a timely manner. However, Contractor is advised that plant operational needs take precedence over construction requests.
17. Contractor is responsible for providing all locks, tags, chains, blocks, and any other devices necessary to safely de-energize and lock-out the process piping and/or equipment.
18. When Contractor has completed their work, they must contact Greg Watkins and receive verbal approval before removing their lock-out devices. Only Owner is authorized to put process piping or equipment in service.
19. Contractor must also follow OR-OSHA internal lock-out procedures. If Contractor believes there is a conflict between Owner's Lock-out/Tag-out procedure and their own procedure, Contractor must advise Owner as soon as practical.
20. Cleaning of a process unit to be taken out of service shall be performed by Owner. Owner shall clean process unit a single time, when unit is first taken out of service. Additional cleaning events must be performed by Contractor. Owner's cleaning operations shall include draining hosing to remove material loosely attached to surfaces. Additional cleaning required by Contractor to perform the Work must be provided by Contractor.
21. Prepare and submit a detailed Facility Outage Plan when removal of an existing facility from service is necessary to complete the Work. Restrictions on outages are described in this section.

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22. Submit the Facility Outage Plan to the Engineer and Owner for review and approval at least 2 weeks prior to the scheduled outage. Develop the Facility Outage Plan to satisfy the Work Sequence restrictions and conditions specified in this section. Do not proceed with any Work involving facility outages until the Outage Plan has been approved by the Engineer and Owner.
23. The Facility Outage Plan must describe, as applicable, a listing of existing facilities that will be taken out of service, the length of time required to complete the operation, and the necessary personnel and equipment which will be provided in order to successfully complete the operation.
24. Coordinate the outage schedule with the overall construction schedule.

J. Relocation of Existing Facilities:

1. During construction, it is expected that minor relocations of Work will be necessary.
2. Provide complete relocation of existing structures and Underground Facilities, including piping, utilities, equipment, structures, electrical conduit wiring, electrical duct bank, and other necessary items.
3. Use only new materials for relocated facility. Match materials of existing facility, unless otherwise shown or specified.
4. Perform relocations to minimize downtime of existing facilities.
5. Install new portions of existing facilities in their relocated position prior to removal of existing facilities, unless otherwise accepted by Owner.

K. Stage Work to maintain unobstructed access for emergency vehicles to all buildings and fire hydrants.

1.07 ADJACENT FACILITIES AND PROPERTIES

A. Examination:

1. Before onsite work begins Contractor, Owner, and affected property owners and utility owners shall make a thorough examination of pre-existing conditions including existing buildings, structures, and other improvements in vicinity of Work, as applicable, which could be damaged by construction operations.
2. Periodic reexamination must be jointly performed to include, but not limited to, cracks in structures, settlement, leakage, and similar conditions.

B. Documentation:

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1. Record and submit documentation of observations made on examination inspections in accordance with Subsection 1.08 of this specification section.
2. Upon receipt, Owner will review, sign, and return one record copy of documentation to Contractor to be kept on file in field office.
3. Such documentation shall be used as indisputable evidence in ascertaining whether and to what extent damage occurred as a result of Contractor's operations, and is for the protection of adjacent property owners, Contractor, and Owner.

1.08 CONSTRUCTION PHOTOGRAPHS

- A. Photographically document all phases of the project including preconstruction, construction progress, and post-construction. Each photo must have date with time stamp and/or method to identify the date and local time that the photo was taken for the Project.
- B. Use digital camera and provide color photos in digital format of not less than 5.0 mega pixels color.
- C. Owner reserves the right to select the subject matter and vantage point from which photographs are to be taken.
- D. Preconstruction and Post-Construction:
 1. After Effective Date of the Agreement and before Work at Site is started, and again upon issuance of Substantial Completion, take a minimum of 100 exposures of Construction Site and property adjacent to perimeter of Construction Site. Deliver digital photos to Owner and Engineer on USB storage devices labeled with the project name and number, and upload all photos to the Project Software in an organized method (day/month/year) acceptable to Owner.
 2. Particular emphasis shall be directed to structures both inside and outside the Site.
- E. Construction Progress Photos:
 1. Photographically demonstrate progress of construction, showing every aspect of Site and adjacent properties as well as interior and exterior of new or impacted structures.
 2. Weekly: Take minimum 40 exposures using Digital Camera and upload monthly to the Project Software in an organized method (day/month/year) acceptable to Owner.

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PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 SALVAGE OF MATERIALS

- A. Meet with Owner prior to starting to dismantle equipment or piping designated to be salvaged. Owner will indicate locations where equipment is to be disconnected.

3.02 CUTTING, FITTING, AND PATCHING

- A. Cut, fit, adjust, or patch Work and work of others, including excavation and backfill as required, to make Work complete.
- B. Obtain prior written authorization of Owner before commencing Work to cut or otherwise alter:
 - 1. Structural or reinforcing steel, structural column or beam, elevated slab, trusses, or other structural member.
 - 2. Weather- or moisture-resistant elements.
 - 3. Efficiency, maintenance, or safety of element.
 - 4. Work of others.
- C. Refinish surfaces to provide an even finish.
 - 1. Refinish continuous surfaces to nearest intersection.
 - 2. Refinish entire assemblies.
 - 3. Finish restored surfaces to such planes, shapes, and textures that no transition between existing work and Work is evident in finished surfaces.
- D. Restore existing work, Underground Facilities, and surfaces that are to remain in completed Work including concrete-embedded piping, conduit, and other utilities as specified and as shown.
- E. Make restorations with new materials and appropriate methods as specified for new Work of similar nature; if not specified, use recommended practice of manufacturer or appropriate trade association.
- F. Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces and fill voids.
- G. Remove specimens of installed Work for testing when requested by Owner.

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3.03 PROTECTION OF PUBLIC PROPERTY

- A. Contractor shall employ such means and methods as necessary to adequately protect public and private property and property of the Owner against damage. In the event of damage to such property, Contractor must, at his own expense, immediately restore the property to a condition equal to the original condition and to the satisfaction of the Owner of said property.

3.04 SUPPLEMENTS

- A. The supplements listed below, following “End of Section,” are a part of this specification:
1. Shutdown Request Form.
 2. MWMC Asset Tracking Spreadsheet.

END OF SECTION

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SHUTDOWN REQUEST FORM

Type of Outage (flow, electrical, control, other)	Detailed Description of Work	Process Units / Equipment Affected, and Operational State During Outage	Duration of Outage	Constraints & Coordination	Safety Representative (name, contact info.)

MWMC ASSET TRACKING FORM

Project Name:
Project Number:
MWMC Project Manager:
MWMC Project Manager Phone:
MWMC Project Manager Email:
General Contractor:
General Contractor Foreman:
General Contractor Phone:
General Contractor Email:

INSTRUCTIONS:

The Contractor shall complete/update the spreadsheet on a quarterly basis for all equipment that meets any of the conditions below:

- a) all equipment denoted with an 'equipment number' on the conformed contract documents
- b) all equipment with a purchase price over \$1,000

Exceptions are structures, piping, landscape, etc.

Equipment Number	Description	Manufacturer	Manufacturer Address	Manufacturer Contact	Manufacturer Phone	Manufacturer Email	Model No.	Serial No.	Purchase Price	Install Price (incl. labor)	Warranty Start Date	Warranty End Date

SECTION 01 31 19
PROJECT MEETINGS

PART 1 GENERAL

1.01 GENERAL

- A. Schedule weekly meeting with Owner and Engineer. Coordinate meeting location with Owner, prepare meeting agendas with regular participant input and distribute with written notice of each meeting, preside at meetings, record minutes to include significant proceedings and decisions, and distribute minutes to participants and affected parties for review and comment within 3 days of each meeting. Incorporate Owner's comments into minutes.

1.02 PRECONSTRUCTION CONFERENCE

- A. Upon issuance of Notice to Proceed, or earlier when mutually agreeable, Project Manager will arrange preconstruction conference in convenient place for most persons invited, in accordance with the General Conditions.
- B. Contractor shall be prepared to discuss the following subjects, as a minimum:
1. Required schedules.
 2. Affirmation of BOLI PWR requirements.
 3. Status of Bonds and insurance.
 4. Sequencing of critical path work items.
 5. Project coordination.
 6. Designation and contact information of responsible personnel.
 7. Progress payment procedures.
 8. Contract Documents modification procedures.
 9. Security procedures.
 10. Temporary facilities and controls including temporary utilities.
 11. Major product delivery and priorities.
 12. Contractor's safety and emergency plan and safety representative, and Owner's safety requirements.
 13. Major subcontractors and suppliers.
 14. Procedures and Processing of:
 - a. Field decisions.
 - b. Proposal requests.
 - c. Submittals.
 - d. Change Orders.
 - e. Applications for Payment.
 - f. Record Documents.
 15. Existing utilities.
 16. Housekeeping procedures.

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- C. Attendees must include:
1. Owner's representatives.
 2. Contractor's office representative.
 3. Contractor's onsite superintendent.
 4. Contractor's quality control representative.
 5. First-tier subcontractors' representatives.
 6. Engineer.
 7. Others as appropriate.

1.03 PRELIMINARY SCHEDULES REVIEW MEETING

- A. As set forth in specification Section 00 72 00, General Conditions of the Contract and Section 01 32 16, Construction Progress Schedule.

1.04 PROGRESS MEETINGS

- A. Schedule regular progress meetings at site, conducted weekly to review the Work progress, progress schedule, Shop Drawings and Sample submissions schedule, Application for Payment, contract modifications, and other matters needing discussion and resolution. Prepare draft agenda for Owner's review and incorporate Owner comments into final agenda. Meeting topics must include:

1. Safety.
2. Work progress.
3. Construction schedule, coordination, and planning.
4. Status of submittals and requests for information.
5. Tracking of cost documentation for contract changes.
6. Tracking and discussion of new and old meeting topics.
7. Status of pay applications.

- B. Attendees must include:

1. Owner's representative(s).
2. Contractor.
3. Subcontractors and Suppliers, as appropriate.
4. Design Consultant as requested by Owner.
5. Engineer.
6. Others as appropriate.

- C. Record minutes of meeting and distribute copies of minutes within 6 days of meeting to participants and interested parties.

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1.05 QUALITY CONTROL AND COORDINATION MEETINGS

- A. Scheduled by Owner as necessary to review test and inspection reports, and other matters relating to quality control of the Work and work of other contractors.
- B. Attendees will include:
 - 1. Owner.
 - 2. Contractor.
 - 3. Contractor's designated quality control representative.
 - 4. Subcontractors and Suppliers, as necessary.
 - 5. Engineer.

1.06 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene at site prior to commencing the Work of that section.
- B. Require attendance of entities directly affecting, or affected by, the Work of that section.
- C. Notify Project Manager and Owner 4 working days in advance of meeting date.
- D. Provide suggested agenda to Project Manager to include reviewing conditions of installation, preparation and installation or application procedures, and coordination with related Work and work of others.

1.07 FACILITY STARTUP MEETINGS

- A. Schedule and attend a minimum of two facility startup meetings for each facility or process. The first of such meetings must be held prior to submitting Facility Startup Plan as specified in Section 01 75 16, Startup Procedures, and must include preliminary discussions regarding such plan.
- B. Agenda items must include, but not be limited to, content of Facility Startup Plan, coordination needed between various parties in attendance, and potential problems associated with startup.
- C. Attendees must include:
 - 1. Owner.
 - 2. Contractor.
 - 3. Contractor's designated quality control representative.

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4. Subcontractors and equipment manufacturer's representatives whom Contractor deems to be directly involved in facility startup.
5. Engineer.
6. Owner's operations personnel.
7. Others as required by Contract Documents or as deemed necessary by Contractor.
8. Owner's DDC Controls Contractor.

1.08 POST CONSTRUCTION MEETING

- A. Meet with Owner to inspect the Work 11 months after date of Substantial Completion.
- B. Arrange meeting at least 7 days before meeting.
- C. Meet at Project Site.
- D. Inspect the Work and draft list of items to be completed or corrected.
- E. Review service and maintenance contracts, and take appropriate corrective action when necessary.
- F. Complete or correct defective work and extend correction period accordingly.
- G. Require attendance of Superintendent, appropriate manufacturers and installers of major units of constructions, and affected subcontractors as requested by Owner.

1.09 OTHER MEETINGS

- A. In accordance with Contract Documents and as may be required by Owner and Engineer.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 31 23
PROJECT SOFTWARE

PART 1 GENERAL

1.01 GENERAL

- A. Contractor must comply with the use of Virtual Project Manager (VPM) software for specified communications. Owner will pay all software and licensing costs for the collaboration software.

1.02 VPM COMMUNICATIONS

- A. USE VPM for project collaboration in accordance with this specification section. Use must adhere to instructions provided to Contractor by Owner. Owner reserves the right to update this subsection based on functionality updates and/or procedural changes. Updates will be communicated to all parties. At a minimum, VPM must be used to share and process submittals, change requests and proposals, RFIs, and pay applications. All project permits, photos, schedules and daily logs must be uploaded to VPM. Appropriate Contractor representative must attend Owner-provided VPM training.
- B. Provide computer hardware and internet browser software at location(s) from where this project is managed by Contractor. VPM software and licenses to use the project database will be provided by MWMC for the duration of the project.
- C. Equipment:
 - 1. Computer.
 - 2. Digital Camera.
 - 3. Scanner.
- D. Supply a high-speed Internet connection at all locations from which the project will be managed by Contractor.

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E. User Requirements:

1. Contractor will be assigned at least one User account.
2. Company and contact information will be managed in the site by Owner VPM Administrator. All parties must ensure information is accurate. Submit all company and contact information and revisions to Owner VPM Administrator.
3. Each company must have one license and access to VPM. Licenses can be shared. Accounts that are inactive for more than 90 days will be deactivated.
4. All users shall log into VPM regularly while the project is ongoing to check for messages and outstanding items.
5. All parties must notify Owner's VPM Administrator within 48 hours when an employee with access to VPM has been terminated to facilitate deactivation of the associated user account.
6. All parties are responsible for obtaining training in the use of VPM. Owner will offer VPM training classes during the initial implementation phase of the project.

F. Document Management:

1. VPM's Document Management system consists of modules, with set procedures and data entry requirements, that are used for the organization and management of common communications in construction management. Contractor must use the following features:
 - a. Daily Logs.
 - b. Change Order Manager.
 - c. Transmittals.
 - d. Submittals.
 - e. RFIs.

- G. For all other documents and electronic files that are not managed under one of the modules in VPM, this project will utilize VPM's File Director system for document sharing, filing, and storage. All appropriate files must be uploaded to File Director. Contractor must upload documents created by Contractor and subcontractors. Owner's VPM Administrator may require a file naming convention for files uploaded to VPM and may set protocol for version control and other file management procedures for documents. A preliminary file folder structure has been created to organize project documents. VPM allows users to upload, download, view and markup files, based on permissions. Owner's VPM Administrator will manage the folder structure and these permissions levels.

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- H. The project will utilize VPM's Cost Management system to generate and respond to Contractor Change Requests (CCRs), Contract Change Orders, and Bulletins (via Requests for Quote (RFQs)). Contractor must utilize and respond to requirements of these modules in accordance with instructions of Owner's VPM Administrator for any consideration of or implementation of changes to the contract initiated by Contractor or Owner. All changes to the contract and all background materials related to those changes must be documented in VPM.

END OF SECTION

SECTION 01 32 16
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. General:

1. All schedules must be submitted in electronic file format compatible with uploading to the Project Software.
2. Progress schedules must employ the Critical Path Method (CPM) using retained logic for the planning, scheduling, and reporting of the Work. The CPM must be generally as outlined in Associated General Contractors of America (AGC) 580, "Construction Project Planning and Scheduling Guidelines." If a conflict occurs between the AGC publication and this specification, this specification shall govern.
3. Contractor's scheduling personnel must have working knowledge and a minimum of 5 years using scheduling software on projects of similar size and nature. Should the Contractor not have experienced personnel to utilize software for Construction Progress Schedule development, the Contractor must employ a scheduling consultant to generate the detailed Construction Progress Schedule and monthly updates.
4. Schedule Collaborative Meeting:
 - a. Meet with Owner within twenty (20) days of Contract execution to coordinate between the schedule and Schedule of Values and to establish logical major categories and rollup headings that will be used to track project progress, to evaluate Contractor pay applications, establish monthly cash flow estimates for construction work planning, determine Adjustments to Contract Time per Part 1.07 of this specification, and coordinate the work sequence with plant operations and other concurrent construction projects as necessary.
 - b. The major categories and rollup headings as outlined in this meeting shall form the basic structure of the schedule. The resulting structure shall be optimized to provide the highest level of usefulness to Owner in managing the project including monitoring and communicating project progress.
 - c. Major categories and rollup headings must match the categories used in the Schedule of Values as specified in Section 01 29 76, Progress Payment Procedures.

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1.02 SUBMITTALS

- A. Qualifications of Scheduling Professional:
1. Submit qualifications of scheduling professional within twenty (20) days of Contract execution.
 2. Qualifications must include:
 - a. Name of Scheduling Professional.
 - b. Years' of experience using scheduling software.
 - c. Type of software used.
 - d. List of projects and associated dollar value where Scheduling Professional used the scheduling software.
 - e. Narrative description of the Scheduling Professional's level of competence using scheduling software.
- B. Preliminary Construction Progress Schedule: Submit in electronic Excel and PDF formats within thirty (30) days of Contract execution.
- C. Detailed Progress Schedule:
1. Submit initial detailed Construction Progress Schedule within sixty (60) days of Contract execution.
 2. Submit an updated detailed Construction Progress Schedule with each monthly payment request. Failure to do so may result in Owner withholding all or part of the monthly progress payment until the detailed Construction Progress Schedule is updated in accordance with this specification Section.
 3. Submit in electronic Excel and PDF formats through Project Software.
 4. With each schedule update, submit document certifying that the Construction Progress Schedule submitted is the actual schedule being utilized for execution of the Work.
- D. Prior to final payment, submit a final updated Construction Progress Schedule.
- E. Schedule Layout:
1. PDF file submittals must be formatted as requested by Owner or Engineer.
 2. Title Block: Show name of Project, Owner, date submitted, revision or update number, and the name of the scheduler. Updated schedules shall indicate data date.
 3. Identify horizontally across top of schedule the time frame by year, month, and day.
 4. Identify each activity with a unique number and a brief description of the Work associated with that activity.
 5. Clearly indicate the critical path.

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6. Show the controlling relationships between activities.
7. Plot activities on a time-scaled basis with the length of each activity proportional to the current estimate of the duration.
8. Plot activities on an early start basis unless otherwise requested by Owner.
9. Provide a legend to describe standard and special symbols used.

F. Schedule Format Structure:

1. List information for each activity in tabular format, including, at a minimum:
 - a. Activity Identification Number.
 - b. Activity Description.
 - c. Original Duration.
 - d. Remaining Duration.
 - e. Early Start Date (Actual start on Updated Progress Schedules).
 - f. Early Finish Date (Actual finish on Updated Progress Schedules).
 - g. Late Start Date.
 - h. Late Finish Date.
 - i. Total Float.
2. Sort schedule per Owner if directed.

1.03 PRELIMINARY PROGRESS SCHEDULE

- A. In addition to basic requirements outlined in specification Section 00 72 00, General Conditions of the Contract, show a detailed schedule beginning with Notice to Proceed for a minimum duration of 120 days, and a summary schedule of balance of Work through Final Completion. The schedule may be in bar chart format and shall show the sequence in which Contractor proposes to perform Work, all specific completion dates and milestones indicated in the Contract Documents, and the dates on which Contractor plans to start and finish major portions of the Work.
- B. Show major category and rollup headings as determined jointly by Owner and Contractor during the Schedule Collaborative Meeting specified herein.
- C. Show major activities including, but not limited to, the following:
 1. Notice to Proceed.
 2. Permits.
 3. Submittals, with review time. Contractor may use Schedule of Submittals required under specification Section 01 33 00, Submittal Procedures.
 4. Early procurement activities for long lead equipment and materials
 5. Specified Work sequences and construction constraints including anticipated outages and shutdowns.

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6. Owner-furnished products delivery and installation dates.
 7. Operation & Maintenance (O&M) Manuals draft and final due dates
 8. Contract milestone and completion dates as specified in Section 00 52 00, Agreement Form, and described in Section 01 31 13, Project Coordination.
 9. Major structural, mechanical, equipment, electrical, architectural, and instrumentation and control Work.
 10. System and equipment startup and commissioning.
 11. Project close-out.
 12. Demobilization.
- D. Preliminary Construction Progress Schedule must show major portions of the Work and must be replaced by the detailed Construction Progress Schedule as indicated herein.
- E. Format must be in accordance with this specification section.

1.04 DETAILED PROGRESS SCHEDULE & MONTHLY UPDATES

- A. When accepted by Owner, the detailed Construction Progress Schedule will replace the preliminary Construction Progress Schedule and become the baseline Construction Progress Schedule. Subsequent revisions will be considered as updated Construction Progress Schedules or monthly updates.
- B. Show durations and sequences of activities required for complete performance of the Work.
- C. Update monthly to reflect actual progress and occurrences to date, including weather delays.
- D. Contents:
1. Schedule must begin with the date of Notice to Proceed and conclude with the date of Final Completion.
 2. Identify Work calendar basis using days as a unit of measure.
 3. Show complete interdependence and sequence of construction and Project-related activities reasonably required to complete the Work.
 4. Identify the Work of separate stages and other logically grouped activities and clearly identify critical path of activities.
 5. Reflect sequences of the Work, restraints, delivery windows, review times, Contract Times and Project milestones set forth in the Contract and Section 01 31 13, Project Coordination.
 6. Do not use the following types of logic relationships.
 - a. Negative lags.
 - b. Lags exceeding 10 workdays.
 - c. Start-to-finish relationships.

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- d. Open ends. Only the first activity will have no predecessor and only the last activity will have no successor.
 - e. Constraints. Contractor may use a limited number of constraints only with Owner's written authorization.
 - f. Manually modified dates. The contractor may manually modify dates only with Owner's written authorization.
 - g. Obtain Owner's written authorization prior to using lags with finish-to-start relationships.
7. Include as applicable:
- a. Obtaining permits, submittals for early product procurement, and long lead time items.
 - b. Mobilization and other preliminary activities.
 - c. Initial sitework.
 - d. The project start date, Substantial Completion date(s), Final Completion date, specified Work sequences, and other contractually mandated milestones, start or finish dates for phases, or site access or availability dates.
 - e. Work to be performed by Contractor, subcontractors, and suppliers.
 - f. Work required for completion of the project to be performed by Owner, other contractors, and third parties such as government agencies and authorities, regulatory authorities, or other entities.
 - g. Major equipment design, fabrication, factory testing, and delivery dates.
 - h. Delivery and installation dates for Owner-furnished products as specified in Section 01 11 00, Summary of Work.
 - i. Anticipated power and process outages.
 - j. Installation, erection, removal, and similar activities related to temporary systems or structures.
 - k. O & M manual submittals.
 - l. Sitework.
 - m. Concrete Work.
 - n. Structural steel Work.
 - o. Architectural features Work.
 - p. Conveying systems Work.
 - q. Equipment Work.
 - r. Mechanical Work.
 - s. Electrical Work.
 - t. Instrumentation and control Work.
 - u. Interfaces with Owner-furnished equipment.
 - v. Equipment and system startup and test activities.
 - w. Commissioning activities including required acceptance testing, inspections, or similar activities.

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- x. Project closeout and cleanup including punch lists, as-built drawings, Substantial Completion, O&M training and Final Completion.
- y. Demobilization.
- 8. The identity and logic of activities comprising the detailed Construction Progress Schedule must meet the following criteria:
 - a. The description of work by activity. Activity descriptions must contain the physical area of the work indicated in the drawings and the specific type of work. Activity boundaries must be easily measurable, and descriptions must be clear and concise. Do not preface activity descriptions with “Begin” or “Complete.” The beginning and end of each activity must be readily verifiable, and progress must be quantifiable.
 - b. Responsibility for each activity must be identified with a single performing organization.
 - c. Schedule reports must correspond to major categories within the Schedule of Values (SOV) for tracking purposes. See Section 01 29 76, Progress Payment Procedures. The cost component of these categories must be provided in the SOV. Schedule reports must provide the basis for Contractor’s Schedule of Estimated Monthly Progress Payments specified in Section 01 29 76, Progress Payment Procedures.
 - d. Potential problems or constraints related to the implementation of the construction plan must be identified in writing.
 - e. Foreseeable delays to activities such as normal seasonal weather must be considered and included in the planning and scheduling of all work.
 - f. Maximize Start-to-Start activity relationships. Overlapping activities minimizes out-of-sequence problems that arise when most relationships are Finish-to-Start with zero lead or lag.
 - g. No activity duration, exclusive of those for Submittals review and product procurement, shall be less than 1 day or more than 30 days unless otherwise approved.
 - h. Activity duration for Submittal review shall not be less than review time specified unless clearly identified and prior written acceptance has been obtained from Engineer.

1.05 PROGRESS OF THE WORK/UPDATE PROCEDURE

- A. Construction Progress Schedule updates must reflect:
 - 1. Progress of Work to within five (5) working days prior to submission.
 - 2. Approved changes in Work scope and activities modified since submission.
 - 3. Delays in Submittals or resubmittals, deliveries, or Work.

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4. Adjusted or modified sequences of Work.
 5. Other identifiable changes.
 6. Revised projections of progress and completion.
 7. Report of changed logic.
- B. Updates to the Construction Progress Schedule must be provided to the Owner and Engineer by the last day of each month unless otherwise approved by Owner.
- C. Produce detailed subschedules during Project, upon request of Owner or Engineer, to further define critical portions of the Work such as facility shutdowns.
- D. If Contractor fails to complete activity by its latest scheduled completion date and this failure is anticipated to extend Contract Time or milestones, Contractor must, within 7 days of such failure, submit a written statement as to how Contractor intends to correct nonperformance and return to current Construction Progress Schedule. Actions by Contractor to complete the Work within the Contract Time or Milestones are not justification for adjustment to the Contract Sum or Contract Time.
- E. Owner may order Contractor to increase equipment, labor force or working hours at no additional cost to Owner if Contractor fails to:
1. Complete a Milestone activity by its Construction Progress Schedule date.
 2. Satisfactorily execute Work as necessary to prevent delay to overall completion of Project.
- F. Should Contractor plan to complete the Work earlier than any required milestone or specific completion date, Owner and Engineer shall not be liable to Contractor for any costs or other damages if Contractor is unable to complete the Work before such Milestone or completion date.

1.06 SCHEDULE ACCEPTANCE

- A. Engineer and Owner acceptance of proposed schedules will demonstrate agreement that:
1. Contract Time including Final Completion and all intermediate Milestone times are valid.
 2. Specified Work sequences and constraints are shown as specified.
 3. Specified Owner-furnished Equipment or Material arrival dates, or range of dates, are included.
 4. Access restrictions are accurately reflected.
 5. Startup and testing times are as specified.

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6. Submittal review times are as specified.
 7. Startup testing duration is as specified and timing is acceptable.
- B. In all other respects, Engineer's acceptance of Contractor's schedule indicates that, in Engineer's judgement, schedule represents a reasonable plan for constructing Project in accordance with the Contract Documents. Engineer's review does not change Contract requirements. Lack of comment on any aspect of schedule that is not in accordance with the Contract Documents will not thereby indicate acceptance of that change unless Contractor has explicitly called the nonconformance to Engineer's attention in submittal. Schedule remains Contractor's responsibility and Contractor retains responsibility for performing all activities, for activity durations, and for activity sequences required to construct Project in accordance with the Contract Documents.
- C. If preliminary Construction Progress Schedule is found unacceptable:
1. Make requested corrections and resubmit within ten (10) days.
 2. Until acceptable to Engineer as Baseline Progress Schedule, continue review and revision process, during which time Contractor must update schedule on a monthly basis to reflect actual progress and occurrences to date.
- D. Unacceptable detailed Construction Progress Schedule:
1. Make requested corrections and resubmit within ten (10) days.
 2. Until acceptable to Engineer as Baseline Construction Progress Schedule, continue review and revision process.

1.07 ADJUSTMENT OF CONTRACT TIME

- A. Reference Section 00 72 00, General Conditions of the Contract, and Section 00 94 00, Contract Document Modifications.
- B. Evaluation and reconciliation of modification to Contract Time must be based on the updated Construction Progress Schedule at the time of any proposed adjustment or claimed delay.
- C. Schedule Contingency:
1. Contingency, when used in the context of the Construction Progress Schedule, is time between Contractor's proposed completion time and Contract Time.
 2. Contingency included in Construction Progress Schedule is a Project resource available to both Contractor and Owner to meet Contract Milestones and Contract Time. Use of schedule contingency must be shared to the proportionate benefit of both parties.

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3. Use of schedule contingency suppression techniques such as preferential sequencing and extended activity times is prohibited.
4. Pursuant to the contingency sharing provisions of this specification, no extensions of Contract Time will be granted, nor will delay damages be paid until a delay occurs which (i) consumes all available contingency time, and (ii) extends Work beyond the Contract Completion date.

D. Float:

1. Float time is a Project resource available to both parties to meet Contract stages and Contract Time.
2. Use of float suppression techniques such as preferential sequencing or logic, special lead/lag logic restraints, and extended activity times are prohibited, and use of float time disclosed or implied by use of alternate float-suppression techniques shall be shared to proportionate benefit of Owner and Contractor.
3. Pursuant to above float-sharing requirement, no extensions of the Contract Time will be granted nor delay damages paid until a delay occurs which (i) impacts Project's critical path, (ii) consumes available float or contingency time, and (iii) extends Work beyond Final Completion date.

E. Claims for Adjustments to Contract Time:

1. Where Engineer has not yet rendered a formal decision on any Contractor claim for adjustment of the Contract Time and parties are unable to agree as to amount of adjustment to be reflected in the Construction Progress Schedule, Contractor must reflect an interim adjustment in the Construction Progress Schedule acceptable to Engineer.
2. Such interim acceptance is not binding on either Contractor or Owner and will be made only for the purpose of continuing to schedule Work until such time as a formal decision has been rendered regarding any potential adjustment to the Contract Time.
3. Contractor must thereafter provide updates to the Construction Progress Schedule in accordance with Engineer's formal decision.

1.08 WEEKLY LOOK AHEAD SCHEDULE

- A. During weekly progress meetings, Contractor must submit to Owner and Engineer a progress schedule showing activities completed during the previous week and the Contractor's schedule of activities for the upcoming three (3) weeks.
- B. The weekly schedule may be a CPM schedule, or a bar chart as agreed upon between Contractor and Owner but must utilize the logic and conform to the

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status of the current Construction Progress Schedule. If the weekly schedule no longer conforms to the current Construction Progress Schedule, Contractor may be required to revise the schedule.

- C. Activity designations used in the weekly schedule must be consistent with those used in the Baseline Schedule, the current Construction Progress Schedule, and the SOV.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 DEFINITIONS

- A. Action Submittal: Written and graphic information submitted by Contractor that requires Project Manager's approval.
- B. Informational Submittal: Information submitted by Contractor that does not require Project Manager's approval.

1.02 PROCEDURES

- A. Prepare all submittals and shop drawings for submission in electronic PDF format including half-size and full-size drawings, reinforcement drawings, catalog information, and all other required submittal information as specified herein.
- B. Transmit all electronic submittals to Project Manager via VPM.
- C. Deliver samples to Owner and Owner's representative at the Project site. Provide VPM Transmittal with Submittal.
- D. Transmittal of Submittal:
 - 1. Contractor shall:
 - a. Review each submittal and check for compliance with Contract Documents.
 - b. Stamp each submittal with uniform approval stamp before submitting to Project Manager.
 - 1) Stamp to include Project name, submittal number, Specification number, Contractor's reviewer name, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with Contract Documents.
 - 2) Project Manager and Design Consultant will not review submittals that do not bear Contractor's approval stamp and will return them without action.
 - 2. Complete, sign, and transmit with each submittal package one Transmittal of Contractor's submittal form attached at end of this section.

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3. Identify each submittal with the following:
 - a. Numbering and Tracking System as Defined VPM.
 - 1) Resubmission of submittal shall have original number with revision which VPM will provide.
 - b. Specification section and paragraph to which submittal applies.
 - c. Project title and MWMC's project number.
 - d. Date of transmittal.
 - e. Names of Contractor, Subcontractor or Supplier, and manufacturer as appropriate.
 4. Identify and describe each deviation or variation from Contract Documents.
- E. Format:
1. Do not base Shop Drawings on reproductions of Contract Documents.
 2. Package submittal information by individual Specification section. Do not combine different Specification sections together in submittal package, unless otherwise directed in Specification.
 3. Present in a clear and thorough manner and in sufficient detail to show kind, size, arrangement, and function of components, materials, and devices, and compliance with Contract Documents.
 4. Index with labeled tab dividers in orderly manner.
- F. Timeliness: Schedule and submit in accordance Schedule of Submittals, and requirements of individual Specification sections.
- G. Processing Time:
1. Time for review shall commence on Project Manager's receipt of submittal.
 2. Project Manager will act upon Contractor's submittal and transmit response to Contractor not later than 30 days after receipt, unless otherwise specified.
 3. Resubmittals will be subject to same review time.
 4. No adjustment of Contract Times or Price will be allowed due to delays in progress of Work caused by rejection and subsequent resubmittals.
- H. Resubmittals: Clearly identify each correction or change made.
- I. Incomplete Submittals:
1. Project Manager will return entire submittal for Contractor's revision if preliminary review deems it incomplete.

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2. When any of the following are missing, submittal will be deemed incomplete:
 - a. Contractor's review stamp, completed and signed.
 - b. Transmittal of Contractor's Submittal, completed and signed.
 - c. Insufficient number of copies.
 3. Contractor shall clearly indicate on any instance when any portion of a submittal is intentionally not included in the submittal package. Contractor shall also indicate the reason for omitting any portion of a submittal and timing for submittal of that missing portion(s). Failure to so indicate may lead to rejection of the submittal as incomplete.
- J. Submittals not required by Contract Documents: Will not be reviewed and will be returned stamped "Not Subject to Review."

1.03 ACTION SUBMITTALS

- A. Prepare and submit Action Submittals required by individual Specification sections.
- B. Provide a copy of the specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. Check marks (√) shall denote full compliance with a paragraph. If deviations from the specifications are indicated and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the specifications. The submittal shall be accompanied by a detailed, written justification for each deviation. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.
- C. Provide "Certificate of Unit Responsibility" completed forms (see specification Section 01 43 33, Manufacturers' Field Services, and related requirements.).
- D. Shop Drawings:
 1. Copies: Electronic format submitted via VPM or delivered simultaneously to Owner.

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2. Identify and Indicate:
 - a. Applicable Contract Drawing and Detail number, products, units and assemblies, and system or equipment identification or tag numbers.
 - b. Equipment and Component Title: Identical to title shown on the Drawings.
 - c. Critical field dimensions and relationships to other critical features of Work. Note dimensions established by field measurement.
 - d. Project-specific information drawn accurately to scale.
3. Manufacturer's standard schematic drawings and diagrams as follows:
 - a. Modify to delete information that is not applicable to the Work.
 - b. Supplement standard information to provide information specifically applicable to the Work.
4. Product Data: Provide as specified in individual Specifications.
5. Foreign Manufacturers: When proposed, include following additional information:
 - a. Names and addresses of at least two companies that maintain technical service representatives close to Project.
 - b. Complete list of spare parts and accessories for each piece of equipment.

E. Samples:

1. Copies: Two, unless otherwise specified in individual Specifications.
2. Preparation: Mount, display, or package Samples in manner specified to facilitate review of quality. Attach label on unexposed side that includes the following:
 - a. Manufacturer name.
 - b. Model number.
 - c. Material.
 - d. Sample source.
3. Manufacturer's Color Chart: Units or sections of units showing full range of colors, textures, and patterns available.
4. Full-size Samples:
 - a. Size as indicated in individual Specification section.
 - b. Prepared from same materials to be used for the Work.
 - c. Cured and finished in manner specified.
 - d. Physically identical with product proposed for use.

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F. Action Submittal Dispositions:

1. Project Manager and/or Design Consultant will review, mark, and stamp as appropriate, and distribute marked-up copies as noted:
 - a. Approved:
 - 1) Contractor may incorporate product(s) or implement Work covered by submittal.
 - 2) Distribution: One electronic copy in VPM distributed to Project Manager. All parties will have access to the electronic version in VPM.
 - b. Approved as Noted:
 - 1) Contractor may incorporate product(s) or implement Work covered by submittal, in accordance with Project Manager's notations.
 - 2) Distribution: One electronic copy in VPM distributed to Project Manager. All parties will have access to the electronic version in VPM.
 - c. Partial Approval, Resubmit as Noted:
 - 1) Make corrections or obtain missing portions, and resubmit.
 - 2) Except for portions indicated, Contractor may begin to incorporate product(s) or implement Work covered by submittal, in accordance with Project Manager's notations.
 - a) Distribution: One electronic copy in VPM distributed to Project Manager. All parties will have access to the electronic version in VPM.
 - d. Revise and Resubmit:
 - 1) Contractor may not incorporate product(s) or implement Work covered by submittal.
 - 2) Distribution: One electronic copy in VPM distributed via VPM. All parties will have access to the electronic version in VPM.

1.04 INFORMATIONAL SUBMITTALS

A. General:

1. Copies: Submit electronic copies, unless otherwise indicated in individual Specification section.
2. Refer to individual Specification sections for specific submittal requirements.

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3. Project Manager and/or Design Consultant will review each submittal. If submittal meets conditions of the Contract, Project Manager will forward to appropriate parties. If Project Manager determines submittal does not meet conditions of the Contract and is therefore considered unacceptable, Project Manager will return with review comments to Contractor and require that submittal be corrected and resubmitted.
- B. Application for Payment: Electronic in accordance with specification Section 01 29 76, Progress Payment Procedures.
- C. Certificates:
1. General:
 - a. Provide notarized statement that includes signature of entity responsible for preparing certification.
 - b. Signed by officer or other individual authorized to sign documents on behalf of that entity.
 2. Welding: In accordance with individual Specification sections.
 3. Installer: Prepare written statements on manufacturer's letterhead certifying that installer complies with requirements as specified in individual Specification sections.
 4. Material Test: Prepared by qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
 5. Certificates of Successful Testing or Inspection: Submit when testing or inspection is required by Laws and Regulations or governing agency or specified in individual Specification sections.
 6. Manufacturer's Certificate of Compliance: In accordance with specification Section 01 43 33, Manufacturers' Field Services.
 7. Manufacturer's Certificate of Proper Installation: In accordance with specification Section 01 43 33, Manufacturers' Field Services.
 8. Manufacturer's certificate of unit responsibility; In accordance with specification Section 01 43 33, Manufacturers' Field Services.
- D. Construction Photographs on Compact Disk: In accordance with specification Section 01 31 13, Project Coordination, and as may otherwise be required in Contract Documents.
- E. Contract Closeout Submittals: Electronic in accordance with specification Section 01 70 00, Closeout Requirements.
- F. Contractor-Design Data in Electronic Format:
1. Written and graphic information.
 2. List of assumptions.
 3. List of performance and design criteria.

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4. Summary of loads or load diagram, if applicable.
 5. Calculations.
 6. List of applicable codes and regulations.
 7. Name and version of software.
 8. Information requested in individual Specification section.
- G. Manufacturer's Instructions: Written or published information that documents manufacturer's recommendations, guidelines, and procedures in accordance with individual Specification sections in electronic format.
- H. Operation and Maintenance Data: As required in Section 01 78 23, Operation and Maintenance Data.
- I. Schedules (all schedules in electronic format):
1. Schedule of Submittals: Prepare separately or in combination with Progress Schedule as specified in Section 01 32 16, Construction Progress Schedules.
 - a. Show for each, at a minimum, the following:
 - 1) Specification section number.
 - 2) Identification by numbering and tracking system as specified under Paragraph Transmittal of Submittal.
 - 3) Estimated date of submission to Project Manager, including reviewing and processing time.
 - b. On a monthly basis, submit updated schedule of submittals via VPM to Project Manager if changes have occurred or resubmittals are required.
 2. Schedule of Values: In accordance with specification Section 01 29 76, Progress Payment Procedures and coordinated with schedules in accordance with specification Section 01 32 16, Construction Progress Schedule.
 3. Schedule of Estimated Progress Payments: In accordance with Section 01 32 16, Construction Progress Schedule.
 4. Progress Schedules: In accordance with specification Section 01 32 16, Construction Progress Schedule.
- J. Special Guarantee (in electronic format): Supplier's written guarantee as required in individual Specification sections.

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- K. Statement of Qualification (in electronic format): Evidence of qualification, certification, or registration as required in Contract Documents to verify qualifications of professional land surveyor, engineer, materials testing laboratory, specialty Subcontractor, trade, Specialist, consultant, installer, and other professionals.
- L. Submittals Required by Laws, Regulations, and Governing Agencies:
1. Submit promptly notifications, reports, certifications, payrolls, and otherwise as may be required, directly to the applicable federal, state, or local governing agency or their representative.
 2. Transmit via VPM to Project Manager for Owner's records one electronic copy of correspondence and transmittals (to include enclosures and attachments) between Contractor and governing agency.
- M. Test and Inspection Reports (in electronic format):
1. General: Shall contain signature of person responsible for test or report.
 2. Factory:
 - a. Identification of product and Specification section, type of inspection or test with referenced standard or code.
 - b. Date of test, Project title and number, and name and signature of authorized person.
 - c. Test results.
 - d. If test or inspection deems material or equipment not in compliance with Contract Documents, identify corrective action necessary to bring into compliance.
 - e. Provide interpretation of test results, when requested by Project Manager and/or Design Consultant.
 - f. Other items as identified in individual Specification sections.
 3. Field: As a minimum, include the following:
 - a. Project title and number.
 - b. Date and time.
 - c. Record of temperature and weather conditions.
 - d. Identification of product and Specification section.
 - e. Type and location of test, Sample, or inspection, including referenced standard or code.
 - f. Date issued, testing laboratory name, address, and telephone number, and name and signature of laboratory inspector.
 - g. If test or inspection deems material or equipment not in compliance with Contract Documents, identify corrective action necessary to bring into compliance.
 - h. Provide interpretation of test results, when requested by Project Manager.
 - i. Other items as identified in individual Specification sections.

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- N. Testing and Startup Data (in electronic format): In accordance with specification Section 01 75 16, Startup Procedures.
- O. Training Data (in electronic format): In accordance with specification Section 01 43 33, Manufacturers' Field Services.
- P. Provide a copy of the specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. Check marks (√) shall denote full compliance with the entire paragraph. If deviations from the specifications are indicated and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the specifications. The submittal shall be accompanied by a detailed, written justification for each deviation. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.

1.05 ENGINEERED SUBMITTALS

- A. Engineered submittal requirements are described in applicable specification sections and summarized in this section. General requirements for engineered submittals are listed in this section.
- B. Engineered submittals shall be submitted along with other related submittal information.
- C. Engineered submittals will be reviewed as Action Submittals.
- D. Engineered submittals returned as "Partial Approval, Resubmit as Noted" or "Revise and Resubmit" shall be reviewed and revised by the Oregon Professional Engineer who prepared the original submittal. Updated engineered submittals shall be stamped and signed by the Oregon Professional Engineer.

1.06 SUPPLEMENT

- A. The supplement listed below, following "End of Section," is a part of this specification:
 - 1. Transmittal of Contractor's Submittal Form.

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PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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**TRANSMITTAL OF CONTRACTOR'S SUBMITTAL
FORM 01 33 00 A**

(ATTACH TO EACH SUBMITTAL)

DATE: _____

TO: _____

Submittal No.: _____

New Submittal Resubmittal

Project: _____

Project No.: _____

Specification Section No.: _____

(Cover only one section with each transmittal)

Schedule Date of Submittal:

FROM: _____
Contractor

SUBMITTAL TYPE: Shop Drawing Sample Informational

The following items are hereby submitted:

Number of Copies	Description of Item Submitted (Type, Size, Model Number, Etc.)	Spec. and Para. No.	Drawing or Brochure Number	Contains Deviation to Contract	
				No	* Yes

* Provide explanation and justification for each Contract deviation (attach documentation)

Contractor hereby certifies that (i) Contractor has complied with the requirements of Contract Documents in preparation, review, and submission of designated Submittal and (ii) the Submittal is complete and in accordance with the Contract Documents and requirements of laws and regulations and governing agencies.

By: _____
Contractor (Authorized Signature)

**SECTION 01 35 00
SPECIAL PROCEDURES**

PART 1 GENERAL

1.01 ORGANIZATION

- A. Specifications are written and organized in accordance with Construction Specifications Institute format.
- B. The specifications are abbreviated or “streamline” type and frequently include incomplete sentences. The omission of words or phrases such as, but not limited to, “the Contractor shall,” “in conformity with,” “shall,” “shall be,” “as noted,” “according to the plans,” “a,” “an,” “the,” and “all,” are intentional omitted words or phrases and shall be supplied by inference, in the same manner as they are in notes on the Drawings. Titles and headings are a part of the Specification the same as the text of the article or paragraph.
- C. Organization of the Specifications into Divisions and Sections is for convenience only and is not intended to establish limits of work. Divisions not applicable are noted as “Not Used.”

1.02 DEFINITIONS

- A. Approved: Equal quality and performance to that specified and “approved by the Engineer.”
- B. As shown, as indicated, as detailed, as noted, or words of similar import: Refer to Contract Documents.
- C. For approval or review: For the Engineer’s approval or review.
- D. Provide: “Furnish and install,” or “furnish labor and materials required for installation, ready for use and under the terms of the Contract Documents.”
- E. Selected: As selected by the Project Manager and Engineer.

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1.03 COORDINATION

- A. It is the responsibility of the Contractor to determine the extent and division of work between Contractor and Subcontractor.
- B. Drawings showing location of equipment, piping, sleeves, electrical conduit, boxes, panels, etc. are diagrammatic and job conditions may produce conflicts. Contractor and subcontractors coordinate work to minimize conflict. Advise Project Manager of conflicts before proceeding with any related work so that correction can be made in joint conference.

1.04 ACCESS DOORS

- A. Each trade installing work requiring access after completion of the Contract will furnish and install the necessary access frames and panels or doors. Furnish and install ground screeds and trim necessary to make a complete installation. Access doors or panels to conform to fire rating classification of the assembly in which it is installed.

1.05 SCAFFOLDING

- A. Scaffolding to conform to all applicable safety codes.

1.06 LAWS AND REGULATIONS

- A. The Contractors attention is directed to the fact that all applicable state laws, municipal ordinances, safety requirements, rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the Contract throughout and they will be deemed to be included in the Contract the same as though written out in full.

1.07 WORKING AREA

- A. Confine all construction operations including storage of material and equipment to within the limits of construction. Use of the Owner's property outside staging area will not be permitted except under unusual circumstances for limited periods of time as approved by Owner or Owner's Representative. Coordinate with work of subcontractors.
- B. Maintain clear access to Project at all times for fire fighting equipment, delivery of materials, etc. Maintain exitways from existing buildings required by authorities having jurisdiction.
- C. Provide a full-time cleanup person to remove and dispose of debris.

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1.08 USE OF PUBLIC PROPERTY

- A. Contractor shall make all arrangements with applicable governing agencies for use of public property and pay any required fees.

1.09 ADJACENT STREETS

- A. Clean and repair adjacent streets resulting from Contractor's operations.

1.10 WORK BY OTHERS

- A. Manufacturers'/Suppliers' Drawings, Specifications and Shop Drawings containing the words "by others" or any statement of necessary work not included by the manufacturer/supplier must be provided by Contractor.

1.11 EXCESSIVE NOISE

- A. The proximity of residential and operation of existing adjacent facilities requires noise level to be held to a minimum.
- B. All equipment shall have muffling devices in good working order at all times. Equipment not so equipped will be removed from Site.
- C. Coordination:
 - 1. Cooperate with Owner in locating high noise producing equipment in areas least offensive and/or provide sound enclosure or shielding to dampen sound.
 - 2. Cooperate with Owner in discontinuance of certain operations during critical periods. Keep Owner advised in advance of operations which will cause excessive noise or vibration.
- D. Audio devices not be played within occupied portions of buildings or where they can be heard by building occupants.

1.12 TESTING AND INSPECTION

- A. Comply with testing requirements as specified and required by authority having jurisdiction.
- B. Notify Owner at least 24 hours prior to commencement of Work requiring special inspection.
- C. Provide sampling and testing as required by the Universal Building Code(UBC) to extent noted in each specification section. Results of tests are binding on Contractor. Retesting for unsatisfactory work to be paid by Contractor.

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1.13 REFERENCE STANDARDS

- A. For products specified by association or trade standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. The date of the standard is that in effect as of Bid date or date of Owner-Contractor Agreement when there are not bids, except when a specific date is specified.
- C. Obtain copies of standards when required by Contract Documents.

1.14 USE OF EXISTING RESTROOMS AND MWMC OWNED PARKING FACILITIES

- A. Construction personnel may not use Owner's permanent parking facilities.
- B. Limited parking will be made available in the designated Contractor staging areas or as otherwise agreed upon and noted on the Drawings.

1.15 CONTRACTOR DAILY LOG

- A. Record and maintain a written daily log of all construction activity throughout the entire course of the Project and must have logs available for Owner/Engineer review at all times.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 35 23
OWNER SAFETY REQUIREMENTS

PART 1 GENERAL

1.01 GENERAL

- A. This section includes a description of the minimum requirements for safety, and development and maintenance of a Construction Safety Plan.
- B. Contractor alone is responsible for conditions at the Jobsite including safety of all persons, employees, and subcontractors' employees, and safety of property, during performance of the Work. This requirement applies continuously and is not limited to normal working hours.

1.02 REFERENCES

- A. Oregon Revised Statutes (ORS) 654 - Oregon Safe Employment Act. (https://www.oregonlegislature.gov/bills_laws/ors/ors654.html)
- B. 29 U.S.C. Chapter 15; 29 C.F.R. Chapter XVII - Occupational Safety and Health Code (OSHA).
- C. Oregon Administrative Rules (OAR) 437 OR-OSHA.

1.03 FEDERAL, STATE, AND LOCAL SAFETY REQUIREMENTS

- A. Maintain the Jobsite and perform Work in a manner that meets Owner's and Contractor's responsibility under statutory and common law for the provision of a safe place to work. Safety provisions must conform to the Federal and State Department of Labor Occupational Safety and Health Act (OSHA), and all applicable federal, state, and local laws, ordinances, codes, and all regulations specified in the Contract Documents. Comply with all applicable laws, ordinances, rules, regulations, and lawful orders of any public authority having jurisdiction for the work involved herein. Where any of these are in conflict, the more stringent requirement applies. Erect and maintain, as required by existing conditions and progress of the work, all reasonable safeguards for safety and protection including posting danger signs and other warnings against hazards, promulgating safety regulations, and notifying owners and users of adjacent utilities. Contractor's failure to thoroughly familiarize himself with the aforementioned safety provisions shall not relieve him from compliance with the obligations or relieve him of the penalties set forth herein.

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- B. Provide toilet and hand-washing facilities at the Site in accordance with ORS 654.150 for maintaining employee personal cleanliness.
- C. Upon their presentation of proper credentials, allow inspectors of the U.S. Occupational Safety and Health Administration (OSHA) and the Oregon Occupational Safety and Health Administration (OR-OSHA) to inspect the Work and Project Site without delay and without an inspection warrant.
- D. The duty of the Owner's Representative to conduct construction review of Contractor's performance is not intended to include review of the adequacy of Contractor's safety measures in, on, or near the construction Site. However, Owner retains the right to stop Work or otherwise require conformance with safety requirements when non-conformance with laws are observed and noted by Owner's Representative.

1.04 SAFE ACCESS TO THE WORK

- A. Provide safe access to the Work.

1.05 CONSTRUCTION SAFETY PROGRAM

- A. Appoint for the duration of this Contract a qualified supervisory employee or consultant to develop and/or supervise Contractor's written job safety program complying with the requirements for employee and public safety set forth herein to effectively implement the required safety provisions.
- B. Have onsite a Safety and Health Plan which must be submitted in electronic format to Owner's Representative within 10 days of Notice to Proceed for reference only. The submittal must be accompanied by a letter to Owner indicating that Contractor is aware of the health and safety dangers at wastewater treatment facilities and is experienced and qualified to perform the Work indicated. The letter must be signed by an officer of the Contractor. Adoption of, compliance with, and submission of such plan to Owner are conditions precedent to the Contractor's right to receive progress payments. Any new version of Contractor's plan must be submitted to Owner's Representative within ten (10) days of the date when revisions are made in the format required herein.
- C. Owner shall have no responsibility for, nor liability regarding, the safe operations of the Contractor.

1.06 CONSTRUCTION SAFETY AND HEALTH PLAN

- A. Detail the Methods and Procedures to comply with ORS 654, OAR/OR-OSHA, Federal, and Local Health and Safety Laws, Rules and Requirements for the duration of the Work.

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B. Include the following:

1. Identification of the Certified or Licensed Safety Consultant who will prepare, initiate, maintain and supervise safety programs, and procedures
2. Procedures for providing workers with an awareness of safety and health hazards expected to be encountered during construction
3. Equipment appropriate to the safety and health hazards expected to be encountered during construction including, but not limited to, warning devices, barricades, safety equipment in public right-of-way and protected areas, and safety equipment used in multi-level structures
4. Methods for minimizing employees' exposure to safety and health hazards expected during construction
5. Procedures for reporting safety or health hazards
6. Procedures for correcting a recognized safety and health hazard
7. Procedures for investigation of accidents, injuries, illnesses and unusual events that may occur at the construction site
8. Periodic and scheduled inspections of general work areas and specific workstations
9. Appropriate training for employees and workers at the jobsite including, but not limited to, the hazards described in Subsection 1.07 of this Specification section.
10. Communication methods of safe working conditions, work practices and required personal protective equipment

1.07 CONTRACTOR'S PERSONNEL PROTECTION, SPECIAL PRECAUTIONS

- A. Contractor must be experienced and qualified to anticipate and meet the safety and health requirements of this project including, but not limited to, addressing exposure to wastewaters of varying degrees of treatment. Workers involved in the removal, reconnection, or repair of existing facilities, sewers, or service connections may be exposed to disease-producing organisms. Observe hygienic precautions including appropriate inoculation, as required, which must be made available to all construction personnel.
- B. Because of noxious or explosive gases, solvents, gasoline, or other hazardous material in sewage, some work areas are considered hazardous to open flame, sparks, or unventilated occupancy. Take necessary measures to ensure that all construction personnel observe proper safety precautions when working in these areas and are aware of how to respond to an atmospheric leak of these hazards.

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- C. Provide Owner with written documentation that all personnel and visitors of the Contractor and his subcontractors and suppliers have been made aware of this subdivision of the Specifications.
- D. Provide awareness of Owner's low explosive level (LEL) alarm and evacuation procedures to all personnel and subcontractors under direction of the Contractor.

1.08 SAFETY EQUIPMENT

Maintain jobsite safety equipment applicable to the work as prescribed by the governing safety authorities, and all articles necessary for giving first aid to the injured. Establish a procedure for the immediate removal of persons who may be injured on the jobsite and transportation to a hospital or a doctor's care.

1.09 ACCIDENT REPORTS

- A. Promptly report all jobsite accidents to Owner in writing giving full details, names, and statements of witnesses. If death, serious injury, or serious damages are caused by a jobsite accident, immediately report the accident to Owner by telephone or messenger followed by the written report.
- B. If anyone makes a claim against Contractor or any subcontractor on account of any jobsite accident, promptly report the facts in writing to Owner giving full details of the claim.

1.10 TRAFFIC SAFETY AND ACCESS TO PROPERTY

- A. Comply with all rules and regulations of city, state, and county authorities regarding closing or restricting the use of public streets or highways. No public or private road shall be closed except by the express permission of the Owner. Conduct work to ensure the least possible obstruction to traffic and normal commercial pursuits. Protect all obstructions within traveled roadways by installing approved signs, barricades, and lights where necessary for the safety of the public. The convenience of the general public and residents adjacent to the project, and the protection of persons and property are of prime importance and must be provided for in an adequate and satisfactory manner.
- B. Where traffic will pass over trenches after they are backfilled and before they are paved, the top of the trench shall be maintained at an elevation equal to that of the surrounding permanent surface. Temporary access driveways must be provided where required. Cleanup operations must follow immediately behind any backfilling tasks and the worksite must be kept in an orderly condition at all times.

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- C. Certified flagging personnel must assist traffic when intermittent stoppage will occur. When flagmen and guards are required by regulation or when deemed necessary for safety, they must be furnished with approved high-visibility apparel and approved traffic-control devices.
- D. All open excavations must be securely fenced or backfilled at the end of each day.
 - 1. Temporary construction fencing must be placed around pipe laying excavation at the end of each day.
 - 2. Traffic cones and delineators must be placed around all equipment near roadways unless inside fencing.
 - 3. Detour signage must be in place at all times when through travel is restricted.
- E. All excavations or other soil-disturbing activities require appropriate precautions to prevent soil and aggregates from being deposited on public roadways. Wash stations, sweeping operations, and other appropriate cleanup operations must be in place prior to beginning these activities.
- F. Provide temporary provisions to allow for the use of sidewalks, private and public driveways, and proper functioning of all gutters, sewer inlets, drainage ditches and culverts, irrigation ditches, and natural water courses.

1.11 FIRE PREVENTION AND PROTECTION

Execute all work in a fire-safe manner. Supply and maintain on the site adequate fire-fighting equipment capable of extinguishing incipient fires. Comply with applicable federal, local, and state fire-prevention regulations. Where these regulations do not apply, follow applicable parts of the National Fire Prevention Standard for Safeguarding Construction, Alteration, and Demolition Operations (NFPA No. 241). Keep fire hydrants on or adjacent to the Work accessible to firefighting equipment and apparatus at all times.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 35 43
HAZARDOUS MATERIALS PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Procedures required when encountering hazardous materials at the Work site.

1.02 REFERENCES

- A. Oregon Revised Statutes (ORS).
1. ORS 465 - Hazardous Waste and Hazardous Materials I.
 2. ORS 466 - Hazardous Waste and Hazardous Materials II.
 3. ORS 468 - Environmental Quality Generally.
 4. ORS 468A - Air Quality.
- B. Oregon Administrative Rules (OAR).
1. Chapter 340 - Department of Environmental Quality.
- C. United States Code of Federal Regulation (CFR), Title 29 and Title 40.
1. 29 CFR 1910.1000 - Occupational Safety and Health Standards, Air Contaminants.
 2. 29 CFR 1910.134 - Occupational Safety and Health Standards, Respiratory Protection.
- D. Steel Structure Painting Council:
1. Guide 61 - Guide for Containing Debris Generated During Paint Removal Operations.
 2. Guide 61 - Description of Methods and Systems.
 3. Guide 71 - Guide for the Disposal of Lead-Contamination Surface Preparation Debris.
 4. PA Guide 3 – Guide to Safety in Paint Application.

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1.03 SUBMITTALS

- A. Submit laboratory reports, hazardous material removal plans, and certifications to Owner.

1.04 HAZARDOUS MATERIALS PROCEDURES

- A. Hazardous materials are those defined by Oregon Administrative Rules, Division 101.
- B. When Hazardous Materials are discovered during the Work:
 - 1. Prepare and initiate implementation of plan of action.
 - 2. Notify Owner and other affected persons immediately.
 - 3. Notify such agencies as required by Laws and Regulations within the periods stipulated by such Laws and Regulations.
 - 4. Designate a Certified Industrial Hygienist to issue pertinent instructions and recommendations for protection of workers and other affected persons' health and safety.
 - 5. Employ a subcontractor registered by OR-OSHA and licensed by the State Construction Contractor's Board, and employing personnel certified to undertake removal, storage, transportation, disposal, and other remedial work required by and in accordance with laws and regulations. Contractor is responsible for proper removal and disposal of hazardous materials.
- C. Forward to Owner copies of reports, permits, receipts, and other documentation related to remedial work.
- D. Assume responsibility for worker health and safety, including health and safety of Subcontractors and their workers.
- E. Instruct workers on recognition and reporting of materials that may be hazardous.
- F. File requests for adjustments to Contract Time and Contract Sum due to the discovery of Hazardous Materials in the Work site in accordance with specification Section 00 72 00, General Conditions of the Contract.
- G. Minimize delays by continuing performance of the Work in areas not affected by hazardous materials operations.

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1.05 LEAD PAINT REMOVAL AND DISPOSAL

- A. If lead based paint removal is required for the project, all work must be performed by a certified Lead Abatement Professional according to all applicable rules and regulations including, but not limited to, OAR 333 Part 69. All appropriate notices shall be submitted as needed.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 42 13
ABBREVIATIONS AND ACRONYMS

PART 1 GENERAL

1.01 REFERENCE TO STANDARDS AND SPECIFICATIONS OF TECHNICAL SOCIETIES

- A. References to standards and specifications of technical societies and reporting and resolving discrepancies associated therewith must be in accordance with Part 3 of specification Section 00 72 00 General Conditions of the Contract, and as may otherwise be required herein and in the individual Specification sections.
- B. Work specified by reference to published standard or specification of government agency, technical association, trade association, professional society or institute, testing agency, or other organization must meet requirements or surpass minimum standards of quality for materials and workmanship established by the designated standard or specification.
- C. Where so specified, products or workmanship must also meet or exceed additional prescriptive, or performance requirements included within the Contract Documents to establish a higher or more stringent standard of quality than required by a referenced standard.
- D. Where two or more standards are specified to establish quality, product and workmanship must meet or exceed the more stringent requirement(s).
- E. Where both a standard and a brand name are specified for a product in the Contract Documents, any proprietary product named must meet or exceed the requirements of specified reference standards.
- F. Copies of applicable reference standards have not been bound in these Contract Documents. Where copies of standards are needed by Contractor, obtain a copy or copies directly from publication source and maintain in an orderly manner at the Site as Work Site records available to Contractor's personnel, subcontractors, and Owner.

1.02 ABBREVIATIONS

- A. Abbreviations for trade organizations and government agencies: Following is a list of construction industry organizations and government agencies to which references may be made in the Contract Documents, with abbreviations used.

1. AA Aluminum Association

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2.	AABC	Associated Air Balance Council
3.	AAMA	American Architectural Manufacturers Association
4.	AASHTO	American Association of State Highway and Transportation Officials
5.	ABMA	American Bearing Manufacturers' Association
6.	ACI	American Concrete Institute
7.	AEIC	Association of Edison Illuminating Companies
8.	AFBMA	Anti-Friction Bearing Manufacturer's Association
9.	AGA	American Gas Association
10.	AGMA	American Gear Manufacturers' Association
11.	AI	Asphalt Institute
12.	AIA	American Institute of Architects
13.	AISC	American Institute of Steel Construction
14.	AISI	American Iron and Steel Institute
15.	AITC	American Institute of Timber Construction
16.	ALS	American Lumber Standards
17.	AMCA	Air Movement and Control Association
18.	ANSI	American National Standards Institute
19.	APA	APA – The Engineered Wood Association
20.	API	American Petroleum Institute
21.	APWA	American Public Works Association
22.	AREMA	American Railway Project Engineering and Maintenance-of-Way Association
23.	ARI	Air-Conditioning and Refrigeration Institute
24.	ASAE	American Society of Agricultural Engineers
25.	ASCE	American Society of Civil Engineers
26.	ASCII	American Standard Code for Information Interchange
27.	ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
28.	ASME	American Society of Mechanical Engineers
29.	ASNT	American Society for Nondestructive Testing
30.	ASTM	ASTM International
31.	AWI	Architectural Woodwork Institute
32.	AWPA	American Wood Preservers' Association
33.	AWPI	American Wood Preservers' Institute
34.	AWS	American Welding Society
35.	AWWA	American Water Works Association
36.	BHMA	Builders Hardware Manufacturers' Association
37.	CBM	Certified Ballast Manufacturer
38.	CDA	Copper Development Association
39.	CGA	Compressed Gas Association
40.	CISPI	Cast Iron Soil Pipe Institute

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41.	CMAA	Crane Manufacturers' Association of America
42.	CRSI	Concrete Reinforcing Steel Institute
43.	CS	Commercial Standard
44.	CSA	Canadian Standards Association
45.	CSI	Construction Specifications Institute
46.	CWSRF	Clean Water State Revolving Fund
47.	DEMA	Diesel Engine Manufacturer's Association
48.	DEQ	Department of Environmental Quality
49.	DIN	Deutsches Institut für Normung e.V.
50.	DIPRA	Ductile Iron Pipe Research Association
51.	EI	Edison Electric Institute
52.	EIA	Electronic Industries Alliance
53.	EJCDC	Engineers Joint Contract Documents' Committee
54.	EJMA	Expansion Joint Manufacturer's Association
55.	ETL	Electrical Test Laboratories
56.	FAA	Federal Aviation Administration
57.	FCC	Federal Communications Commission
58.	FDA	Food and Drug Administration
59.	FEDSPEC	Federal Specifications Superintendent of Documents
60.	FEMA	Federal Emergency Management Agency
61.	FIPS	Federal Information Processing Standards
62.	FM	Factory Mutual
63.	Fed. Spec.	Federal Specifications (FAA Specifications)
64.	FS	Federal Specifications and Standards (Technical Specifications)
65.	GA	Gypsum Association
66.	GANA	Glass Association of North America
67.	HEI	Heat Exchange Institute
68.	HI	Hydraulic Institute
69.	HMI	Hoist Manufacturers' Institute
70.	IBC	International Building Code
71.	ICBO	International Conference of Building Officials
72.	ICC	International Code Council
73.	ICEA	Insulated Cable Engineers' Association
74.	IFC	International Fire Code
75.	IEEE	Institute of Electrical and Electronics Engineers, Inc.
76.	IES	Illuminating Engineering Society
77.	IFI	Industrial Fasteners Institute
78.	IGMA	Insulating Glass Manufacturer's Alliance
79.	IMC	International Mechanical Code
80.	INDA	Association of the Nonwoven Fabrics Industry
81.	IPC	International Plumbing Code

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82.	ICEA	Insulated Cable Engineers Association
83.	ISA	Instrumentation, Systems, and Automation Society
84.	ISO	International Organization for Standardization
85.	ITL	Independent Testing Laboratory
86.	JIC	Joint Industrial Council
87.	MCAA	Mechanical Contractors Association of America
88.	MSS	Manufacturers Standardization Society
89.	MIA	Marble Institute of America
90.	MIL	Military Specifications
91.	MMA	Monorail Manufacturers' Association
92.	NAAMM	National Association of Architectural Metal Manufacturers
93.	NACE	National Association of Corrosion Engineers (NACE International)
94.	NBS	National Bureau of Standards
95.	NEBB	National Environmental Balancing Bureau
96.	NEC	National Electrical Code
97.	NECA	National Electrical Contractor's Association
98.	NEMA	National Electrical Manufacturers' Association
99.	NESC	National Electrical Safety Code
100.	NETA	International Electrical Testing Association
101.	NFPA	National Fire Protection Association
102.	NHLA	National Hardwood Lumber Association
103.	NICET	National Institute for Certification in Engineering Technologies
104.	NIST	National Institute of Standards and Technology
105.	NRCA	National Roofing Contractors Association
106.	NRTL	Nationally Recognized Testing Laboratories
107.	NSF	National Sanitation Foundation (NSF International)
108.	NSPE	National Society of Professional Engineers
109.	NTMA	National Terrazzo and Mosaic Association
110.	NWWDA	National Wood Window and Door Association
111.	OAPD	Oregon Accident Prevention Division
112.	ODOT	Oregon Department of Transportation
113.	OECI	Overhead Electrical Crane Institute
114.	OESC	Oregon Electrical Specialty Code
115.	OMSC	Oregon Mechanical Specialty Code
116.	OPSC	Oregon Plumbing Specialty Code
117.	OSSC	Oregon Structural Specialty Code
118.	ORS	Oregon Revised Statutes
119.	OSHA	Occupational Safety and Health Administration
120.	PCA	Portland Cement Association
121.	PCI	Precast/Prestressed Concrete Institute

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122.	PEI	Porcelain Enamel Institute
123.	PPI	Plastic Pipe Institute
124.	PS	Product Standards Section-U.S. Department of Commerce
125.	RLM	Reflector Luminaire Manufacturer
126.	RMA	Rubber Manufacturers' Association
127.	RUS	Rural Utilities Service
128.	SAE	Society of Automotive Engineers
129.	SAMA	Scientific Apparatus Makers Association
130.	SDI	Steel Deck Institute
131.	SDI	Steel Door Institute
132.	SJI	Steel Joist Institute
133.	SMACNA	Sheet Metal and Air Conditioning Contractors National Association
134.	SPI	Society of the Plastics Industry
135.	SSPC	Society for Protective Coatings
136.	SWI	Steel Window Institute
137.	TEMA	Tubular Exchanger Manufacturers' Association
138.	TCA	Tile Council of North America
139.	TIA	Telecommunications Industry Association
140.	TIMA	Thermal Insulation Manufacturer's Association
141.	UBC	Uniform Building Code
142.	UFC	Uniform Fire Code
143.	UL	Underwriters Laboratories Inc.
144.	UMC	Uniform Mechanical Code
145.	UPC	Uniform Plumbing Code
146.	USBR	U.S. Bureau of Reclamation
147.	WCLIB	West Coast Lumber Inspection Bureau
148.	WWPA	Western Wood Products Association

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 43 33
MANUFACTURERS' FIELD SERVICES

PART 1 GENERAL

1.01 DEFINITIONS

- A. Person-Day: One person for 8 hours within regular Contractor working hours.

1.02 QUALIFICATION OF MANUFACTURER'S REPRESENTATIVE

- A. Authorized representative of the manufacturer, factory trained, and experienced in the technical applications, installation, operation, and maintenance of respective equipment, subsystem, or system, with full authority by the equipment manufacturer to issue the certifications required of the manufacturer. Additional qualifications may be specified elsewhere.
- B. Representative subject to acceptance by Owner and Project Manager. No substitute representatives will be allowed unless prior written approval by such has been given.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 FULFILLMENT OF SPECIFIED MINIMUM SERVICES

- A. Furnish manufacturers' services when required by an individual specification section, to meet the requirements of this section.
- B. Where time is necessary in excess of that stated in the Specifications for manufacturers' services, or when a minimum time is not specified, the time required to perform the specified services shall be considered incidental.
- C. Schedule manufacturer' services to avoid conflict with other onsite testing or other manufacturers' onsite services.
- D. Determine, before scheduling services, that all conditions necessary to allow successful testing have been met.
- E. Only those days of service approved by Owner will be credited to fulfill the specified minimum services.

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- F. When specified in individual specification sections, manufacturer's onsite services shall include:
1. Assistance during product (system, subsystem, or component) installation to include observation, guidance, instruction of Contractor's assembly, erection, installation or application procedures.
 2. Inspection, checking, and adjustment as required for product (system, subsystem, or component) to function as warranted by manufacturer and necessary to furnish Manufacturer's Certificate of Proper Installation.
 3. Providing, on a daily basis, copies of all manufacturers' representatives' field notes and data to Owner.
 4. Revisiting the Site as required to correct problems and until installation and operation are acceptable to Owner.
 5. Resolution of assembly or installation problems attributable to or associated with, respective manufacturer's products and systems.
 6. Assistance during functional and performance testing, and facility startup and evaluation.
 7. Training of Owner's personnel in the operation and maintenance of respective product as required.
 8. Additional requirements may be specified elsewhere.
 9. Assistance during the warranty period for inspection, checking, and adjustment as required for product (system, subsystem, or component) to function per the Contract Document.

3.02 MANUFACTURER'S CERTIFICATE OF COMPLIANCE

- A. When specified in individual specification section, submit prior to shipment of product or material.
- B. Owner may permit use of certain materials or assemblies prior to sampling and testing if accompanied by accepted certification of compliance.
- C. Signed by product manufacturer certifying that product or material specified conforms to or exceeds specified performance criteria. Attach supporting reference data, affidavits, and certifications as appropriate.
- D. May reflect recent or previous test results on material or product, if acceptable to Project Manager.

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3.03 MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

- A. When so specified, a Manufacturer's Certificate of Proper Installation form, a copy of which is attached to this section, shall be completed and signed by the equipment manufacturer's representative.
- B. Such form shall certify that the signing party is a duly authorized representative of the manufacturer, is empowered by the manufacturer to inspect, approve, and operate their equipment and is authorized to make recommendations required to assure that the equipment is complete and operational.

3.04 TRAINING

- A. General:
 - 1. Furnish manufacturers' representatives for detailed classroom and hands-on training to Owner's personnel on operation and maintenance of specified product (system, subsystem, and component) and as required in applicable specifications.
 - 2. Furnish trained, articulate personnel to coordinate and expedite training, to be present during training coordination meetings with the Owner's Representatives, and who are familiar with the operation and maintenance manual information specified in Section 01 78 23, Operation and Maintenance Data.
 - 3. Manufacturer's representative must be familiar with facility operation and maintenance requirements as well as with specified equipment.
 - 4. At least 7 days prior to the onsite training program provide the completed and approved training materials, to include operation and maintenance information that will be retained by each trainee.
- B. Training Schedule:
 - 1. List specified equipment and systems that require training services and show:
 - a. Respective manufacturer.
 - b. Estimated dates for installation completion.
 - c. Estimated training dates.
 - 2. Allow for multiple sessions when several shifts are involved.
 - 3. Adjust schedule to ensure training of appropriate personnel as deemed necessary by Owner, and to allow full participation by manufacturers' representatives. Adjust schedule for interruptions in operability of equipment.
 - 4. Coordinate with specification Section 01 32 16, Construction Progress Schedule.

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3.05 SUPPLEMENTS

- A. The supplements listed below, following “End of Section,” are a part of this specification:
1. Manufacturer’s Certificate of Proper Installation Form.
 2. Certificate of Compliance Form.

END OF SECTION

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**MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION
FORM 01 43 33 A**

OWNER _____ EQPT SERIAL NO: _____

EQPT TAG NO: _____ EQPT/SYSTEM: _____

PROJECT NO: _____ SPEC. SECTION: _____

I hereby certify that the above-referenced equipment/system has been:

(Check Applicable)

- Installed in accordance with Manufacturer's recommendations.
- Inspected, checked, and adjusted.
- Serviced with proper initial lubricants.
- Electrical and mechanical connections meet quality and safety standards.
- All applicable safety equipment has been properly installed.
- Functional tests.
- System has been performance tested and meets or exceeds specified performance requirements. (When complete system of one manufacturer)

Note: Attach any performance test documentation from manufacturer.

Comments: _____

I, the undersigned Manufacturer's Representative, hereby certify that I am (i) a duly authorized representative of the manufacturer, (ii) empowered by the manufacturer to inspect, approve, and operate his equipment and (iii) authorized to make recommendations required to assure that the equipment furnished by the manufacturer is complete and operational, except as may be otherwise indicated herein. I further certify that all information contained herein is true and accurate.

Date: _____, 20__

Manufacturer: _____

By Manufacturer's Authorized Representative: _____

(Authorized Signature)

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CERTIFICATE OF UNIT RESPONSIBILITY FORM 01 43 33 B

For Specification Section

(Section Title)

In accordance with the contract documents, the undersigned manufacturer accepts unit responsibility for all components of equipment furnished under specification Section _____. We hereby certify that these components are compatible and comprise a functional unit suitable for the specified performance and design requirements.

Notary Public

Name of Corporation

Commission Expiration Date

Address

Seal:

By:

Duly Authorized Official

Legal Title of Official

Date

SECTION 01 45 16
FIELD QUALITY CONTROL PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- 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. This section covers requirements for quality assurance and inspection required in accordance with Section 109 and Chapter 17 of the Oregon Structural Specialty Code (OSSC) and is in addition to and supplements the requirements included in the Quality Assurance Plan contained on the Drawings.
- C. Special inspections and associated testing of field construction and shop fabrication will be performed by an approved accredited independent agency. Owner will secure and pay for the services of the agency to perform all special inspections and associated test.
- D. Provide Owner and Owner’s agency access to the Work for all inspections described in this specification section.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. International Code Council (ICC):
 - a. International Building Code (IBC).
 - b. Evaluation Service (ICC-ES) Reports and Legacy Reports.
 - c. Oregon Structural Specialty Code (OSSC)
 - 2. American Society of Civil Engineers (ASCE): ASCE 7, Minimum Design Loads for Buildings and Other Structures.

1.03 DEFINITIONS

- A. Mechanical Component Supports: The 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 the component for anchorage.

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- B. Registered Design Professional in Responsible Charge: An architect or engineer, registered or licensed to practice professional architecture or engineering in the state of Oregon, acting as the Owner's agent to provide special inspection in accordance with the OSSC.
- C. Shear Wall: A wall designed to resist lateral forces parallel to the plane of the wall. Unless noted otherwise on the Drawings, load-bearing walls with direct in-plane connections to roof and floors must be considered shear walls.
- D. Special Inspection: Inspection required of materials, installation, fabrication, erection, or placement of components requiring special expertise to ensure compliance with approved Contract Documents and referenced standards.
- E. Special Inspection, Continuous: The full-time observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed.
- F. Special Inspection, Periodic: Observation by the Special Inspector of all in-place materials, either during their placement or upon the completion of their placement. The completion observation shall be performed so that work can be corrected prior to other related work proceeding. Additionally, the Special Inspector shall continuously observe the first 5 percent of each type of construction requiring special inspection.
- G. Special Inspector: The authorized representative of the accredited independent agency secured by the Owner and approved by the Authority Having Jurisdiction to perform special inspection and associated tests.
- H. Statement of Special Inspections: The detailed written procedure contained in the Contract Documents establishing the systems and components subject to special inspection and testing, as well as the type and frequency of testing and the extent and duration of the special inspection and the reports to be completed and distributed by the Special Inspector.
- I. Structural Observation: The visual observation of the structural system by a registered design professional for general conformance of seismic force and wind force-resisting systems to the approved Contract Documents at significant construction stages and at completion of the structural system. Structural observation does not include or waive the responsibility for any required special inspections or inspections by the building official.

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1.04 SUBMITTALS

A. Informational Submittals:

1. Contractor's Statement of Responsibility: A Statement of Responsibility shall be completed by the Contractor and any Subcontractor responsible for construction of a seismic force-resisting or wind-resisting system or component designated herein. See attached form.
2. Contractor shall submit to the Project Manager a Quality Assurance/Control Plan within 21 days of the Notice to Proceed. The submittal must be approved before the construction Work begins.
3. Submit the required special inspections and documentation/findings.

1.05 INSPECTION AND TESTING REQUIREMENTS

A. Identification of Designated Systems for Inspection:

1. Seismic Force-Resisting Systems Designated for Quality Assurance under OSSC Section 1707 and Subject to Special Inspection Under 1707.
2. For components with component importance factor of 1.5 as specified in Section 01 61 10, Seismic Requirements.

B. Sampling and Testing:

1. Unless otherwise indicated, all sampling and testing must be in accordance with the methods prescribed in the current standards of the ASTM, as applicable to the class and nature of the material, product, or equipment considered; however, Owner will use any generally-accepted system of sampling and testing which will ensure that the quality of the workmanship is in compliance with the Contract Documents.
2. Any waiver by 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 specified testing or other quality assurance requirements as originally specified, 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.
3. Notwithstanding the existence of such waiver, Owner will 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 Owner to require the removal or correction and reconstruction of any such work in accordance with the Contract Documents.

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C. Inspection and Testing Laboratory Service:

1. Owner may provide services of an independent testing laboratory to perform routine testing of earth work and concrete at the Site, (i.e., soil density; concrete strength, slump, and air content) and perform random tests of other areas previously completed and inspected Contractor.
2. Owner's testing laboratory will perform other inspections, testings, and other services specified in the Contract Documents, to be performed by the Owner, or as required by Owner's Representative.
3. Reports will be submitted by Owner's testing laboratory to the Owner's Representative in duplicate indicating observations and results of tests, and indicating compliance or non-compliance with Contract Documents.
4. Cooperate with Owner and Owner's testing laboratory by furnishing samples of materials, concrete design mix, equipment, tools, storage, and other assistance as requested.
5. Notify Owner and Special Inspection agency 24 hours prior to the expected time for operations requiring inspection and laboratory testing services.
6. Retesting required because of non-conformance to specified requirements must be performed by the same testing laboratory as directed by Owner. Contractor must bear all costs from such retesting.
7. Provide samples and tests required for Contractor's use.
8. All tests required by these Specifications or referenced codes and standards are the responsibility of Contractor, unless specifically noted otherwise.

- D. The OSSC may require that special inspections be performed on certain structural elements of the project. Owner will perform and Contractor must coordinate all onsite special inspections required by Section 1704 of the current version of the OSSC during normal working hours established by the Contract Documents.

1.06 STATEMENT OF SPECIAL INSPECTIONS

A. Statement of Special Inspections:

1. The Statement of Special inspections identifies the following components of the quality assurance and inspection program to be followed in construction of the Work:
 - a. The designated seismic systems and main seismic force-resisting systems and components that are subject to quality assurance.
 - b. The special inspections and testing to be provided as required by Section 1704 and Section 1708 of the OSSC and other applicable sections and referenced standards therein

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- c. The type and frequency of testing required.
- d. The type and frequency of special inspections required.
- e. The required frequency and distribution of testing and special inspection reports to be distributed by the Project special inspector to the Engineer, Contractor, Authority having Jurisdiction, and Owner.
- f. The structural observations to be performed.
- g. The required frequency and distribution of structural observation reports.

B. Project Quality Control Plan:

- 1. Contractor is responsible for producing Work to meet the quality required by the Contract Documents and to perform the quality control efforts necessary to ensure those requirements are met. The Owner's Representative's inspection of any Work will not relieve the Contractor of the primary responsibility for such efforts.
- 2. The Contractor shall submit to the MWMC Project Manager a Quality Control Plan based on the Statement of Special Inspections contained on the Drawings for review and approval within 21 days of the Notice to Proceed. The submittal must be approved before construction Work begins. The Quality Control Plan will include:
 - a. A description of the workings and structure of Contractor's Quality Control Plan that will be implemented to ensure quality Work.
 - b. A Contract-specific Inspection Plan that lists and describes the inspections which Contractor will conduct, their frequency, acceptance criteria, and who will conduct each inspection. The Inspection Plan must include Work to be performed by subcontractors, fabricators, and suppliers and may can be shown in table form for clarity.
 - c. Identification of the individuals within the Contractor's organization who are responsible for quality assurance including their role and authority.
- 3. Following approval of Contractor's Quality Control Plan, Contractor and Owner must meet to discuss and define quality standards and expectations and to coordinate the Owner inspection efforts with Contractor's plan.
- 4. Accommodate procedural changes to Contract required quality control issues requested by Owner.

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PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. The Contractor shall furnish access to the Work for Quality Assurance special inspections and required testing, and for structural observation.
- B. Work found to be defective shall be corrected.
- C. The Registered Design Professional in Responsible Charge will submit a statement of special inspections in support of Contractor's building permit submittal, which shall include a complete list of materials and work requiring special inspections, the inspections to be performed, and a list of the individuals, agencies, and firms intended to conduct said inspections.
- D. Structural observation will be performed by the registered project design professional for general conformance to the approved Contract Documents of the seismic force-resisting systems. Structural observation so performed does not include or waive the responsibility for any required special inspections or inspections by the Authority Having Jurisdiction.
- E. Notify Owner and Special Inspection agency 48 hours prior to the expected time for operations requiring special inspection or structural observations.

3.02 SUPPLEMENT

- A. The supplement listed below, following "End of Section," is a part of this specification:
 - 1. Contractor Quality Responsibility Form.

END OF SECTION

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CONTRACTOR QUALITY RESPONSIBILITY FORM 01 45 16 A

(Project)

(Name of Contracting Company)

(Business Address)

(_____) _____
(Telephone)

(_____) _____
(Fax)

I, (We) hereby certify that I am (we are) aware of the special requirements contained in the Contract Documents for this Project for Quality Assurance for seismic force-resisting systems and components including architectural, mechanical, and electrical components, as listed in the Quality Assurance Plan, and that:

1. I, (We) are responsible for construction of the following systems so listed:

Facility	Seismic Force-Resisting System or Component

(add attachments as necessary)

2. Control of this work will be exercised to obtain conformance with the Contract Documents approved by the building official.
3. I, (We) will adopt procedures for exercising control of the work, the method and frequency of reporting, and for the distribution of reports required under the Quality Assurance Plan for this Project.
4. I, (We) will provide timely notification to the Project Manager and any designated responsible firm or agency as required for Quality Assurance testing and inspection for this Project.

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5. The following person is hereby identified as exercising control over quality assurance for the work designated above:

Name: _____

Qualifications: _____

(Print name and official title of person signing this form)

Signed by: _____

Date: _____

Contractor's Statement of Responsibility for Quality Assurance

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SECTION 01 45 20
FIELD QUALITY CONTROL FORMS

PART 1 FORMS

1.01 DESCRIPTION

- A. The forms listed below and included in this section are referenced from other sections of the Project manual:

Form No.	Title
01 33 00 A	Transmittal of Contractor's Submittal Form
01 45 16 A	Contractor's Quality Responsibility Form
01 43 33 A	Manufacturer's Certificate of Proper Installation
01 43 33 B	Certificate of Unit Responsibility
01 43 33 C	Certificate of Compliance
01 87 13 A	Equipment Test Report Form
11 01 00 A	Equipment Operation and Maintenance Transmittal Form
11 01 00 B	Equipment Record Form
01 75 16 A	Unit Process Startup Form
01 75 16 B	Facility Performance Demonstration Certification Form
03 62 00 A	24-hour Evaluation of Non-shrink Grout Test Form
09 90 00 A	Coating System Inspection Checklist
01 79 23 A	Manufacturer's Instruction Certification Form
11 05 10 A	Rigid Equipment Mount Installation Inspection Checklist
11 05 13 A	Motor Test Data Form
26 08 00 A	Wire and Cable Resistance Test Data Form
26 08 00 B	Installed Motor Test Data Form
26 08 00 C	Dry Transformer Test Data Form
26 08 00 D	Motor Control Center Test Form
46 08 00 A	Loop Wiring and Insulation Resistance Test Data Form

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46 08 00 B	Control Circuit Piping Leak Test Form
46 08 00 C	Controller Calibration Test Data Form
46 08 00 D	Panel Indicator Calibration Test Data Form
46 08 00 E	Recorder Calibration Test Data Form
46 08 00 F	Signal Trip Calibration Test Data Form
46 08 00 G	Field Switch Calibration Test Data Form
46 08 00 H	Transmitter Calibration Test Data Form
46 08 00 I	Miscellaneous Instrument Calibration Test Data Form
46 08 00 J	Individual Loop Test Data Form
46 08 00 K	Loop Commissioning Test Data Form
01 78 23 A	Maintenance Summary Form

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TRANSMITTAL OF CONTRACTOR'S SUBMITTAL FORM 01 33 00 A
(ATTACH TO EACH SUBMITTAL)

DATE: _____

TO: _____

Submittal No.: _____

New Submittal Resubmittal

Project:

Project No.:

Specification Section No.:

(Cover only one section with each transmittal)

Schedule Date of Submittal:

FROM: _____

Contractor

SUBMITTAL TYPE: Shop Drawing Sample Informational

The following items are hereby submitted:

Number of Copies	Description of Item Submitted (Type, Size, Model Number, Etc.)	Spec. and Para. No.	Drawing or Brochure Number	Contains Deviation to Contract	
				No	Yes

* Provide explanation and justification for each Contract deviation (attach documentation)

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Contractor hereby certifies that (i) Contractor has complied with the requirements of Contract Documents in preparation, review, and submission of designated Submittal and (ii) the Submittal is complete and in accordance with the Contract Documents and requirements of laws and regulations and governing agencies.

By: _____
Contractor (Authorized Signature)

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CONTRACTOR'S QUALITY RESPONSIBILITY FORM 01 45 16 A

(Project)

(Name of Contracting Company)

(Business Address)

(_____) _____
(Telephone)

(_____) _____
(Fax)

I, (We) hereby certify that I am (we are) aware of the special requirements contained in the Contract Documents for this Project for Quality Assurance for seismic force-resisting systems and components including architectural, mechanical, and electrical components, as listed in the Quality Assurance Plan, and that:

I, (We) are responsible for construction of the following systems so listed:

Facility	Seismic Force-Resisting System or Component

(add attachments as necessary)

Control of this work will be exercised to obtain conformance with the Contract Documents approved by the building official.

I, (We) will adopt procedures for exercising control of the work, the method and frequency of reporting, and for the distribution of reports required under the Quality Assurance Plan for this Project.

I, (We) will provide timely notification to the Project Manager and any designated responsible firm or agency as required for Quality Assurance testing and inspection for this Project.

The following person is hereby identified as exercising control over quality assurance for the work designated above:

Name: _____

Qualifications: _____

(Print name and official title of person signing this form)

Signed by: _____ Date: _____

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MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION FORM 01 43 33 A

MANUFACTURER _____ CONTRACTOR: _____

EQPT ASSET #: _____ EQPT SERIAL #: _____

PROJECT NO: _____ SPEC. SECTION: _____

I hereby certify that the above-referenced equipment/system has been:

(Check Applicable)

- Installed in accordance with Manufacturer's recommendations.
- Inspected, checked, and adjusted.
- Serviced with proper initial lubricants.
- Electrical and mechanical connections meet quality and safety standards.
- All applicable safety equipment has been properly installed.
- Functional tests.
- System has been performance tested, and meets or exceeds specified performance requirements. (When complete system of one manufacturer)

Note: Attach any performance test documentation from manufacturer.

Comments: _____

I, the undersigned Manufacturer's Representative, hereby certify that I am (i) a duly authorized representative of the manufacturer, (ii) empowered by the manufacturer to inspect, approve, and operate this equipment and (iii) authorized to make recommendations required to assure that the equipment is complete and operational, except as may be otherwise indicated herein. I further certify that (i) the equipment described above is as specified in the project manual, (ii) has been provided in accordance with the manufacturer's recommendations, and (iii) that the trial operation of the equipment item has been satisfactory. All information contained herein is true and accurate.

Date: _____, 20__

Manufacturer: _____

By Manufacturer's Authorized Representative: _____

(Authorized Signature)

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CERTIFICATE OF UNIT RESPONSIBILITY FORM 01 43 33 B

for Specification Section _____

[Section Title]

In accordance with Section 11000-1.02 Unit Responsibility of the contract documents, the undersigned manufacturer of driven equipment ("manufacturer") accepts unit responsibility for all components of equipment furnished to the Project under specification Section _____ and for related equipment manufactured under Sections _____, _____, and _____.

We have reviewed the requirements in specification Section 01 43 33 Manufacturers' Field Services and all sections referencing this (these) section(s), including but not limited to drivers, supports for driving and driven equipment and all other specified appurtenances to be furnished to the Project by manufacturer. And, we have further reviewed, and modified as necessary, the requirements for associated variable speed drives and motor control centers. We hereby certify that all specified components are compatible and comprise a functional unit suitable for the specified performance and design requirements whether or not the equipment was furnished by us. We will make no claim nor establish any condition that problems in operation for the product provided under this specification Section _____ are due to incompatibility of any components covered by this Certificate of Unit Responsibility. Nor will we condition or void any warranty for the performance of the product of this specification Section _____ due to incompatibility of any components covered under this Certificate of Unit Responsibility.

Our signature on this Certificate of Unit Responsibility does not obligate us to take responsibility for, nor to warrant the workmanship, quality, or performance of related equipment provided by others under specification sections _____, _____, and _____. Our obligation to warranty all equipment provided by us shall remain unaffected.

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Notary Public

Commission expiration date

Seal:

Name of Corporation

Address

By:

Duly Authorized Official

Legal Title of Official

Date

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CERTIFICATE OF COMPLIANCE FORM 01 43 33 C

For Specification Section _____

In accordance with the contract documents, the undersigned manufacturer certifies all
components of equipment furnished are in compliance under Specification Section _____

We hereby certify that these components are compatible and comprise a functional unit for the
specified performance and design requirements.

Notary Public

Name of Corporation

Commission Expiration Date

Address

Seal:

By:

Duly Authorized Official

Date

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EQUIPMENT TEST REPORT FORM 01 87 13 A

NOTE: This example equipment test report is provided for the benefit of the Contractor and is not specific to any piece of equipment to be installed as a part of this project. The example is furnished as a means of illustrating the level of detail required for the preparation of equipment test report forms for this project.

City Of Sample

Example Water Treatment Plant

Stage IV Expansion Project

ABC Construction Company, Inc., General Contractor

XYZ Engineering, Inc., Construction Manager

Equipment Test Report

- Equipment Name: Sludge Pump 2
- Equipment Number: P25202
- Specification Ref: 11390
- Location: East Sedimentation Basin Gallery

	Contractor		Construction Manager	
	Verified	Date	Verified	Date
A. Preoperational Checklist				
1. Mechanical				
a. Lubrication				
b. Alignment				
c. Anchor bolts				
d. Seal water system operational				
e. Equipment rotates freely				
f. Safety guards				
g. Valves operational				
h. Hopper purge systems operational				
i. Sedimentation tank/hopper clean				
j. O&M manual information complete				
k. Manufacturer's installation certificate complete				
2. Electrical (circuit ring-out and high-pot tests)				
a. Circuits:				
1) Power to MCC 5				
2) Control to HOA				

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	Contractor		Construction Manager	
	Verified	Date	Verified	Date
3) Indicators at MCC:				
a) Red (running)				
b) Green (power)				
c) Amber (auto)				
4) Indicators at local control panel				
b. Wiring labels complete				
c. Nameplates:				
1) MCC				
2) Control station				
3) Control panel				
d. Equipment bumped for rotation				
3. Piping Systems				
a. Cleaned and flushed:				
1) Suction				
2) Discharge				
b. Pressure tests				
c. Temporary piping screens in place				
4. Instrumentation and Controls				
a. Flowmeter FE2502F calibration				
1) Calibration Report No.				
b. Flow recorder FR2502G calibrated against transmitter				
c. VFD speed indicator calibrated against independent reference				
d. Discharge overpressure shutdown switch calibration				
e. Simulate discharge overpressure Shutdown				
B. Functional Tests				
1. Mechanical				
a. Motor operation temperature satisfactory				
b. Pump operating temperature satisfactory				
c. Unusual noise, etc?				

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	Contractor		Construction Manager	
	Verified	Date	Verified	Date
d. Pump operation: 75 gpm/50 psig				
(1) Measurement:				
(a) Flow:				
(b) Pressure:				
(c) Test gage number:				
e. Alignment hot				
f. Dowelled in				
g. Remarks:				
2. Electrical				
a. Local switch function:				
1) Runs in HAND				
2) No control power in OFF				
3) Timer control in AUTO				
b. Overpressure protection switch PS2502C functional in both HAND and AUTO				
c. Overpressure protection switch PS2502C set at 75 psig				
d. PLC 2500 set at 24-hour cycle, 25 min ON				
C. Operational Test				
1. 48-hour continuous test. Pump cycles as specified, indicators functional, controls functional, pump maintains capacity, overpressure protection remains functional, hour meter functional				

RECOMMENDED FOR BENEFICIAL OCCUPANCY:

Construction Manager

Date

ACCEPTED FOR BENEFICIAL OCCUPANCY

Owner's Representative

Date

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OPERATION AND MAINTENANCE TRANSMITTAL FORM 11 01 00 A

Date:	Submittal No: ¹
To:	Contract No:
	Spec. Section:
	Submittal Description:
Attention:	From:

Checklist	Contractor		Construction Manager	
	Satisfactory	N/A	Accept	Deficient
1. Table of contents				
2. Equipment record forms				
3. Manufacturer information				
4. Vendor information				
5. Safety precautions				
6. Operator prestart				
7. Start-up, shutdown, and post shutdown procedures				
8. Normal operations				
9. Emergency operations				
10. Operator service requirements				
11. Environmental conditions				
12. Lubrication data				
13. Preventive maintenance plan and schedule				
14. Troubleshooting guides and diagnostic techniques				
15. Wiring diagrams and control diagrams				
16. Maintenance and repair procedures				
17. Removal and replacement instructions				
18. Spare parts and supply list				
19. Corrective maintenance man-hours				
20. Parts identification				

¹ See specification Section 01 33 00 Submittal Procedures.

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21. Warranty information				
22. Personnel training requirements				
23. Testing equipment and special tool information				

Remarks:

Contractor's Signature:

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EQUIPMENT RECORD FORM 11 01 00 B

Equip Descrip		Equip Loc	
Equip No.	Shop Dwg No.	Date Inst	Cost
Mfgr		Mfgr Contact	
Mfgr Address			Phone
Vendor		Vendor Contact	
Vendor Address			Phone

Maintenance Requirements	D	W	M	Q	S	A	Hours

Lubricants: Recommended: _____
Alternative: _____

Misc. Notes:

Recommended Spare Parts				Electrical Nameplate Data			
Part No	Quan	Part Name	Cost	Equip			
				Make			
				Serial No.		Id No.	
				Model No.		Frame No.	
				Hp	V	Amp	Hz
				Ph	Rpm	Sf	Duty
				Code	Insl. Cl	Des	Type
				Nema Des	C Amb	Temp Rise	Rating
				Misc.			
				Mechanical Nameplate Data			
				Equip			

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				Make				
				Serial No.		Id No.		
				Model No.		Frame No.		
				Hp	Rpm	Cap	Size	
				Tdh	Imp Sz	Belt No.	Cfm	
				Psi	Assy No.	Case No.		
				Misc				

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UNIT PROCESS STARTUP FORM 01 75 16 A

OWNER: _____

PROJECT: _____

Unit Process Description: (Include description and equipment number of all equipment and devices):

Startup Procedure (Describe procedure for sequential startup and evaluation, including valves to be opened/close order of equipment startup, etc.):

Startup Requirements (Water, power, chemicals, etc.): _____

Evaluation Comments: _____

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FACILITY PERFORMANCE DEMONSTRATION CERTIFICATION FORM 01 75 16 B

OWNER: _____ PROJECT: _____

Unit Processes Description (List unit processes involved in facility startup):

Unit Processes Startup Sequence (Describe sequence for startup, including computerized operations, if any):

Contractor Certification that Facility is capable of performing its intended function(s), including fully automatic operation:

Contractor: _____ Date: _____, 20____

Project Manager: _____ Date: _____, 20____
(Authorized Signature)

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24-HOUR EVALUATION OF NONSHRINK GROUT TEST FORM 03 62 00 A

(Test Lab Name)

(Address)

(Phone No.)

OBJECTIVE: Define standard set of test procedures for an independent testing laboratory to perform and complete within a 24-hour period.

SCOPE: Utilize test procedures providing 24-hour results to duplicate field grouting demands. Intent of evaluation is to establish grout manufacturer's qualifications.

PRIOR TO TEST: Obtain five bags of each type of grout.

1. From intended grout supplier for Project.
2. Five bags of grout shall be of same lot number.

ANSWER THE FOLLOWING QUESTIONS FOR GROUT BEING TESTED FROM LITERATURE, DATA, AND PRINTING ON BAG:

- A. Product data and warranty information contained in company literature and data? Yes_____ No_____
- B. Literature and bag information meet specified requirements? Yes_____ No_____
- C. Manufacturer guarantees grout as specified in Article Guarantee? Yes_____ No_____
- D. Guarantee extends beyond grout replacement value and allows participation with Contractor in replacing and repairing defective areas? Yes_____ No_____
- E. Water demands and limits printed on bag? Yes_____ No_____
- F. Mixing information printed on the bag? Yes_____ No_____
- G. Temperature restrictions printed on bag? Yes_____ No_____

****Rejection of a grout will occur if one or more answers are noted NO.***

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GROUT TESTING PROCEDURES

A. BAGGED MATERIAL:

1. List lot numbers. _____
2. List expiration date. _____
3. Weigh bags and record weight. _____

Engineer will disqualify grout if bag weights have misstated measure plus or minus 2 pounds by more than one out of five bags. (Accuracy of weights is required to regulate amount of water used in mixing since this will affect properties.)

B. MIXING AND CONSISTENCY DETERMINATION:

1. Mix full bag of grout in 10 gallon pail.
2. Use electric drill with a paddle device to mix grout (jiffy or jiffler type paddle).
3. Use maximum water allowed per water requirements listed in bag instructions.
4. Mix grout to maximum time listed on bag instructions.
5. In accordance with COE CRD-C611 (flow cone) determine time of mixed grout through the flow cone. _____ seconds
6. Add water to attain 20 to 30 second flow in accordance with COE CRD-C611.
7. Record time of grout through cone at new water demand. _____ seconds
8. Record total water needed to attain 20 to 30 second flow. _____ pounds
9. Record percent of water. _____ percent

C. When fluid grout is specified and additional water is required beyond grout manufacturer's listed maximum water, COE CRD-C621 will be run at new water per grout ratio to determine whether grout passes using actual water requirements to be fluid. Use new water per grout ratio on remaining tests.

D. BLEED TEST:

1. Fill two gallon cans half full of freshly mixed grout at ambient temperatures for each category and at required consistency for each.
2. Place one can of grout in tub of ice water and leave one can at ambient temperature.
3. Cover top of both cans with glass or plastic plate preventing evaporation.
4. Maintain 38 to 42 degrees F temperature with grout placed in ice and maintain ambient temperature for second container for 1 hour.
5. Visually check for bleeding of water at 15-minute intervals for 2 hours.
6. Perform final observation at 24 hours.
If grout bleeds a small amount at temperatures specified, grout will be rejected.

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- E. Extended Flow Time and Segregation Test (for Category II and III):
1. Divide the remaining grout into two 3 gallon cans. Place the cans into the 40-degree F and 100-degree F containers and leave for 20, 40, and 60 minutes. Every 20 minutes remove and check for segregation or settlement of aggregate. Use a gloved hand to reach to the bottom of the can, if more than 1/4-inch of aggregate has settled to the bottom or aggregate has segregated into clumps reject the grout.
 2. Right after the settlement test mix the grout with the drill mixer for 10 seconds. Take a COE CRD-C611 flow cone test of grout and record flow time. Maintain this process for 1 hour at ambient temperatures of 40 and 100 degrees F.
 - a. 20 min _____, sec. @ 40 degrees F.
 - b. 40 min _____, sec. @ 40 degrees F.
 - c. 60 min _____, sec. @ 40 degrees F.
 - d. 20 min _____, sec. @ 100 degrees F.
 - e. 40 min _____, sec. @ 100 degrees F.
 - f. 60 min _____, sec. @ 100 degrees F.

All Category II and III grout that will not go through the flow cone with continuous flow after 60 minutes will be disqualified.

Qualified

Disqualified

- F. 24-hour Strength Test:
1. Using grout left in mixing cans in accordance with COE CRD-C621 for mixing and consistency determination test and for extended time flow test, make minimum of nine cube samples.
 2. Store cubes at 70 degrees F for 24 hours.
 3. Record average compressive strength of nine cubes at 24 hours.

Grout will be disqualified if 24-hour compressive strengths are under 2,500 psi for grouts claiming fluid placement capabilities.

Grouts that have not been disqualified after these tests are qualified for use on the Project for the application indicated in Nonshrink Grout Schedule.

Signature of Independent Testing Laboratory

Date Test Conducted

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COATING SYSTEM INSPECTION CHECKLIST FORM 09 90 00 A

Project Name			
Owner		Coating System Manufacturer (CSM)	
General Contractor (GC)		Coating System Applicator (CSA)	
Area or Structure		Location within Structure	
Coating System (e.g., E-1)		Coating Type (e.g., Epoxy, etc.)	

Coating System Inspection Checklist

Step	Description		Name	Signature	Date
1	Completion of cleaning and substrate decontamination prior to abrasive blast cleaning.	GC QC			
		CSM QC			
		CSA QC			
2	Installation of protective enclosure of structure or area and protection of adjacent surfaces or structures that are not to be coated.	GC QC			
		CSM QC			
		CSA QC			
3	Completion of ambient condition control in structure or building area and acceptance of ventilation methods in structure or Area.	GC QC			
		CSM QC			
		CSA QC			

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Coating System Inspection Checklist

Step	Description		Name	Signature	Date
4	Completion of Surface Preparation for Substrates to Be Coated.	GC QC			
		CSM QC			
		CSA QC			
5	Completion of Primer Application.	GC QC			
		CSM QC			
		CSA QC			
6	Completion of Concrete Repairs If Required and Related Surface Preparation Rework Prior to Coating System Application.	GC QC			
		CSM QC			
		CSA QC			
7	Completion of Concrete Filler/ Surface Application to Concrete.	GC QC			
		CSM QC			
		CSA QC			
8	Completion of First Finish Coat Application and of Detail Treatment at Transitions or Terminations.	GC QC			
		CSM QC			
		CSA QC			
9	Completion of Second Finish Coat Application and of Detail Treatment at Transitions and Terminations.	GC QC			
		CSM QC			
		CSA QC			
10		GC QC			

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Coating System Inspection Checklist					
Step	Description		Name	Signature	Date
	Completion of Full and Proper Cure of Coating System.	CSM QC			
		CSA QC			
11	Completion of Testing of Cured Coating System including Adhesion, Holiday (Continuity) Testing and Dry Film Thickness.	GC QC			
		CSM QC			
		CSA QC			
12	Completion of Localized Repairs to Coating System Following Testing.	GC QC			
		CSM QC			
		CSA QC			
13	Final Acceptance of Coating System Installation Including Final Clean-Up Complying with Specification Requirements and the CSM's Quality Requirements.	GC QC			
		CSM QC			
		CSA QC			

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MANUFACTURER'S INSTRUCTION CERTIFICATION FORM 01 79 23 A

Contract No:

Specification Section:

Equipment name:

Contractor:

Manufacturer of equipment item:

The undersigned manufacturer certifies that a service engineer has instructed the Owner's personnel in the proper maintenance and operation of the equipment designated herein.

Operations Check List (check appropriate spaces)

Start-up procedure reviewed

Shutdown procedure reviewed

Normal operation procedure reviewed

Others:

Maintenance Check List (check appropriate spaces)

Described normal oil changes
(frequency)

Described special tools required

Described normal items to be reviewed
for wear

Described preventive maintenance
instructions

Described greasing frequency

Others:

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Manufacturer

Signature of Authorized Representative

Date

Signature of Contractor Representative
Date

Signature of Authorized Representative
Date

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RIGID EQUIPMENT MOUNT INSTALLATION CHECKLIST FORM 11 05 10 A

Equipment Tag No.: _____ Date: _____

Grout Product Name and Type: _____

Grouting System Manufacturer: _____

Grouting Application Contractor: _____

General Contractor: _____

Step 1: Verify Equipment Anchor Installation Conformance to Equipment Pad Details

Name: Contractor Rep.		Date
Name: Construction Manager		Date
Name: Millwright		Date

Step 2: Completion of Cleaning and Concrete Substrate Preparation Prior to Grouting

Name: Contractor Rep.		Date
Name: Construction Manager		Date
Name: Grouting Contractor Rep.		Date
Name: Grout Manufacturer's Technical Rep.		Date

Step 3: Equipment Leveling

Name: Contractor Rep.		Date
Name: Construction Manager		Date
Name: Millwright		Date

Step 4: Installation of Protection of Adjacent Surfaces or Structures NOT TO BE GROUDED

Name: Contractor Rep.		Date
Name: Construction Manager		Date
Name: Grouting Contractor Rep.		Date
Name: Grout Manufacturer's Technical Rep.		Date

Step 5: Preparation and Construction of Forms and Epoxy Grout Filling Standpipes

Name: Contractor Rep.		Date
Name: Construction Manager		Date
Name: Grouting Contractor Rep.		Date
Name: Grout Manufacturer's Technical Rep.		Date

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Step 6: Completion of Ambient Condition Control in Structure or Building Area and Acceptance of Ambient Conditions as They Apply to Application and Curing Requirements for the Grouting System

Name: Contractor Rep.		Date
Name: Construction Manager		Date
Name: Grouting Contractor Rep.		Date
Name: Grout Manufacturer's Technical Rep.		Date

Step 7: Epoxy Grout Installation

Name: Contractor Rep.		Date
Name: Construction Manager		Date
Name: Grouting Contractor Rep.		Date
Name: Grout Manufacturer's Technical Rep.		Date

Step 8: Completion of Full and Proper Cure of Epoxy Grout

Name: Contractor Rep.		Date
Name: Construction Manager		Date
Name: Grouting Contractor Rep.		Date
Name: Grout Manufacturer's Technical Rep.		Date

Step 9: Completion of Localized Repair of Grout Voids

Name: Contractor Rep.		Date
Name: Construction Manager		Date
Name: Grouting Contractor Rep.		Date
Name: Grout Manufacturer's Technical Rep.		Date

Step 10: Final Acceptance of Grouting System Installation Including Final Clean-Up of the Work Site Complying with All Specification Requirements and the GSM's Quality Requirements

Name: Contractor Rep.		Date
Name: Construction Manager		Date
Name: Grouting Contractor Rep.		Date
Name: Grout Manufacturer's Technical Rep.		Date

**MWMC PRIMARY CLARIFIER AND
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MOTOR DATA FORM 11 05 13 A

Equipment Name: _____ Equipment No(s): _____

Project Site Location: _____

Nameplate Markings

Mfr:		Mfr Model:		Frame:		Horsepower:	
Volts:		Phase:		RPM:		Service Factor:	
FLA:		LRA:		Frequency:		Amb Temp Rating:	°C
Time rating:					Design Letter:		
	(NEMA MG1-10.35)					(NEMA MG-1.16)	
KVA Code Letter:					Insulation Class:		

The following information is required for explosion-proof motors only:

- A. Approved by UL for installation in Class _____, Div _____, Group _____
- B. UL frame temperature code _____ (NEC Tables 500-8B)

The following information is required for all motors 1/2 horsepower and larger:

- A. Guaranteed minimum efficiency _____
(Specification Section 11 05 13 Common Motor Requirements for Equipment)
- B. Nameplate or nominal efficiency _____

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Data Not Necessarily Marked on Nameplate

Type of Enclosure:		Enclosure Material:				
Temp Rise:		°C (NEMA MG1-12.41,42)				
Space Heater included?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	If Yes:	Watts	Volts	
Type of motor winding over-temperature protection, if specified:						

Provide information on other motor features specified:

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WIRE AND CABLE RESISTANCE TEST DATA FORM 26 08 00 A

Wire or Cable No.: _____ Temperature, °F: _____

Location of Test	Insulation resistance, megohms
1.	
2.	
3.	
4.	
5.	
6.	
7.	

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

MWMC PRIMARY CLARIFIER AND
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INSTALLED MOTOR TEST DATA FORM 26 08 00 B

Motor Equipment Number: _____ Date of test: _____

Equipment Driven: _____

MCC Location: _____

				Ambient temp	°F
Resistance:					
Insulation resistance phase-to-ground megohms:					
Phase A		Phase B		Phase C	
Current at Full Load:					
Phase				Current, amps	
Phase				Current, amps	
Phase				Current, amps	
Thermal Overload Device:	Manufacturer/catalog #			Amperes	
Circuit breaker (MCP) setting:					

Motor Nameplate Markings:

Mfr		Mfr Model		Frame		HP	
Volts		Phase		RPM		Service factor**	
Amps		Freq		Ambient temp rating			°C
Time rating				Design letter**			
	(NEMA 1-10.35)				(NEMA MG-1.16)		
Code letter				Insulation class			

**Required for 3-phase squirrel cage induction motors only.

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

**MWMC PRIMARY CLARIFIER AND
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DRY TRANSFORMER TEST DATA FORM 26 08 00 C

(Note: Use Data Form for dry type transformers with voltage rating of 600 Vac or less and sizes to 167 kVA single phase and 500 kVA three phase. Use NETA Test Forms and Test Procedures for higher voltages and larger transformers.)

Equipment Tag No.: _____ Temperature Rating: _____

Description/Location: _____ Feeder size/Source: _____

Primary Voltage: _____ Secondary Voltage: _____ Winding Connection: _____

A. VISUAL INSPECTION

Transformer Inspection	Pass	Fail	Note
Nameplate data as specified			
Mechanical condition			
a. Free of dents and scratches			
b. Anchored properly			
c. Shipping brackets removed			
d. Spacing from wall per nameplate			
Grounding *			
a. Equipment grounding			
b. System grounding			

B. INSULATION-RESISTANCE TESTS:

1. Perform tests with calibrated megohmmeter. Apply 1000 Vdc test voltage for 60 seconds and record readings in megohms at 30-seconds and 60-seconds intervals.

Test Group	Resistance between		30-second reading	60-second reading	Absorption Ratio Index 60-sec. / 30-sec.
Primary Winding to ground	A	GRD			
	B	GRD			
	C	GRD			
Secondary Winding to ground with * N-G Bond removed	a	GRD			
	b	GRD			
	c	GRD			
Primary Winding to Secondary Winding	A	a			
	B	b			
	C	c			

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2. Submit resistance readings to the Construction Manager immediately after the tests that are less than the manufacturer's recommended value or less than 10-megohms. Record the Absorption Ratio Index values for future reference. Ratio must be 1.0 or greater, with infinity (∞) equal to 1.0.

Contractor Representative Certified: _____ Date _____

Owner Representative Witnessed: _____ Date _____

**MWMC PRIMARY CLARIFIER AND
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MOTOR CONTROL CENTER TEST FORM 26 08 00 D

Equipment No.: _____ Ambient room temperature: _____

Location: _____

A. MECHANICAL CHECK:

All bolted connections either bus to bus or cable to bus shall be torqued to the manufacturer's recommendations.

B. ELECTRICAL TESTS:

1. Measure insulation resistance of each bus section phase to phase and phase to ground for 1 minute using a megohmmeter at 1000 volts.

Test results (megohms)			
Phase		Phase	
A-GRD		A-B	
B-GRD		B-C	
C-GRD		C-A	

2. Set the circuit breaker in the starter unit to comply with the requirements of NEC, Article 430-52 and Table 430-152.
3. Motor overload heater elements shall be sized and installed based on the actual nameplate full load amperes of the motor connected to the starter.

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

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LOOP WIRING AND INSULATION RESISTANCE TEST DATA FORM 46 08 00 A

Loop No.: _____

List all wiring associated with a loop in table below. Make applicable measurements as indicated after disconnecting wiring.

Wire No.	Panel Tie	Field TB	Continuity Resistance ^a		Insulation Resistance ^b			
			Cond./Cond.	Cond./Shield	Shield/Gnd.	Shield/Cond.	Cond./Gnd.	Shield/Shield
A			--	(A/SH)				
B			(A/B)	--				
C			(A/C)	--				
D			(A/D)	--				
etc.								

NOTES:

- Continuity Test. Connect ohmmeter leads between wires A and B and jumper opposite ends together. Record resistance in table. Repeat procedure between A and C, A and D, etc. Any deviation of ± 2 ohms between any reading and the average of a particular run indicates a poor conductor, and corrective action shall be taken before continuing with the loop test.
- Insulation Test. Connect one end of a 500 volt megger to the panel ground bus and the other sequentially to each completely disconnected wire and shield. Test the insulation resistance and record each reading.

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

**MWMC PRIMARY CLARIFIER AND
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CONTROL CIRCUIT PIPING LEAK TEST FORM 46 08 00 B

Loop No.: _____

List tubing associated with loop in table below. Make applicable measurements after isolating any air consuming pilots from circuit.

Tube No.	Tubing Equivalent Length of 1/4-Inch Copper ^a	Test Period (seconds)	Permitted Pressure Drop (psi) ^b	Measured Pressure Drop (psi)
A				
B				
C				
D				
etc.				

NOTES:

- a. Convert actual tubing and air motor volume to equivalent 1/4-inch copper tubing.
- b. Pressure drop shall not exceed 1 psi per hundred feet 1/4-inch tubing per 5 seconds.

CERTIFIED _____ **Date** _____
Contractor's Representative

WITNESSED _____ **Date** _____
Owner's Representative

MWMC PRIMARY CLARIFIER AND
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CONTROLLER CALIBRATION TEST DATA FORM 46 08 00 C

Tag No. and Description: _____

Make & Model No.: _____ Serial No.: _____

Input: _____ Process Variable (PV) Scale: _____

Output: _____ Output Scale: _____

PV Scale Calibration

% of Range	Input	Expected Reading	Actual Reading	% Deviation
0				
50				
100				
% Deviation Allowed:				

Connect output to PV for following tests:

Set Point (SP) Indicator Accuracy			Output Meter Accuracy			Controller Accuracy		
SP	PV Reading	Expected % Dev.	Actual Reading	Expected Reading	Actual % Dev.	Output	Output	% Dev.
(0%)								
(50%)								
(100%)								
% Deviation Allowed:			% Deviation Allowed:			% Deviation Allowed:		

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

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PANEL INDICATOR CALIBRATION TEST DATA FORM 46 08 00 D

Tag No. and Description: _____

Make & Model No.: _____ Serial No.: _____

Input: _____

Scale: _____ Range: _____

PV Scale Calibration

% of Range	Input	Expected Reading	Actual Reading	% Deviation
0				
50				
100				
% Deviation Allowed:				

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

MWMC PRIMARY CLARIFIER AND
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RECORDER CALIBRATION TEST DATA FORM 46 08 00 E

Tag No. and Description: _____

Make & Model No.: _____ Serial No.: _____

Input: _____ Chart: _____

Scale: _____ Range: _____

% of Range	Input	Expected Reading	Actual Reading	% Deviation
0				
50				
100				
% Deviation Allowed:				

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

MWMC PRIMARY CLARIFIER AND
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SIGNAL TRIP CALIBRATION TEST DATA FORM 46 08 00 F

Tag No. and Description: _____

Make & Model No.: _____ Serial No.: _____

Input: _____

Scale: _____ Range: _____

Set Point(s): _____

After setting set point(s), run signal input through entire range and calculate deadband.

Set Point	Incr. Input Trip Point	Decr. Input Trip Point	Calc. Deadband	Required Deadband

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

MWMC PRIMARY CLARIFIER AND
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FIELD SWITCH CALIBRATION TEST DATA FORM 46 08 00 G

Tag No. and Description: _____

Make & Model No.: _____ Serial No: _____

Input: _____

Range: _____

Set Point(s): _____

Simulate process variable (flow, pressure, temperature, etc.) and set desired set point(s). Run through entire range of switch and calculate deadband.

Set Point	Incr. Input Trip Point	Decr. Input Trip Point	Calc. Deadband	Required Deadband

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

MWMC PRIMARY CLARIFIER AND
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TRANSMITTER CALIBRATION TEST DATA FORM 46 08 00 H

Tag No. and Description: _____

Make & Model No.: _____ Serial No.: _____

Input: _____

Output: _____

Range: _____ Scale: _____

Simulate process variable (flow, pressure, temperature, etc.) and measure output with appropriate meter.

% of Range	Input	Expected Reading	Actual Reading	% Deviation
0				
50				
100				
% Deviation Allowed:				

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

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MISCELLANEOUS INSTRUMENT CALIBRATION TEST DATA FORM 46 08 00 I
(For instruments not covered by any of the preceding test forms, the Contractor shall create a form
containing all necessary information and calibration procedures.)

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

MWMC PRIMARY CLARIFIER AND
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INDIVIDUAL LOOP TEST DATA FORM 46 08 00 J

Loop No.: _____

Description: _____

(Give complete description of loop's function using tag numbers where appropriate.)

P&ID No.: _____

(Attach copy of P&ID.)

- a. Wiring tested:
(Attach test form 17000-A)
- b. Instrumentation tubing/piping tested:
(Attach test form 17000-B)
- c. Instruments calibrated:
(Attach test forms 17000-C through I)
- d. List step-by-step procedures for testing loop parameters. Test loop with instruments, including transmitters and control valves, connected and functioning. If it is not possible to produce a real process variable, then a simulated signal may be used with the Construction Manager's approval.

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

MWMC PRIMARY CLARIFIER AND
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LOOP COMMISSIONING TEST DATA FORM 46 08 00 K

Loop No.: _____

- a. Loop tested:
(Attach test form 17000-J)
- b. Controlled or connected equipment tests confirmed:
- c. Give complete description of loop's interface with process.
- d. With associated equipment and process in operation, provide annotated chart trace of loop response to changes in set points for verification of performance. This chart should demonstrate 1/4-amplitude damping as output adjusts to set point change. Show set points, starting and finishing times on chart, as well as any other pertinent data.
- e. Connect 2-pen recorder to process variable (PV) and to controller output. Use 1 inch/second chart speed.
- f. Pen 1 - PV - Connections:
- g. Pen 2 - Output - Connections:

CERTIFIED _____ Date _____
Contractor's Representative

WITNESSED _____ Date _____
Owner's Representative

SECTION 01 45 33
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 2024 IBC and is in addition to and supplements requirements included in Statement of Special Inspections shown on the 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, Minimum Design Loads and Associated Criteria for Buildings and Other Structures.
 2. International Code Council (ICC):
 - a. International Building Code (IBC).
 - b. Evaluation Service (ICC-ES) Reports and Legacy Reports.

1.03 DEFINITIONS

- A. Agencies and Personnel:
1. Agency Having Jurisdiction (AHJ): Permitting building agency; may be a federal, state, local, or other regional department, or individual including building official, fire chief, fire marshal, chief of a fire prevention bureau, labor department, or health department, electrical inspector; or others having statutory authority. AHJ may be Owner when authorized to be self-permitting by governmental permitting agency or when no governmental agency has authority.
 2. Approved Agency: An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved.
 3. Registered Design Professional in Responsible Charge: An individual who is registered or licensed to practice their respective design profession as defined by statutory requirements of professional registration laws of state or jurisdiction in which Project is to be constructed.
 4. Special Inspector: Qualified person employed by Owner who will demonstrate competence to the satisfaction of AHJ for inspection of a particular type of construction or operation requiring Special Inspection.

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- B. Statement of Special Inspections: Detailed written procedure contained on the 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.
- C. 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 area where the Work is being performed.
 - 3. Special Inspection, Periodic: Part-time or intermittent observation of the Work requiring Special Inspection by an approved Special Inspector who is present in area where the Work has been or is being performed, and at completion of the Work.
- D. 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 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 the Drawings.
 - 4. Shear Wall: Component of structural lateral load resisting system consisting of a wall designed to resist lateral forces parallel to plane of the wall. Unless noted otherwise on the 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 the Drawings.

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E. Nonstructural Components:

1. Architectural Component Supports: Structural members or assemblies of members which transmit loads and forces from architectural systems or components to structure, including braces, frames, struts, and attachments.
2. Electrical Component Supports: Structural members or assemblies which transmit loads and forces from electrical equipment to structure, including braces, frames, legs, pedestals, and tethers, as well as elements forged or cast as part of component for anchorage.
3. Mechanical and Plumbing Component Supports: Structural members or assemblies which transmit loads and forces from mechanical or plumbing equipment to structure, including braces, frames, skirts, legs, saddles, pedestals, snubbers, and tethers, as well as elements forged or cast as part of component for anchorage.

F. 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 provided on the Drawings.
3. Geotechnical Observation: Visual observation of selected subgrade bearing surfaces and installation of deep foundation elements 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.

1.04 SUBMITTALS

A. Informational Submittals:

1. Contractor's Statement of Responsibility: Form shall be completed by entity responsible for the repair of main seismic-force-resisting system listed in Statement of Special Inspections. Refer to Article Supplements located at "End of Section."

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1.05 STATEMENT OF SPECIAL INSPECTIONS REQUIREMENTS

- A. Designated Systems for Inspection:
1. Seismic-force-resisting systems designated under IBC Section 1705 and subject to Special Inspection under Section 1705: Chlorine Contact Basin Exterior Walls.
 2. Wind-force-resisting systems designated under IBC Section 1705: None required.
 3. Architectural, Plumbing, Mechanical, and Electrical Components subject to Special Inspection under IBC Section 1705.12.5 and Section 1705.12.6 for Seismic Resistance: None required.
- B. Statement of Special Inspections:
1. As included on the Drawings and in support of building permit application, Project-specific requirements were prepared by Registered Design Professional in Responsible Charge. The following identifies elements of inspection, observation, and testing program to be followed in construction of the Work:
 - a. Designated seismic systems and main seismic force-resisting systems and components that are subject to Special Inspection for lateral load resistance.
 - b. Special Inspection and testing required by IBC Section 1705 and other applicable sections and referenced standards therein.
 - c. Type and frequency of Special Inspection required.
 - d. Type and frequency of testing required.
 - e. Required frequency and distribution of testing and Special Inspection reports to be distributed by Special Inspector to Engineer, Contractor, building official, and Owner.
 - f. Geotechnical Observation to be Performed: Not required for this Project.
 - g. Structural Observations to be Performed: Required frequency and distribution of Structural Observation reports to Owner.
- C. Special Inspection and associated testing of shop fabrication and field construction will be performed by an approved accredited independent agency or by Authority Having Jurisdiction's (AHJ) approved, qualified inspection staff. Owner will secure and pay for services of agency to perform Special Inspection and associated testing.

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- D. Code required Special Inspection with associated testing, as provided in Statement of Special Inspections on the Drawings and further provided in this section, is for 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 Structural Observer does not relieve Contractor from Contract requirements.
- F. Contractor is responsible for additional costs associated with Special Inspection and Testing when Work is not ready at time identified by Contractor and Special Inspectors are onsite, but not able to provide contracted services.
- G. Contractor is responsible for associated costs for additional Special Inspection and Testing by Special Inspectors required because of rejection of materials of in place Work that cannot be made compliant to Contract Document without additional inspections and testing.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Requirements of the Statement of Special Inspections are provided by the Owner. All other testing and inspections, unless noted otherwise, are provided by Contractor.
- B. Provide access to shop or Site for Special Inspection and Testing requirements.
- C. Notify Engineer in advance of required Special Inspection no later than 48 hours prior to date of Special Inspection.
- D. Notify Engineer in advance of required Structural Observation no later than 72 hours prior to date of Structural Observation.
- E. Provide access for Special Inspector to construction documents.

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- F. Retain special inspection records on-site to be readily available for review.
- G. Cooperate with Special Inspector and provide safe access to the Work to be inspected.
- H. Submit Fabricator's Certificates of Compliance for approved fabricators.
- I. Provide reasonable auxiliary services as requested by the Special Inspector. Auxiliary services required include, but not limited to:
 - 1. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests to assist the Special Inspector in performing test/inspections.
 - 2. Providing storage space for the Special Inspector's exclusive use, such as for storing and curing concrete test samples and delivery of samples to testing laboratories.
 - 3. Providing the Special Inspector with access to all approved submittals.
 - 4. Providing security and protection of samples and test equipment at the Project Site.
 - 5. Provide samples of materials to be tested in required quantities.
- J. Materials and systems shall be inspected during placement where Continuous Special Inspection is required.
- K. Where Periodic Special Inspection is indicated in the Statement of Special Inspections:
 - 1. Schedule inspections for either during or at completion of their placement or a combination or both.
 - 2. Schedule periodically inspected Work (either inspected during or after its placement) so that corrections can be completed and re-inspected before Work is inaccessible.
 - 3. Sampling a portion of the Work is not allowed. Schedules shall provide for inspection of all Work requiring periodic inspection.

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 requirements contained in Contract Documents for this Project for seismic force-resisting systems as listed in Statement of Special Inspections on the Drawings, and that:

1. I, (We) aware of the systems and the requirements of the special inspection and acknowledge our responsibility in the implementation of the Statement of Special Inspections for the repair of the following systems:

Facility	Specification	Lateral Force-Resisting System
Chlorine Contact Basins and Primary Clarifiers		Concrete Shear Walls (Exterior walls)

2. Control of this Work will be exercised to obtain conformance with Contract Documents approved by building official.
4. Procedures within the Contractor's organization to be used for exercising control of the Work, method and frequency of reporting, and distribution of reports required under Statement of Special Inspections for Project are attached to this statement.
5. I, (We) will provide 48-hour notification to Engineer and approved inspection agency as required for structural tests and Special Inspection for Project.

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6. The following person is hereby identified as exercising control over 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 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Association of Nurserymen: American Standards for Nursery Stock.
 2. Federal Emergency Management Agency.
 3. NFPA, National Fire Prevention Standard for Safeguarding Building Construction Operations.
 4. Telecommunications Industry Association (TIA); Electronic Industries Alliance (EIA): 568B, Commercial Building Telecommunications Cabling Standard.
 5. U.S. Department of Agriculture: Urban Hydrology for Small Watersheds.
 6. U.S. Weather Bureau: Rainfall-Frequency Atlas of the U.S. for Durations From 30 Minutes to 24 Hours and Return Periods From 1-Year to 100 Years.

1.02 SUBMITTALS

- A. Informational Submittals:
1. Copies of permits and approvals for construction as required by Laws and Regulations and governing agencies.
 2. Temporary Utility Submittals: Temporary bypass plan.
 3. Temporary Construction Submittals:
 - a. Parking area plans.
 - b. Contractor's field office, storage yard, and storage building plans, including gravel surfaced area.
 - c. Plan for maintenance of existing plant operations.
 4. Temporary Control Submittals:
 - a. Noise control plan.
 - b. Plan for disposal of waste materials and intended haul routes.
 - c. Dust control plan.

1.03 MOBILIZATION

- A. Mobilization shall include, but not be limited to, these principal items:
1. Obtaining required permits.

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2. Moving Contractor's field office and equipment required for first month operations onto Site.
 3. Installing temporary construction power, wiring, and lighting facilities.
 4. Providing onsite communication facilities, including telephones.
 5. Providing onsite sanitary facilities and potable water facilities as specified and as required by Laws and Regulations, and governing agencies.
 6. Arranging for and erection of Contractor's work and storage yard.
 7. Posting OSHA required notices and establishing safety programs and procedures.
 8. Having Contractor's superintendent at Site full time unless otherwise approved by Owner.
- B. Use area designated for Contractor's temporary facilities as shown on the Drawings.

1.04 PROTECTION OF WORK AND PROPERTY

- A. Comply with Owner's safety rules while on Owner's property.
- B. Keep Owner informed of serious onsite accidents and related claims.
- C. No blasting or use of explosives will be allowed onsite.

1.05 VEHICULAR TRAFFIC

- A. Traffic Routing Plan: Show sequences of construction affecting use of roadways, time required for each phase of the Work, provisions for decking over excavations and phasing of operations to provide necessary access, and plans for signing, barricading, and striping to provide passages for pedestrians and vehicles.

PART 2 PRODUCTS

2.01 PROJECT SIGNS

- A. Provide and maintain one, 8-foot wide by 4-foot high sign constructed of 3/4-inch exterior high density overlaid plywood. Sign must bear name of Project, Owner, Contractor, Engineer, and other participating agencies. Lettering must be blue applied on a white background by an experienced sign painter using exterior type enamel. Information to be included will be provided by Owner.
- B. If applicable, provide sign as specified in specification Section 00 73 73, Statutory Requirements for CWSRF-funded Construction Project.

PART 3 EXECUTION

3.01 TEMPORARY UTILITIES

A. Power:

1. Electric power will be available at or near Site. Determine type and amount available and make arrangements for obtaining temporary electric power service, metering equipment, and pay all costs for electric power used during Contract period, except for portions of the Work designated in writing by Project Manager as substantially complete.
2. Cost of electric power will be borne by Contractor.

B. Provide temporary lighting to meet applicable safety requirements to allow erection, application, or installation of materials and equipment, and observation or inspection of the Work.

C. Heating, Cooling, and Ventilating:

1. Provide as required to maintain adequate environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for installation of materials, and to protect materials, equipment, and finishes from damage due to temperature or humidity
2. Provide adequate forced air ventilation of enclosed areas to cure installed materials, to dispense humidity, and to prevent hazardous accumulations of dust, fumes, vapors, or gases.
3. Pay all costs of installation, maintenance, operation, removal, and fuel consumed.

D. Water:

1. No construction or potable water is available at Site. Make arrangements for and bear costs of providing water required for construction purposes and for drinking by construction personnel during construction.
2. Provide bottled water for drinking and culinary uses.

E. Sanitary and Personnel Facilities:

1. Provide and maintain facilities for all construction personnel.
2. Obtain Owner's permission before allowing construction personnel to use existing sanitary facilities at Site.

F. Telephone and Email Service: Provide wireless phone and internet services at Site for construction purposes.

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- G. Furnish and maintain on Site adequate firefighting equipment capable of extinguishing incipient fires. Comply with applicable parts of National Fire Prevention Standard for Safeguarding Building Construction Operations (NFPA No. 241).

3.02 PROTECTION OF WORK AND PROPERTY

A. General:

1. Perform Work within right-of-way and easements in a systematic manner that minimizes inconvenience to property owners and the public.
2. No residence or business shall be cut off from vehicular traffic for a period exceeding 1 hour, unless special arrangements have been made.
3. Maintain in continuous service all existing oil and gas pipelines, underground power, telephone or communication cable, water mains, irrigation lines, sewers, poles and overhead power, and all other utilities encountered along line of the Work, unless other arrangements satisfactory to owners of said utilities have been made.
4. Where completion of the Work requires temporary or permanent removal or relocation of existing utility, coordinate all activities with owner of said utility and perform all work to their satisfaction.
5. Protect, shore, brace, support, and maintain underground pipes, conduits, drains, and other underground utility construction uncovered or otherwise affected by construction operations.
6. Keep fire hydrants and water control valves free from obstruction and available for use at all times.
7. In areas where Contractor's operations are adjacent to or near a utility, such as gas, telephone, television, electric power, water, sewer, or irrigation system, and such operations may cause damage or inconvenience, suspend operations until arrangements necessary for protection have been made by Contractor.
8. Notify property owners and utility offices that may be affected by construction operation at least 2 days in advance: Before exposing a utility, obtain utility owner's permission. Should service of utility be interrupted due to Contractor's operation, notify proper authority immediately. Cooperate with said authority in restoring service as promptly as possible and bear costs incurred.
9. Do not impair operation of existing sewer system. Prevent construction material, pavement, concrete, earth, volatile and corrosive wastes, and other debris from entering sewers, pump stations, or other sewer structures.
10. Maintain original Site drainage wherever possible.

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- B. Provide and maintain additional temporary security fences as necessary to protect the Work and Contractor-furnished products not yet installed.

- C. Barricades and Lights:
 - 1. Provide barricades and warning lights as required by latest edition of the Oregon Temporary Traffic Control Handbook and in sufficient quantity to safeguard the public and the Work.
 - 2. Provide as necessary to prevent unauthorized entry to construction areas and affected roads, streets, and alleyways, inside and outside of fenced area, and as required to ensure public safety and the safety of construction personnel, Owner's personnel, and other who may be affected by the Work.
 - 3. Locate to enable access by facility operators and property owners.
 - 4. Protect streets, roads, highways, and other public thoroughfares that are closed to traffic by effective barricades with acceptable warning signs.
 - 5. Locate barricades at the nearest intersecting public thoroughfare on each side of the blocked section.
 - 6. Illuminate barricades and obstructions with warning lights from sunset to sunrise.

- D. Trees and Plantings:
 - 1. Protect from damage and preserve trees, shrubs, and other plants outside limits of the Work and within limits of the Work, which are designated on the Drawings to remain undisturbed.
 - a. Where practical, tunnel beneath trees when on or near line of trench.
 - b. Employ hand excavation as necessary to prevent tree injury.
 - c. Do not stockpile materials or permit traffic within drip lines of trees.
 - d. Provide and maintain temporary barricades around trees.
 - e. Water vegetation as necessary to maintain health.
 - f. Cover temporarily exposed roots with wet burlap, and keep burlap moist until soil is replaced around roots.
 - g. No trees, except those specifically shown on the Drawings to be removed, shall be removed without written approval of Project Manager.
 - h. Dispose of removed trees in a legal manner off the Site.
 - 2. Balling and burlapping of trees indicated for replacement shall conform to recommended specifications set forth in the American Standards for Nursery Stock, published by American Association of Nurserymen. All balls shall be firm and intact and made-balls will not be accepted. Handle ball and burlap trees by ball and not by top.

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3. In event of damage to bark, trunks, limbs, or roots of plants that are not designated for removal, treat damage by corrective pruning, bark tracing, application of a heavy coating of tree paint, and other accepted horticultural and tree surgery practices.
4. Replace each plant that dies as a result of construction activities.
5. See the Drawings for additional requirements

E. Existing Structures:

1. Where Contractor contemplates removal of small structures such as mailboxes, signposts, and culverts that interfere with Contractor's operations, obtain approval of property owner and Project Manager.
2. Move mailboxes to temporary locations accessible to postal service.
3. Replace items removed in their original location and a condition equal to or better than original.

F. Protect finished floors and concrete floors exposed as well as those covered with composition tile or other applied surfacing.

G. Keep ditches, culverts, and natural drainages continuously free of construction materials and debris.

H. Construct, maintain, and operate cofferdams, channels, flume drains, sumps, pumps, or other temporary diversion and protection works. Furnish materials required, install, maintain, and operate necessary pumping and other equipment for the environmentally safe removal and disposal of water from the various parts of the Work. Maintain foundations and parts of the Work free from water.

3.03 TEMPORARY CONTROLS

A. Air Pollution Control:

1. Minimize air pollution from construction operations.
2. Burning of waste materials, rubbish, or other debris is not permitted on or adjacent to Site.
3. Adhere to environmental regulations for dust control and take steps to minimize dust when handling aggregates. Treat or water unpaved vehicle routes and other areas used in construction to prevent dust.
4. Provide and maintain temporary dust-tight partitions, bulkheads, or other protective devices during construction to permit normal operation of existing facilities. Construct partitions of plywood, insulating board, plastic sheets, or similar material. Construct partitions in such a manner that dust and dirt from demolition and cutting will not enter other parts of existing building or facilities. Remove temporary partitions as soon as need no longer exists.

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- B. Provide acoustical barriers so noise emanating from tools or equipment will not exceed legal noise levels.
- C. Water Pollution Control:
1. Divert sanitary sewage and nonstorm waste flow interfering with construction and requiring diversion to sanitary sewers. Prevent overflows to existing waterway.
 2. Prior to commencing excavation and construction, obtain Owner's approval of detailed plans showing procedures intended to handle and dispose of sewage, groundwater, and stormwater flow, including dewatering pump discharges.
 3. Comply with procedures outlined in U.S. Environmental Protection Agency manuals entitled, "Guidelines for Erosion and Sedimentation Control Planning" and "Implementation, Processes, Procedures, and Methods to Control Pollution Resulting from All Construction Activity."
 4. Comply with state and local requirements including but not limited to the:
 - a. Construction Site Management Plan (CSMP) General Notes.
 - b. Erosion Prevention Permit Application.
 - c. General Permit Form, NPDES Stormwater Discharge Permit (<https://www.oregon.gov/deq/wq/Documents/1200CPermit.pdf>)
 5. Do not dispose of volatile wastes such as mineral spirits, oil, chemicals, or paint thinner in storm or sanitary drains, streams or waterways. Provide acceptable containers for collection and disposal of waste materials, debris, and rubbish.
- D. Erosion, Sediment, and Flood Control:
1. Provide, maintain, and operate temporary facilities to control erosion and sediment releases, and to protect the Work and existing facilities from flooding during construction period.
 2. Design erosion and sediment controls to handle peak runoff resulting from 25-year, 24-hour storm event based on U.S. Weather Bureau, "Rainfall-Frequency Atlas of the United States for Durations from 30 Minutes to 24 Hours and Return Periods from 1-Year to 100 Years," Technical Paper No. 40, 1981.
 3. Size temporary stormwater conveyances based on procedures presented in U.S. Department of Agriculture, "Urban Hydrology for Small Watersheds," Soil Conservation Service Engineering Technical Release No. 55, 1986.
 4. Design temporary flood control facilities for design flood with minimum of 3 feet of freeboard. Design flood shall be as published by FEMA for 100-year recurrence interval.

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3.04 STORAGE YARDS AND BUILDINGS

- A. Coordinate requirements with Section 01 60 00, Product Requirements.
- B. Storage of materials must comply with all requirements of the Fire Marshall.
- C. As needed, construct temporary storage yards for storage of products that are not subject to damage by weather conditions.
- D. Temporary Storage Buildings:
 - 1. Provide environmental control systems that meet recommendations of manufacturers of equipment and materials stored.
 - 2. Arrange or partition to provide security of contents and ready access for inspection and inventory.
 - 3. Store combustible materials (paints, solvents, fuels) in a well-ventilated and remote building meeting safety standards.

3.05 ACCESS ROADS

- A. Construct access roads as shown and within easements, rights-of-way, or Project limits. Utilize existing roads where shown.
- B. Maintain drainage ways. Install and maintain culverts to allow water to flow beneath access roads. Provide corrosion-resistant culvert pipe of adequate strength to resist construction loads.
- C. Provide gravel, crushed rock, or other stabilization material to permit access by all motor vehicles at all times.
- D. Maintain road grade and crown to eliminate potholes, rutting, and other irregularities that restrict access.
- E. Coordinate detours and other operations affecting traffic and access with Owner. Provide at least 72 hours' notice to Owner when operations will alter access to the Site.
- F. Upon completion of construction, restore ground surface disturbed by access road construction to original grade. Leave access roads in condition suitable for future use by Owner. Replace damaged or broken culverts with new culvert pipe of same diameter and material.

3.06 PARKING AREAS

- A. Control vehicular parking to preclude interference with public traffic or parking, access by emergency vehicles, Owner's operations, or construction operations.

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- B. Provide parking facilities for personnel working on the Project. No employee or equipment parking will be permitted on Owner's existing paved areas, except as specifically designated for Contractor's use.
- C. Use Contractor staging areas designated on the Drawings for parking of personal vehicles driven by construction personnel.

3.07 VEHICULAR TRAFFIC

- A. Comply with Laws and Regulations regarding closing or restricting use of public streets or highways. No public or private road shall be closed, except by written permission of proper authority. Ensure the least possible obstruction to traffic and normal commercial pursuits.
- B. Conduct the Work to interfere as little as possible with public travel, whether vehicular or pedestrian.
- C. Whenever it is necessary to cross or obstruct roads, driveways, and walks, whether public or private, provide and maintain suitable and safe bridges, detours, or other temporary expedients for accommodation of public and private travel.
- D. Coordinate traffic routing with that of others working in same or adjacent areas.

3.08 CLEANING DURING CONSTRUCTION

- A. Clean hard surface roadways and Site in accordance with specification Section 00 72 00, General Conditions of the Contract, as specified in other specification sections, and as required herein.
- B. Wet down exterior surfaces prior to sweeping to prevent blowing of dust and debris. At least weekly, sweep all floors (basins, tunnels, platforms, walkways, roof surfaces), and pick up all debris and dispose.
- C. Provide approved containers for collection and disposal of waste materials, debris, and rubbish. Remove waste material, debris and rubbish from Site at least weekly.
- D. At least weekly, brush sweep entry drive and roadways, and all other streets and walkways affected by the Work and where adjacent to the Work.

END OF SECTION

**SECTION 01 50 10
BYPASS PUMPING**

PART 1 GENERAL

1.01 GENERAL

- A. Conditions that require bypass facilities include, but are not limited to:
1. Normal construction sequencing activities required to complete Project.
 2. Inclement weather during temporary shutdowns that require increased treatment or containment capacity.
- B. Provide bypass pumping system including, but not limited to, equipment, piping, appurtenances, and controls, required to intercept, convey, and discharge flow to be controlled. Include standby and emergency equipment. Bypass pumping system must:
1. Protect water resources, wetlands, and other natural resources
 2. Conform to regulatory requirements
 3. Temporary flow control must be done in a manner that will not damage private or public property, or create a nuisance or public menace.
 4. Flow must be conveyed in enclosed pipes that are adequately protected from traffic or other hazards.
- C. Type and locations of bypass and temporary facilities may include, but are not limited to:
1. Final Effluent Channel Temporary Bypass:
 - a. Bypass suction piping must be installed within the chlorine contact basin.
 - b. Diverting flow downstream of the existing weir in the final treatment effluent channel as shown on the Drawings.
 - c. Pumping from the chlorine contact basin to the isolated sections of the final treatment effluent channel when repairing expansion joints and replacing W2 pump station screens in the final treatment effluent channel.
 2. W2 Pump Station Temporary Bypass:
 - a. Bypass suction piping must be installed within the chlorine contact basin.
 - b. Diverting flow into W2 pump station header to replace W2 Pump No. 1, supplying flow to BMF and WPCF plant water.

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- D. 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 Contractor's operations, Owner shall immediately be entitled to employ others to stop the bypassing. Costs incurred there from, including any regulatory agency fines resulting there from, will be deducted from the Contractor's construction progress payments for the full amount incurred by Owner or its agents. If accidental bypass occurs, Contractor must immediately inform Owner.

1.02 DEFINITIONS

- A. Bypass Pumping: Temporary flow control method to ensure continuous flow of wastewater around any wastewater treatment component using one or more pumps.

1.03 PERFORMANCE REQUIREMENTS

- A. Flows are pumped from the chlorine contact basins to a location downstream of the weir in the final treatment effluent channel. It is essential to the operation of the pump stations as well as the MWMC Water Pollution Control Facility (WPCF) that there be no restriction of flow for the duration of the Project.
- B. Flows are pumped from the chlorine contact basins to a of W2 Pump No. 1 allowing flow to be directed to both the BMF and WPCF. It is essential to the operation of the pump stations as well as the MWMC Water Pollution Control Facility (WPCF) that there be no restriction of flow for the duration of the Project.
- C. N plus 1 redundancy must be maintained for equipment (pumping system meets firm capacity with largest unit out of service).

1.04 SUBMITTALS

- A. Action Submittals:
 - 1. Flow Control Plan for both diversion around the Final Treatment Effluent Channel and W2 Pump station which must include:
 - a. Estimated Schedule of Work.
 - b. Pipe routing, pipe and joint components in pipe system, approximate high point elevations, pump location.
 - c. Site access and refueling routes near the pumps, spill containment kit location, any containment or BMPs used associated with potential refueling plan.

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- d. Pump curves for proposed pumps and schematic depiction of location of all control components as well as control narrative for automatic pump control.
 - e. Staffing plan and response plan showing suitable response times to any malfunctions of the temporary pumping system.
 - f. One line diagrams depicting temporary power connections and circuits for all temporary pumps, prepared, signed, and sealed by a professional engineer registered in the state of Oregon. If electrical pumps are used, only temporary circuits with suitable onsite backup electrical generation capacity are acceptable.
 - g. Drawings locating bypass pumps, fuel storage, and pipelines; Suction piping must be indicated where required for bypass pumping.
 - h. Locations where flow will be intercepted and discharged.
 - i. Control Scheme for Bypass Pumping:
 - 1) Control wiring diagrams.
 - 2) Control narratives and setpoints.
 - j. Equipment List:
 - 1) Bypass pump size and capacities, number of each pump size, and power requirements including standby equipment.
 - 2) Bypass pumping piping size and materials.
 - 3) Fuel storage size, capacity, and containment.
 - k. Operation plan for 24-hour, 7 days per week, including holidays, as required to maintain treatment through the plant.
 - l. Other information to completely describe temporary flow control facilities and conformance to specified requirements.
 - 1) Temporary bypass piping layout and bracing to prevent movement during bypass implementation.
 - m. Detailed emergency procedures and response time for equipment failure.
2. Designer Qualifications:
- a. Designer of temporary bypass system or the business providing equipment has designed 10 bypass systems of at least 40 mgd capacity that have operated successfully without system failure or overflow over the past 5 years.
 - b. Plan shall be designed and sealed by a professional engineer licensed in the state of Oregon.
3. Emergency Cleanup Plan:
- a. Procedures for removal of water.
 - b. Procedures for determining nature and extent of damage.
 - c. Implement for bypass pumping.

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PART 2 PRODUCTS

2.01 MANUFACTURER

- A. The bypass pumping system supplier must have at least 5 years' experience in the design, application, and supply of bypass pumping systems for municipal sewage treatment works.
 - 1. The business providing equipment has designed at least 10 bypass systems of at least 40 mgd capacity in the past 5 years which have operated successfully without system failure or overflow.
- B. The system must be provided with a minimum two duty diesel driven pumps and one standby diesel driven pump.
- C. The bypass pumping system must be from one of the following listed below:
 - 1. Rain for Rent.
 - 2. Xylem.
 - 3. "Or-equal" manufacturers will be considered as specified in Instructions to Bidders and the General Conditions. "Or-equal" manufacturers for equipment of this section must meet the minimum experience qualifications specified in this section. "Or-equal" manufactures that fail to demonstrate the minimum experience qualifications will not be considered equal.

2.02 GENERAL

- A. Provide, install, maintain, and operate temporary bypass facilities, including pumps and temporary components such as dams, plugs, and bulkheads required to keep Owner's Water Pollution Control Facility operations online. See Drawings for schematic layout proposed by Engineer. Determine correct size, location and quantity of pumps, pipes, and appurtenances.
- B. Materials and equipment may be new or used at Contractor's option.
- C. Power for bypass pumping must be supplied by the Contractor.

2.03 DESIGN CONSTRAINTS

- A. Design, furnish, install, operate, and remove all work necessary for temporary bypass pumping. Provide all fuel, operations, rental, additional staffing, programming, and other elements required for operation of the system and restoration of all features to the previous and equal state of those features after temporary pumping is complete. Owner will not provide electricity for operation of the temporary pumping system if diesel driven pumps are used.

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- B. Design, furnish, install, operate and remove temporary pumping system. The duration of the Contractor's temporary pumping operation is part of Contractor's means and methods. Owner or owner's agents review or commentary on the temporary pumping system shall not be construed to assume Contractor's liability and responsibility for the temporary pumping system, and the response speed and disposition of the Owner or owner's agents to any RFIs or submittals shall not be considered as damages or delays to the Contractor so long as the responses are made in accordance with the Contract Documents.
- C. Final Treatment Effluent Temporary Bypass Technical Design Requirements:
1. The actual capacity of the system shall be no less than 115.5 MGD with the largest pump out of service.
 2. The installed firm capacity of pumps pulling from upstream of the CCB effluent box area, as labeled on the Drawings, must be between 25.6 mgd and 115.5 mgd spread across two Chlorine Contact Basins.
 3. No single component failure in the control system nor the temporary works of any electrical supply shall prevent the operation of the temporary pumping system.
 4. Do not exceed noise requirements of 69 dBA measured at 30 feet distance from the equipment.
 5. Use all pipes, fittings, joints, valves, instruments, and other components of the system in accordance with allowable and intended use as determined by the literature or representative of the original manufacturer.
 6. Use all pipes, fittings, joints, and valves in a manner that does not exceed their allowable working pressures.
 7. All piping systems shall be restrained.
 8. Suction piping velocities must not exceed 7 feet per second at a pumps nominal design capacity. Discharge piping velocities must not exceed 10 feet per second at nominal design capacity.
 9. Utilize the pumps withdrawing upstream from the CCB effluent box as shown on the Drawings. The control system, for all flows, shall prevent overflow of treated effluent over the CCB effluent weir.
 10. The control system must function automatically and include a 24/7 dial out alarm to the person responsible for the system in the event of malfunction or adverse operating levels.
 11. Support and restrain pipes, valves, and other equipment and instruments in an appropriate manner. The Contractor shall consider and mitigate the impacts of thermal expansion and hydraulic thrust on all piping systems.
 12. Sodium bisulfite dosing must be completed using the existing MWMC operating systems. Contractor coordinate dosing point to downstream of bypass with operations staff.

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D. W2 Pump Station Temporary Bypass Technical Design Requirements:

1. The installed pumps pulling from upstream of the CCB effluent box area, must be between able to support both irrigation and plant operations water supply capacity. The capacity of the systems shall be able to maintain a consistent operating pressure of 65 psi and flowrates for the scenarios listed below:
 - a. Diversion flow rates for plant operations water supply during dry weather are required to meet the ranges below:
 - 1) Minimum: 1.02 mgd.
 - 2) Maximum: 3.00 mgd.
 - 3) Average: 1.68 mgd.
 - b. Diversion flow rates for plant operations water supply during wet weather are required to meet the ranges below:
 - 1) Minimum: 1.25 mgd.
 - 2) Maximum: 4.40 mgd.
 - 3) Average: 1.83 mgd.
 - c. Diversion flow rates for Biosolids Management Facility irrigation support are required to meet the ranges below:
 - 1) Minimum: 51 gpm.
 - 2) Maximum: 2,099 gpm.
 - 3) Average: 581 gpm.
2. No single component failure in the control system nor the temporary works of any electrical supply shall prevent the operation of the temporary pumping system.
3. Do not exceed noise requirements of 69 dBA measured at 30 feet distance from the equipment.
4. Use all pipes, fittings, joints, valves, instruments, and other components of the system in accordance with allowable and intended use as determined by the literature or representative of the original manufacturer.
5. Use all pipes, fittings, joints, and valves in a manner that does not exceed their allowable working pressures.
6. All piping systems shall be restrained.
7. Utilize the pumps withdrawing upstream from the CCB effluent box as shown on the Drawings. The control system, for all flows, shall maintain operation and irrigation requirements as listed above, and prevent overflow of treated effluent over the CCB effluent weir.
8. Bypass pumping facilities shall utilize variable flow pumping to prevent rapid changes in pressure in the plant operations water supply.
9. The control system must function automatically and include a 24/7 dial out alarm to the person responsible for the system in the event of malfunction or adverse operating levels.

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10. Support and restrain pipes, valves, and other equipment and instruments in an appropriate manner. The Contractor shall consider and mitigate the impacts of thermal expansion and hydraulic thrust on all piping systems.

2.04 BYPASS PUMPING

A. Final Effluent Channel Bypass Pumps:

1. Fully automatic, self-priming units that do not require foot valves in priming system. Standalone vacuum pumps or compressed air systems are not permitted.
2. Solids handling design with ability to pump minimum 3-inch diameter sphere.
3. Able to run dry or recirculate flow for long periods of time to accommodate cyclical nature of flows.
4. Diesel Engine: Whisper quiet pump enclosures equipped to minimize noise. Noise levels shall not exceed limits set by Local Ordinances (Eugene Municipal Code 4.080, 4.083). Provide sound attenuating enclosures as required to meet noise limits.
5. Standby Pump: One of each size onsite shall be available.
6. Bypass pumping performance requirements flow ranges for the Dry season (May 1 – October 31) are as follows:
 - a. Final Treatment Flow:
 - 1) Average: 25.6 mgd.
 - 2) Peak Day: 85.9 mgd.
 - 3) Peak Hour: 115.5 mgd.
7. Provide adequate equipment capacity and size to handle the range of flows at the treatment plant.
8. Bypass pumps must be able to maintain level in the chlorine contact basins between Elevation 392.00 and Elevation 390.00. This shall be the allowable operating band.
9. Coordinate suction pipe elevation with Owner to minimize solids pumped but maintain minimum required suction pipe submergence.
10. Bypass pumping facilities shall utilize variable flow pumping to prevent rapid changes in flow; flows shall not increase or decrease by more than 10 percent of flow.
11. Measure Pumped flow using a flowmeter.

B. W2 Pump Station Bypass Pumps:

1. Fully automatic, self-priming units that do not require foot valves in priming system. Standalone vacuum pumps or compressed air systems are not permitted.
2. Able to run dry or recirculate flow for long periods of time to accommodate cyclical nature of flows.

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3. Diesel Engine: Whisper quiet pump enclosures equipped to minimize noise. Noise levels shall not exceed limits set by Local Ordinances (Eugene Municipal Code 4.080, 4.083). Provide sound attenuating enclosures as required to meet noise limits.
4. Standby Pump: One of each size onsite shall be available.
5. Bypass pumping performance requirements flow ranges for the Dry season are as follows:
 - a. Diversion flow rates for plant operations water supply during dry weather are required to meet the ranges below:
 - 1) Minimum: 1.02 mgd.
 - 2) Maximum: 3.00 mgd.
 - 3) Average: 1.68 mgd.
 - b. Diversion flow rates for plant operations water supply during wet weather are required to meet the ranges below:
 - 1) Minimum: 1.25 mgd.
 - 2) Maximum: 4.40 mgd.
 - 3) Average: 1.83 mgd.
 - c. Diversion flow rates for Biosolids Management Facility irrigation support are required to meet the ranges below:
 - 1) Minimum: 51 gpm.
 - 2) Maximum: 2,099 gpm.
 - 3) Average: 581 gmp.
6. Provide adequate equipment capacity and size to handle the range of flows required by the treatment plant and BMF irrigation.
7. Bypass pumps must be able to maintain pressure in the W2 pump station header between 65 psi.
8. Coordinate suction pipe elevation with Owner to minimize solids pumped but maintain minimum required suction pipe submergence.
9. Bypass pumping facilities shall utilize variable flow pumping to prevent rapid changes in flow and maintain required pressure ranges.
10. Measure Pumped flow using a flowmeter.

2.05 TEMPORARY PIPING

- A. Use be Schedule 80 PVC per Section 40 27 00.10, Polyvinyl Chloride (PVC) Pipe and Fittings Data Sheet, or SDR 32.5, HDPE per Section 22 10 01.08, High Density Polyethylene (HDPE) Pipe and Fittings Data Sheet.

2.06 SUCTION PIPING

- A. Provide suction piping with ability to remove quickly without damaging the basin.
- B. Provide lifting mechanism designed to quickly remove piping.

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- C. Designed for the hydraulic loading with a maximum flow velocity of 5 fps.
- D. Suggested locations shown on the Drawings.

2.07 DISCHARGE PIPING AND VALVES

- A. Each pump must have an individual check valve.
- B. Discharge piping must be restrained and support for hydraulic thrust, gravity and thermal expansion loads.

2.08 SOUND ATTENUATING ENCLOSURES

- A. Materials designed for sound attenuation.
- B. Designed to provide ventilation required for diesel driven engine pumps.

PART 3 EXECUTION

3.01 GENERAL

- A. Notify Owner at least 12 weeks prior to implementing bypass pumping.
- B. Install temporary systems and maintain flow around Work area in a manner that will not cause property damage, restrict site access, or prevent access to equipment and unaffected Work areas.
- C. Operate and maintain temporary systems 24 hours per day, 7 days per week without limitation as required to control and treat flows.
- D. Promptly remove from Site all bypass pumping equipment and materials as soon as they are no longer needed.

3.02 OPERATING REQUIREMENTS:

- A. Continuously monitor pump operation and suitable condition by an automatic means with dial out capability to a staffed phone number or through continuous observation and staffing.
- B. Notify MWMC operations staff within 1 hour of any deficiencies in the temporary pumping system.
- C. Notify MWMC operations staff 3 weeks prior to testing or operation of the temporary pumping system, and 1 week prior to cessation of temporary pumping operations.

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- D. Minimize temporary pump operation to the extent possible using reasonable measures to conserve electricity use.

3.03 EQUIPMENT AND MATERIALS

- A. Install and/or locate temporary equipment, appurtenances, and piping required for bypass pumping to maintain treatment through the WPCF.
- B. Provide all fuel to run and operate bypass pumping.

3.04 FIELD QUALITY CONTROL

- A. Notify Owner 1 week prior to testing.
- B. Hydrostatic testing requirements of temporary piping.
 - 1. Prior to initiating bypass pump(s), test piping with maximum pressure equal to 1.5 times maximum operating pressure of system, as determined by temporary pumping system designer.
- C. Prior to interrupting flow through the plant, operate bypass pumping system for 48 hours and verify pump and controls operate as specified.
 - 1. Test dial out function and automatic controls testing prior to taking actions preventing normal discharge of the CCB effluent channel to the outfall structure.

END OF SECTION

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 DEFINITIONS

A. Products:

1. New items for incorporation in the Work, whether purchased by Contractor or Owner for the Project, or taken from previously purchased stock and may also include existing materials or components required for reuse.
2. Includes the terms material, equipment, machinery, components, subsystem, system, hardware, software, and terms of similar intent and is not intended to change meaning of such other terms used in Contract Documents, as those terms are self-explanatory and have well recognized meanings in construction industry.
3. Items identified by manufacturer's product name, including make or model designation, indicated in manufacturer's published product literature, that is current as of the date of the Contract Documents.

1.02 DESIGN REQUIREMENTS

- A. Where Contractor design is specified, design of installation, systems, equipment, and components, including supports and anchorage, shall be in accordance with provisions of latest edition of International Building Code (IBC) by International Code Council.
- B. Design of equipment and components shall be for the loads stated on the Drawings on the General Structural Note sheets.

1.03 ENVIRONMENTAL REQUIREMENTS

- A. Provide materials and equipment suitable for installation and operation under rated conditions at 400 feet above sea level.
- B. Provide equipment and devices installed outdoors or in unheated enclosures capable of continuous operation within an ambient temperature range of 0-degree F to 105 degrees F.

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1.04 PREPARATION FOR SHIPMENT

- A. When practical, factory assemble products. Mark or tag separate parts and assemblies to facilitate field assembly. Cover machined and unpainted parts that may be damaged by the elements with strippable protective coating.
- B. Package products to facilitate handling and protect from damage during shipping, handling, and storage. Mark or tag outside of each package or crate to indicate its purchase order number, bill of lading number, contents by name, name of Project and Contractor, equipment number, and approximate weight. Include complete packing list and bill of materials with each shipment.
- C. Extra Materials, Special Tools, Test Equipment, and Expendables:
 - 1. Furnish as required by individual specifications.
 - 2. Schedule:
 - a. Ensure that shipment and delivery occurs concurrent with shipment of associated equipment.
 - b. Transfer to Owner must occur immediately after Contractor's acceptance of equipment from Supplier.
 - 3. Packaging and Shipment:
 - a. Package and ship extra materials and special tools to avoid damage during long term storage in original cartons insofar as possible, or in appropriately sized, hinged-cover, wood, plastic, or metal box.
 - b. Prominently displayed on each package, the following:
 - 1) Manufacturer's part nomenclature and number, consistent with Operation and Maintenance Manual identification system.
 - 2) Applicable equipment description.
 - 3) Quantity of parts in package.
 - 4) Equipment manufacturer.
 - 4. Deliver materials to Site.
 - 5. Notify Owner upon arrival for transfer of materials.
 - 6. Replace extra materials and special tools found to be damaged or otherwise inoperable at time of transfer to Owner.
- D. Request a minimum 7-day advance notice of shipment from manufacturer. Upon receipt of manufacturer's advance notice of shipment, promptly notify Owner of anticipated date and place of material or equipment arrival.
- E. Ensure that applicable Factory Test Results are reviewed and accepted by Owner before product shipment as required in individual Specification sections.

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1.05 DELIVERY AND INSPECTION

- A. Deliver products in accordance with accepted current Construction Progress Schedule and coordinate to avoid conflict with the Work and conditions at Site. Deliver anchor bolts and templates sufficiently early to permit setting prior to placement of structural concrete.
- B. Deliver products in undamaged condition, in manufacturer's original container or packaging, with identifying labels intact and legible. Include date of manufacture and shelf life on label where applicable.
- C. Unload products in accordance with manufacturer's instructions for unloading or as specified. Record receipt of products at Site. Promptly inspect for completeness and evidence of damage during shipment.
- D. Remove damaged products from Site and expedite delivery of identical new undamaged products, and remedy incomplete or lost products to avoid delays.

1.06 HANDLING, STORAGE, AND PROTECTION

- A. Handle and store products in accordance with manufacturer's written instructions and in a manner to prevent damage. Store in approved storage yards or sheds provided in accordance with specification Section 01 50 00 Temporary Facilities and Controls. Provide manufacturer's recommended maintenance during storage, installation, and until products are accepted for use by Owner. Contractor to maintain the maintenance activity log, dated and signed according to the completion of each day's item of work.
- B. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to ensure that products are maintained under specified conditions free from damage or deterioration. Maintain written inventory of products in storage to facilitate inspection and to estimate progress payments for products delivered but not installed in the Work.
- C. Store electrical, instrumentation, and control products, and equipment with bearings in weather-tight structures maintained above 60 degrees F. Protect electrical, instrumentation, and control products, and insulation against moisture, water, and dust damage.
- D. Store fabricated products above ground on blocking or skids and prevent soiling or staining. Store loose granular materials in well-drained area on solid surface to prevent mixing with foreign matter. Cover products subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.

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- E. Store finished products that are ready for installation in dry and well-ventilated areas. Do not subject to extreme changes in temperature or humidity.
- F. After installation, provide coverings to protect products from damage due to traffic and construction operations. Remove coverings when no longer needed.
- G. Prevent contamination of personnel, storage building, and Site with hazardous materials. Meet requirements of product specification, codes, and manufacturer's instructions.

PART 2 PRODUCTS

2.01 GENERAL

- A. Provide manufacturer's standard materials suitable for service conditions unless otherwise specified.
- B. Where product specifications include a named manufacturer, and performance requirements, named manufacturer's products must meet the performance specifications.
- C. Like products furnished and installed in the Work must be of one manufacturer and of the same series or product line to achieve standardization for appearance, operation and maintenance, spare parts and replacement, manufacturer's services, and implement same or similar process instrumentation and control functions.
- D. Do not use materials and equipment removed from existing premises except as specifically permitted by Contract Documents.
- E. Design and manufacture equipment, components, systems, and subsystems with consideration for health and safety of operation, maintenance, accessibility, durability of parts, and in compliance with applicable OSHA, state and local health and safety regulations.
- F. Coating materials must meet federal, state, and local requirements limiting the emission of volatile organic compounds, and for worker exposure.
- G. Provide safety guard for all belt or chain drives, fan blades, couplings, or other moving or rotary parts. Cover rotating part on all sides. Design for easy installation and removal. Use 16-gauge or heavier galvanized or finished steel, aluminum, or galvanized or steel 1/2-inch mesh. Provide galvanized steel accessories, bolts, and supports. For outdoors application, prevent entrance of rain and dripping water.

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H. Authority Having Jurisdiction (AHJ):

1. Install work in accordance with latest edition of Oregon Electrical Specialty Code (OESC). Where required by the AHJ, material and equipment must be labeled or listed by a nationally recognized testing laboratory or other organization acceptable to the AHJ in order to provide a basis for approval under NEC.
2. Materials and equipment manufactured within the scope of standards published by UL must conform to those standards and must have an applied UL listing mark.

2.02 FABRICATION AND MANUFACTURE

A. General:

1. Manufacture parts to U.S.A. standard sizes and gauges.
2. Two or more items of the same type must be identical, by the same manufacturer, and interchangeable.
3. Design structural members for anticipated shock and vibratory loads.
4. Use 1/4-inch minimum thickness for steel that will be submerged, wholly or partially, during normal operation.
5. Modify standard products as necessary to meet performance Specifications.

B. Lubrication System: Require no more than weekly attention during continuous operation.

2.03 SOURCE QUALITY CONTROL

- A. Calibration Instruments must bear the seal of a reputable laboratory certifying instrument has been calibrated within the previous 12 months to a standard endorsed by the National Institute of Standards and Technology (NIST).
- B. Perform factory tests in accordance with accepted test procedures and document successful completion.

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PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect materials and equipment for signs of pitting, rust decay, or other deleterious effects of storage. Do not install material or equipment showing such effects. Remove damaged material or equipment from the Site and expedite delivery of identical new material or equipment. Delays to the Work resulting from material or equipment damage that necessitates procurement of new products will be considered delays within Contractor's control.

3.02 INSTALLATION

- A. Equipment Drawings show general locations of equipment, devices, and raceway, unless specifically dimensioned.
- B. No shimming between machined surfaces is allowed.
- C. Install the Work in accordance with NECA Standard of Installation, unless otherwise specified.
- D. Repaint painted surfaces that are damaged prior to equipment acceptance.
- E. Do not cut or notch any structural member or building surface without specific approval of Owner.
- F. Handle, install, connect, clean, condition, and adjust products in accordance with manufacturer's instructions and as specified. Retain a copy of manufacturers' instruction at Site available for review at all times.
- G. For material and equipment specifically indicated or specified to be reused in the Work:
 - 1. Use special care in removal, handling, storage, and reinstallation to ensure proper function in the completed Work.
 - 2. Arrange for transportation, storage, and handling of products that require offsite storage, restoration, or renovation.

3.03 FIELD FINISHING

- A. In accordance with specification Section 09 90 00, Painting and Coating, and individual specification sections.

3.04 ADJUSTMENT AND CLEANING

- A. Perform required adjustments, tests, operation checks, and other startup activities.

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3.05 LUBRICANTS

- A. Fill lubricant reservoirs and replace consumption during testing, startup, and operation prior to acceptance of equipment by Owner.

END OF SECTION

SECTION 01 70 00
CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SUBMITTALS

A. Informational Submittals:

1. Submit prior to application for final payment:
 - a. Record Documents: As required in General Conditions.
 - b. Special bonds, Special Guarantees, and Service Agreements.
 - c. Consent of Surety to Final Payment: As required in General Conditions.
 - d. Releases or Waivers of Liens and Claims: As required in General Conditions.
 - e. Releases from Agreements.
 - f. Final Application for Payment: Submit in accordance with procedures and requirements stated in specification Section 01 29 76 Progress Payment Procedures.
 - g. Extra Materials: As required by individual Specification sections.

1.02 RECORD DOCUMENTS

A. Quality Assurance:

1. Furnish qualified and experienced person whose duty and responsibility shall be to maintain record documents.
2. Accuracy of Records:
 - a. Coordinate changes within record documents making legible and accurate entries on each sheet of Drawings and other documents where such entry is required to show change.
 - b. Purpose of Project record documents is to document factual information regarding aspects of the Work, both concealed and visible, to enable future modification of the Work to proceed without lengthy and expensive Site measurement, investigation, and examination.
3. Make entries within 24 hours after receipt of information that a change in the Work has occurred.
4. Prior to submitting each request for progress payment, request Owner's review and approval of current status of record documents. Failure to properly maintain, update, and submit record documents may result in Owner's deferral of Contractor's Applications for Payment or portion thereof.

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1.03 RELEASES FROM AGREEMENTS

- A. Furnish Owner written releases from property owners or public agencies where side agreements or special easements have been made, or where Contractor's operations have not been kept within the Owner's construction right-of-way.
- B. In the event Contractor is unable to secure written releases:
 - 1. Inform Owner of the reasons.
 - 2. Owner or its representatives will examine the Site, and Owner will direct Contractor to complete the Work that may be necessary to satisfy terms of the side agreement or special easement.
 - 3. Should Contractor refuse to perform this Work, Owner reserves right to have it done by separate contract and deduct cost of same from Contract Price, or require Contractor to furnish a satisfactory bond in a sum to cover legal Claims for damages.
 - 4. When Owner is satisfied that the Work has been completed in agreement with Contract Documents and terms of side agreement or special easement, right is reserved to waive requirement for written release if: (i) Contractor's failure to obtain such statement is due to grantor's refusal to sign, and this refusal is not based upon any legitimate Claims that Contractor has failed to fulfill terms of side agreement or special easement, or (ii) Contractor is unable to contact or has had undue hardship in contacting grantor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 MAINTENANCE OF RECORD DOCUMENTS

- A. General:
 - 1. Drawings must be full size.
 - 2. Label or stamp each record document with title, "RECORD DOCUMENTS," in neat large printed letters.
 - 3. Do not cover or conceal Work until required information is recorded.
- B. Preservation:
 - 1. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
 - 2. Make documents and Samples available at all times for observation by Owner.

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C. Making Entries on the Drawings:

1. Using an erasable colored pencil, clearly describe change by graphic line and note as required.
 - a. Color Coding:
 - 1) Green when showing information deleted from the Drawings.
 - 2) Red when showing information added to the Drawings.
 - 3) Blue and circled in blue to show notes.
2. Provide date of each entry.
3. Call attention to entry by “cloud” drawn around area or areas affected.
4. Record actual changes made during construction including:
 - a. Locate items critical to the interface between existing physical conditions or construction and new construction.
 - b. Changes made by Addenda and Field Orders, Change Order, and Project Manager’s written interpretation and clarification using consistent symbols for each and showing appropriate document tracking number.
5. Show on the 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 note 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. Indicate applicable specification section.

3.02 FINAL CLEANING

- A. At completion of the Work or of a part thereof and immediately prior to Contractor’s request for certificate of Substantial Completion; or if no certificate is issued, immediately prior to Contractor’s notice of completion, clean entire Site or parts thereof, as applicable.
1. Leave the Work and adjacent areas affected in a cleaned condition satisfactory to Owner.
 2. Remove grease, dirt, dust, paint or plaster splatter, stains, labels, fingerprints, and other foreign materials from exposed surfaces.
 3. Repair, patch, and touch up marred surfaces to specified finish and match adjacent surfaces.
 4. Broom clean exterior paved driveways and parking areas.
 5. Hose clean sidewalks, loading areas, and others contiguous with principal structures.
 6. Rake clean all other surfaces.
 7. Leave water courses, gutters, and ditches open and clean.

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- B. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.

END OF SECTION

SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Detailed information for the preparation, submission, and Owner's review of Operations and Maintenance (O&M) Data as required by individual specification sections.

1.02 DEFINITIONS

- A. Final Data: Owner-accepted data submitted as specified herein.
- B. Preliminary Data: Initial and subsequent submissions for Owner's review.

1.03 DEQ REQUIREMENTS

- A. All O&M Manuals and components must comply with DEQ requirements and recommendations found in the document linked following this paragraph. If discrepancies are found between requirements in the DEQ document and those found in these specifications, the more stringent requirement shall apply. [DEQ Domestic Wastewater O&M Manual Requirements](#)

1.04 SEQUENCING AND SCHEDULING

- A. Materials and Finishes Data:
 - 1. Submit preliminary data at least 15 days prior to request for final inspection.
 - 2. Submit final data within 10 days after final inspection.

1.05 DATA FORMAT

- A. Electronic Media Format:
 - 1. Portable Document Format (PDF):
 - a. Submit preliminary and final Operation and Maintenance data in PDF format on USB storage device.
 - b. Final data files to be exact duplicates of Engineer-accepted preliminary data. Arrange by specification number and name.
 - c. Files to be fully functional, searchable, and viewable in most recent version of Adobe Acrobat.

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1.06 SUBMITTALS

A. Informational:

1. Submit a detailed outline of proposed organization and contents of Final Data prior to preparation of Preliminary Data.
2. Preliminary Data: Submit two copies in format specified herein.
3. Final Data: Submit two copies in format specified herein.

1.07 DATA FOR MATERIALS AND FINISHES

A. Content for Architectural Products, Applied Materials, and Finishes:

1. Manufacturer's data, giving full information on products:
 - a. Catalog number, size, and composition.
 - b. Color and texture designations.
2. Instructions for Care and Maintenance:
 - a. Manufacturer's recommendation for types of cleaning agents and methods.
 - b. Cautions against cleaning agents and methods that are detrimental to product.
 - c. Recommended schedule for cleaning and maintenance.

B. Content for Moisture Protection and Weather Exposed Products:

1. Manufacturer's data, giving full information on products:
 - a. Applicable standards.
 - b. Chemical composition.
 - c. Details of installation.
2. Instructions for inspection, maintenance, and repair.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 88 13
SPECIAL CONSTRUCTION PERFORMANCE REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. This section is applicable to the following secondary structural system elements, non-structural components, and/or equipment supported by structures:
1. Mechanical, electrical, and plumbing equipment and appurtenances, including, but not limited to:
 - a. Electrical equipment, lighting, process piping, plumbing, etc.
 - b. Fire protection piping, supports, tank and other components
 - c. Monorails, conveyors, jib cranes, etc.
 - d. HVAC units
 2. Conduit, piping, cable trays, raceways, ducts and similar systems.
 3. Hydro-pneumatic and other tanks, saddles, and vessels including their contents and support systems.
 4. All equipment specifically listed in this specification
 5. Storage racks, suspended ceilings, light fixtures, raised floors, partitions, store-front, windows, louvers, architectural features and other non-structural components
- B. This section is applicable to the following elements of the primary structural system:
1. None.

1.02 REFERENCES

- A. The following is a list of standards that may be referenced in this section:
1. American Society of Civil Engineers (ASCE): ASCE/SEI 7-22, Minimum Design Loads and Associated Criteria for Buildings and Other Structures, Chapters 11, 13, 15.
 2. International Building Code (IBC):
 - a. Section 1613.
 - b. Section 1621.
 3. Oregon Structural Specialty Code: Latest adopted edition.
 4. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): Seismic Restraints for Mechanical Systems.

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5. Additional Building Codes as referenced in Section 01 31 13, Project Coordination.

1.03 DEFINITIONS

- A. Specialty Engineer: Contractor's Structural or Civil Engineer licensed in the state of Oregon who is responsible for specific elements of the primary structural system, the secondary structural system, non-structural elements, and/or equipment supported by structures as specified herein.

1.04 GENERAL DESIGN REQUIREMENTS

- A. Produce structural designs that resist applicable loads including dead, live, wind, seismic, fluid, snow, rain, earth, operational, or other loads applicable to the component being designed.
- B. Base minimum design loads on guidelines given in this section, on the Drawings, ASCE 7-22, IBC Chapter 16, equipment manufacturer's requirements and recommendations, and/or other industry accepted design standards for the component being designed (i.e., AWWA D100, API 650, ANSI MH16.1).

1.05 SEISMIC DESIGN REQUIREMENTS

- A. Coordinate field design between Engineer and the Specialty Engineer and provide the proposed design including any modifications required to the primary structure. Produce final designs which resist the total design forces in accordance with the design criteria and are approved by the Engineer and Specialty Engineer.
- B. Seismic attachments, braces, and anchorages for all parts or elements of the mechanical and electrical systems must be designed in accordance with the provisions of IBC Chapter 16 and the following site-specific seismic criteria unless noted otherwise on the Drawings:
 1. Site-Specific Spectral Response Coefficients:
 - a. Short Period Mapped Maximum Considered Earthquake, 5 Percent Damped: $S_s = 0.86g$.
 - b. 1 Second Period Mapped Maximum Considered Earthquake, 5 Percent Damped: $S_1 = 0.39g$.
 - c. Short Period Design Spectral Response Acceleration, 5 Percent Damped: $S_{DS} = 0.78g$.
 - d. 1 Second Period Design Spectral Response Acceleration, 5 Percent Damped: $S_{D1} = 0.56g$.
 2. Site Class: D.

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3. Seismic Design Category: D, unless noted otherwise.
 4. Risk Category: IV, unless noted otherwise.
 5. Component Important Factor, I_p : 1.5.
- C. Coordinate the layout so that adequate space is provided between items for relative motion. Provide additional supports and restraints between items of different systems when necessary to prevent seismic impacts or interaction.
- D. Design non-building structures in accordance with Chapter 15 of ASCE 7-22; all designs utilizing Chapter 15 must include the design and anchorage of the entire non-building structure.
- E. Design anchorages of all elements of structures, nonstructural components, and equipment supported by structures to resist static and dynamic operational loads, plus total seismic loads specified in the IBC, ASCE 7-22 Section 13.3.1, and as follows:
1. For suspended equipment, multiply dead load by 1.2 and add 0.2SDS to account for vertical seismic effects in the downward direction.
 2. For anchorage uplift, multiply dead load by 0.9 and subtract 0.2SDS if used to reduce vertical seismic effects.
 3. Post-installed anchors installed in concrete must be prequalified for seismic application in accordance with ACI 355.2.
- F. Use the first named manufacturer and model of equipment to be anchored as the design basis for layout of the structure and equipment pads.
1. Coordinate all attachments and related work and provide connections as noted in approved Shop Drawings.
 2. If equipment pad dimensions required by Contractor's submitted anchorage calculations deviate from those provided on the Drawings, note the deviation in the submittal for review and provide the correct pad at no additional cost to Owner.
 3. If a manufacturer or model other than the first named manufacturer and model is submitted by Contractor and approved, coordinate all work related to the deviations from the Contract Documents.
 4. Where Specialty Engineer proposes a deviation from the Contract Documents for any manufacturer or model and that deviation is approved by Engineer, provide any modifications to the Work at no additional cost to Owner.

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1.06 DESIGN REQUIREMENTS FOR PIPING, CONDUIT, AND DUCTS

- A. Produce designs for support of piping, conduit, duct or other systems to resist total design forces based on the design criteria coefficients specified above unless shown on the Drawings. Except where the technical specifications give specific exemption from resistance of seismic forces, designed all supports to meet seismic criteria.
- B. Where possible, pipes, conduit, and their connections must be constructed of ductile materials. Pipes, conduits and their connections constructed of nonductile materials must have the brace spacing reduced to one-half of the spacing allowed for ductile material.
- C. Seismic restraints may be omitted for the following conditions:
 - 1. Where flexible connections are provided between components of the Work and the associated ductwork, piping and conduit:
 - a. Fuel piping less than 1-inch nominal pipe size.
 - b. All other piping suspended by individual hangers 12 inches or less in length, from the top of the pipe to the bottom of the structural support for the hanger where the hangers are detailed to avoid bending of the hangers and their connections, or piping of 3 inches nominal pipe size and less ($I_p = 1.0$), or piping of 1-inch nominal pipe size and less (I_p greater than 1.0).
 - c. Electrical conduit less than 2.5 inches trade size, or raceways supported by individual hangers 12 inches or less in length from raceway support point to the bottom of the structural support for the hanger where the hangers are detailed to avoid bending of the hangers and their connections.
 - d. Air-handling ducts not carrying hazardous gases or used for smoke control with less than 6 square feet in cross-sectional area or weighing less than 17 pounds/foot, or ducts suspended by individual hangers 12 inches or less in length from the duct support point to the bottom of the structural support for the hanger where the hangers are detailed to avoid bending of the hangers and their connections.
 - 2. In accordance with ASCE 7:
 - a. Mechanical and electrical components with $I_p = 1.0$ that weigh 400 pounds or less, are mounted 4 feet or less above the adjacent finished floor elevation and are provided with flexible connections between the components and any associated ductwork, piping, or conduit.

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- b. Mechanical and electrical components with $I_p = 1.0$ that weigh 20 pounds or less, are mounted at any height, and are provided with flexible connections to attached ductwork, piping, and conduit.
 - c. Distribution systems weighing 5 pounds per foot or less.
- D. Brace all trapeze assemblies supporting pipes, ducts and conduit to resist the total seismic forces considering the weight of the elements on the trapeze. Pipes, ducts and conduit supported by a trapeze where none of those elements would individually be braced need not be braced if connections from the pipe/conduit/ductwork to component, or directional changes, do not restrict the movement of the trapeze. If this flexibility is not provided, bracing will be required when the aggregate weight of the pipes and conduit exceed 10 pounds/foot or ducting exceeds 17 pounds/foot. Determine the weight assuming all pipes and conduits are filled with water.
- E. As an alternative to designing the supports and anchorage where an approved national standard provides a basis for the earthquake-resistant design, submit standard, data, and details for piping, conduit, duct or other systems:
 - 1. For ductwork, mechanical piping, process piping and electrical conduits, follow Guidelines for Seismic Restraints of Mechanical Systems by SMACNA modified as follows:
 - a. Seismically brace piping regardless of size or location. Provide transverse braces at all changes in direction and at the end of all pipe runs. Space transverse braces not more than 20 feet apart. Provide longitudinal braces at 40-foot centers.
 - b. Seismically brace all ductwork regardless of size or location. Provide transverse braces at all changes in direction and at each end of run. Space braces not over 20 feet apart. Provide longitudinal braces at 40-foot centers.
 - 2. For fire protection systems, follow NFPA 13 modified in accordance with Subparagraph 1.06(E)(1)(b) above. Ensure that no seismic interaction occurs with items of other systems.

1.07 SUBMITTALS

- A. Submit in accordance with Section 01 33 00, Submittal Procedures.
- B. Submit Manufacturer's Certificate of Compliance for components of Contractor-designed seismic anchorages of mechanical and electrical systems as required under Section 01 45 16, Field Quality Control Procedures.

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- C. Submit Specialty Engineer's signed and sealed structural calculations and detailed Shop Drawings for the following elements, and where required in Division 02 through Division 49, of the primary structural system and its attachments, the secondary structural system and its attachments, permanent non-structural components and their attachments, and the attachments and anchorage for permanent equipment supported by the structure:
1. Hydro-pneumatic Tank and Saddles.
 2. Electrical Building Prefabricated Wood Trusses.
 3. Any non-building structures the Specialty Engineer designs using Chapter 15 of ASCE 7-22.
- D. Submit Specialty Engineer's signed and sealed structural calculations and detailed Shop Drawings for the following elements and where required in the equipment specifications in Division 02 through Division 49:
1. Required anchorage items include:
 - a. Process Piping.
 - b. Electrical Conduit.
- E. Structural calculations and detailed shop Drawings must be prepared by Specialty Engineer and submitted to Owner and Engineer at least 4 weeks in advance of installation of any component or equipment to be anchored to the structure.
- F. Structural calculations and detailed Shop Drawings must clearly show the total design seismic forces which will be transferred from the elements of the structural system, non-structural components, and/or equipment and their attachments to the primary structure. Calculations must be reviewed and approved by Engineer for general conformance with the design criteria and building code and therefore calculations must include:
1. Seismic and wind load criteria used to determine design lateral and uplift forces. For external equipment, state whether wind controls for all equipment.
 2. Derivation of forces used including at least one complete sample calculation showing the process used so that Engineer may determine general compliance. Printouts of spreadsheets without explanation of calculations used to determine values are not acceptable.
 3. Adequacy of anchorage to concrete and masonry, or attachment to the primary structure to transfer the design forces from the element.

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4. Detailed Shop Drawings must note:
 - a. Required concrete strength.
 - b. Anchor type, dimensions, and materials. Coordinate material selection with Section 05 05 19, Post-installed Anchors.
 - c. Edge distance, spacing, embedment depth, substrate thickness and any supplementary reinforcing required for anchors installed in concrete.
 - d. Required dimensions of equipment pads based on equipment size and edge distance.
- G. Engineer's review of items within a specification section cannot be completed until all related items have been coordinated and submitted for review.
- H. Quality Assurance Submittals:
 1. Submit test reports for tension testing of anchors.
 2. Submit a letter from the Specialty Engineer verifying that each installation was performed in accordance with the Specialty Engineer's calculations.

1.08 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with the Oregon adopted and amended versions of the International Building Code (IBC) Section 1613, the referenced sections of ASCE 7 plus clarifications and additions specified in this section.

PART 2 PRODUCTS

2.01 GENERAL

- A. Attachments and supports transferring loads to the structure must be constructed of materials and products suitable for the application and designed and constructed in accordance with nationally recognized standards and design criteria shown on the Drawings.
- B. Provide materials in accordance with Section 05 50 00, Metal Fabrications. Source quality control must be in accordance with the referenced section.
- C. Powder driven fasteners and sleeve anchors must not be used for seismic attachments and anchorage where resistance to tension loads is required.

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PART 3 EXECUTION

3.01 GENERAL

- A. Tension testing of expansion or adhesive anchors utilized for anchorage must be done in the presence of Owner and a report of the test results must be submitted. See Section 05 05 19, Post-Installed Anchors, for additional requirements.
- B. Coordinate special inspections for high strength bolting or bolts installed in concrete. See Section 05 05 19, Post-Installed Anchors, for additional requirements.
- C. Install attachments, bracing, and anchorage so that the component force is transferred to the lateral force-resisting system of the structure through a complete load path.
- D. The overall anchorage system must provide restraint in all directions, including vertical, for each component or system so anchored.
- E. Piping must be anchored to ensure piping system has adequate flexibility and expansion capabilities at flexible connections and expansion joints.
- F. Tall and narrow equipment, such as motor control centers and telemetry equipment, must be anchored at the base and within 12 inches from the top of the equipment unless otherwise approved by Owner.
- G. Mechanical and electrical components must not be attached to more than one element of a building structure at a single restraint location where such elements may respond differently during a seismic event. Such attachments must not be made across building expansion and contraction joints.
- H. Provide and install attachments and braces in accordance with Section 05 50 00, Metal Fabrications. Attachment requirements, size, and number of braces must be based on Specialty Engineer's calculations.
- I. Provide and install concrete anchors for the anchorage of equipment in concrete or masonry in accordance with Section 05 50 00, Metal Fabrications. Size of anchor bolts and anchors, and required minimum embedment and spacing, must be based on Specialty Engineer's calculations.

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- J. Details of and calculations for all anchorages must be submitted and accepted as specified within this section. Submittals will be rejected if the proposed anchorage method would create an overstressed condition of the supporting member. Revise and/or strengthen anchorage of structural support as needed so that there is no overstressed condition.

END OF SECTION

SECTION 01 88 15
ANCHORAGE AND BRACING

PART 1 GENERAL

1.01 SUMMARY

- A. This section covers requirements for anchorage and bracing of equipment, distribution systems, and other nonstructural components required in accordance with the ICC 2024 International Building Code (IBC), for seismic, wind, gravity, soil, and operational loads.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Institute of Steel Construction (AISC) 360, Specification for Structural Steel Buildings.
 2. American Society of Civil Engineers (ASCE): ASCE 7, Minimum Design Loads and Associated Criteria for Buildings and Other Structures.
 3. International Code Council (ICC): International Building Code (IBC).
 4. State of Oregon.

1.03 DEFINITIONS

- A. Authority Having Jurisdiction (AHJ): Permitting building agency; may be a federal, state, local, or other regional department, or individual including building official, fire chief, fire marshal, chief of a fire prevention bureau, labor department, or health department, electrical inspector; or others having statutory authority. AHJ may be Owner when authorized to be self-permitting by governmental permitting agency or when no governmental agency has authority.
- B. Designated Seismic System: Architectural, electrical, and mechanical system or their components for which component importance factor is greater than 1.

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1.04 DESIGN AND PERFORMANCE REQUIREMENTS

A. General:

1. Anchorage and bracing systems must be designed by a qualified professional engineer registered in the State of Oregon.
2. Design anchorage into concrete including embedment in accordance with ACI 318-19; Chapter 17 (or other industry standard approved by Engineer), and Project Specifications.
 - a. Unless otherwise noted, design for cracked concrete condition.
3. Design anchorage and bracing of architectural, mechanical, and electrical components and systems in accordance with this section, unless a design is specifically provided within Contract Documents or where exempted hereinafter.
4. Design attachments, braces, and anchors for equipment, components, and distribution systems to structure for gravity, seismic, wind, and operational loading.
5. Design seismic anchorage and bracing for modified existing architectural, mechanical, or electrical systems where code requirements would dictate design for similar new components.
6. Anchor and brace piping and ductwork, whether exempt or not exempt for this section, so that lateral or vertical displacement does not result in damage or failure to essential architectural, mechanical, or electrical equipment.
7. Design anchorage and bracing for:
 - a. Mechanical and electrical components that are not provided with flexible connections between components and associated ductwork, piping, or conduit.
 - b. Distribution systems that weigh more than 5 pounds per foot that have center of mass located more than 4 feet above adjacent finished floor.
8. For components exempted from design requirements of this section, provide bolted, welded, or otherwise positively fastened attachments to supporting structure.

B. Design Loads:

1. Gravity: Design anchorage and bracing for self-weight and superimposed loads on components and equipment.
2. Seismic:
 - a. In accordance with 2024 IBC, Section 1613, and Chapter 13 of ASCE 7.
 - b. Design anchorage and bracing for design criteria listed on General Structural Notes on the Drawings.

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- c. Design forces for anchors in concrete or masonry must be in accordance with ASCE 7, Section 13.4.2, or IBC Section 1905.1.9 as applicable for Project Seismic Design Category.

C. Seismic Design Requirements:

1. Analyze local region of body of nonstructural component for load transfer of anchorage attachment if component I_p is equal to 1.5.
2. Existing components, systems, and equipment in their final condition that are modified by Project requirements and are not exempted by above paragraph require the same anchorage and bracing drawing and calculation submittals as new equipment. Field verify existing conditions.
3. Other seismic design and detailing information identified in ASCE 7, Chapter 13, is required to be provided for new and modified or noted architectural, mechanical and electrical components, systems, or equipment.

1.05 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. List of architectural, mechanical, and electrical equipment requiring Contractor-designed anchorage and bracing, unless specifically exempted.
 - b. Manufacturers' engineered seismic and non-seismic hardware product data.
 - c. Attachment assemblies' drawings including seismic attachments; include connection hardware, braces, and anchors or anchor bolts for nonexempt components, equipment, and systems.
 - d. List of existing architectural, mechanical, and electrical equipment or components to be modified in Project requiring Contractor-designed anchorage and bracing in final retrofitted condition.
 - e. Submittal will be rejected if proposed anchorage method would create excessive stress to supporting member. Revise anchorages and strengthen structural support to eliminate overstressed condition.

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B. Informational Submittals:

1. Anchorage and Bracing Calculations: For attachments, braces, and anchorages, include IBC and Project-specific criteria as noted on General Structural Notes on the Drawings, in addition to manufacturer's specific criteria used for design; sealed by a civil or structural engineer registered in the State of Oregon.
2. Manufacturer's hardware installation requirements.

1.06 SOURCE QUALITY CONTROL

- A. Contractor and supplier responsibilities to accommodate Owner-furnished shop fabrication related special inspections and testing are provided in Project's Statement of Special Inspections on the Drawings, and Section 01 45 33, Special Inspection, Observation, and Testing.
- B. Provide all other specified, regulatory required, or required repair verification inspection and testing that is not listed in Statement of Special Inspections in accordance with Section 01 45 16, Field Quality Control Procedures.
- C. Provide Source Quality Control for welding and hot-dip galvanizing of anchors in accordance with Section 05 50 00, Metal Fabrications.

PART 2 PRODUCTS

2.01 GENERAL

- A. Design and construct attachments and supports transferring seismic and non-seismic loads to structure of materials and products suitable for application and in accordance with design criteria shown on the Drawings and nationally recognized standards.
- B. Provide anchor bolts for anchorage of equipment to concrete or masonry in accordance with Section 05 50 00, Metal Fabrications. Provide anchor bolts of the size, minimum embedment, and spacing designated in calculations submitted by Contractor and accepted by Engineer.
- C. Provide post-installed concrete and masonry anchors for anchorage of equipment to concrete or masonry in accordance with Section 05 05 19, Post-Installed Anchors. Provide post-installed anchors of the size, minimum embedment, and spacing designated in calculations submitted by Contractor and accepted by Engineer.

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- D. Do not use powder-actuated fasteners or sleeve anchors for seismic attachments and anchorage where resistance to tension loads is required. Do not use expansion anchors, other than undercut anchors, for nonvibration isolated mechanical equipment rated over 10 hp.

PART 3 EXECUTION

3.01 GENERAL

- A. Make attachments, bracing, and anchorage in such a manner that component lateral force is transferred to lateral force resisting system of structure through a complete load path.
- B. Design, provide, and install overall seismic anchorage system to provide restraint in all directions, including vertical, for each component or system so anchored.
- C. Provide snubbers in each horizontal direction and vertical restraints for components mounted on vibration isolation systems where required to resist overturning.
- D. Provide piping anchorage that maintains design flexibility and expansion capabilities at flexible connections and expansion joints.
 - 1. Piping and ductwork suspended more than 12 inches below supporting structure must be braced for seismic effects to avoid significant bending of hangers and their attachments, unless high- or limited- deformability piping is used per ASCE 7, Section 13.6.8 or HVAC ducts have a cross-sectional area of less than 6 square feet or weigh 17 pounds per foot or less.
- E. Anchor tall and narrow equipment such as motor control centers and telemetry equipment at base and within 12 inches from top of equipment, unless approved otherwise by Engineer.
- F. Do not attach architectural, mechanical, or electrical components to more than one element of a building structure at a single restraint location where such elements may respond differently during a seismic event. Do not make such attachments across building expansion and contraction joints.

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3.02 INSTALLATION

- A. Do not install components or their anchorages or restraints prior to review and acceptance by Engineer and AHJ.
- B. Notify Engineer upon completion of installation of seismic restraints in accordance with Section 01 45 33, Special Inspection, Observation, and Testing.

3.03 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. In accordance with Section 05 05 19, Post-Installed Anchors.
- B. Owner-Furnished Quality Assurance, in accordance with IBC Chapter 17 requirements, is provided in Statement of Special Inspections Plan on the Drawings. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.
- C. Provide any other specified, regulatory required, or required repair verification inspection and testing that is not listed in Statement of Special Inspections in accordance with Section 01 45 16, Field Quality Control Procedures.

END OF SECTION

**SECTION 01 93 16
RECYCLING**

PART 1 GENERAL

1.01 DEFINITIONS ORS 279C.510

- A. Environmentally Preferable Products: Products that have a lesser or reduced effect on human health and the environment when compared with competing products that serve the same purpose. This comparison may consider raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, or disposal of the product.
- B. Practicable: Sufficient in performance and available at a reasonable price.
- C. Post-Consumer Recycled Material: Material and by-products which have served their intended end-use by a consumer and have been recovered or diverted from solid waste. It does not include those materials and by-products generated from, and commonly reused within, an original manufacturing process.
- D. Recycled Material: Any material that would otherwise be a useless, unwanted or discarded material except for the fact that the material still has useful physical or chemical properties after serving a specific purpose and can, therefore, be reused or recycled.

1.02 PROCEDURES

- A. Demolition:
 - 1. Materials salvage during demolition must comply with ORS 279C.510 and:
 - a. Owner desires that this Project generates the least amount of waste possible. Processes which reduce waste due to error, poor planning, breakage, mishandling, contamination, or other factors must be employed.
 - b. Recycle, reuse, and salvage as much material as possible. Contractor must submit a waste handling plan detailing how the waste materials will be separated and managed.
 - c. Remove and re-use, recycle, or salvage materials associated with the demolition of the buildings, pavement, vegetation, utilities, and any other site improvements to the extent possible.

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- d. Provide onsite instruction of appropriate separation, handling, and recycling, salvage, reuse and return methods to be used by all parties at the appropriate stages of the Project. The following minimum requirements apply for demolition work.
 - 1) Recycle a minimum 80 percent of demolished cast-in-place concrete and asphalt. Material removed from the Site may be crushed and/or ground down and reused in construction of other materials offsite.
 - 2) Ensure that 90 percent of the metal removed from the Site resulting from demolition required in the Contract Documents is recycled as scrap metal and reused in construction of other materials offsite.

B. Recycling of Construction Packaging.

1. Break down cardboard and boxes packaging into flat sheets. Bundle and store in a dry location.
2. As much as possible, require deliveries using pallets to remove pallets from Project Site. For pallets that remain onsite, break down pallets into component wood pieces and comply with requirements for recycling wood.
3. Break down crates to component wood pieces and recycle.
4. Chip brush, branches, and trees onsite.
5. Deposit wood materials into designated clean wood container to be transported to designated recycling facility for use as mulch or bio-fuel.

C. The Contractor, wherever practical, shall support markets for recycled and other environmentally preferable products. The Contractor shall develop a Recycled Product Procurement Policy as noted below and submit the policy to the Owner.

1. The Contractor agrees that “environmentally preferable products” will be purchased and utilized where practicable. Develop and maintain information about environmentally preferable products and recycled products containing the maximum practicable amount of recycled materials, to be purchased.
2. Nothing in this Contractor’s policy shall be construed as requiring the Contractor to procure products that do not perform adequately for their intended use or are not available at a reasonable price in a reasonable period.

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1.03 RECYCLING REPORTS

- A. At the conclusion of each project phase, Contractor must furnish to Owner recycling reports showing a summary of the ordering, disposal, and/or history of products that have been recycled. The report must show description and total quantity of each item ordered or disposed of during the reporting period. The Owner reserves the right to request additional information, if required, when reviewing Contract activity.

1.04 SUBMITTALS

- A. Submit Waste Handling Plan to indicate how waste will be diverted from landfills.
- B. Submit Recycled Product Procurement Policy to indicate planned usage of environmentally preferable products with recycled content.

1.05 QUALITY ASSURANCE

- A. Recycling service company qualifications; any of the following:
 - 1. Listed in the Eugene Area Recycling and Garbage Guide (“brown pages” R1-R8 of Eugene telephone directory).
 - 2. Listed in the City of Eugene Construction and Demolition Materials Recycling Guide.
 - 3. Any recycling service that will certify in writing that accepted construction and demolition debris will be diverted from the landfill, not dumped illegally or dumped at sea.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 03 01 32
REPAIR OF VERTICAL AND OVERHEAD CONCRETE SURFACES

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Association of State Highway and Transportation Officials (AASHTO): T277, Standard Method of Test for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration.
 2. American Concrete Institute (ACI):
 - a. 301, Specifications for Structural Concrete.
 - b. 506.2, Specification for Shotcrete.
 3. ASTM International (ASTM):
 - a. A615/A615M, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - b. A1064/A1064M, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
 - c. A706/A706M, Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - d. C42/C42M, Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 - e. C78/C78M, Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).
 - f. C109/C109M, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-inch or [50-mm] Cube Specimens).
 - g. C157/C157M, Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
 - h. C293/C293M, Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Center-Point Loading).
 - i. C348, Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars.
 - j. C469, Standard Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression.
 - k. C496/C496M, Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens.
 - l. C531, Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.

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- m. C596, Standard Test Method for Drying Shrinkage of Mortar Containing Hydraulic Cement.
 - n. C666/C666M, Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.
 - o. C882/C882M, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
 - p. C928/C928M, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
 - q. C1012/C1012M, Standard Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution.
 - r. C1202, Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration.
 - s. C1583/C1583M, Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method).
 - t. D638, Standard Test Method for Tensile Properties of Plastics.
 - u. D695, Standard Test Method for Compressive Properties of Rigid Plastics.
 - v. D4258, Standard Practice for Surface Cleaning Concrete for Coating.
 - w. D4259, Standard Practice for Abrading Concrete.
 - x. E699, Standard Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components.
- 4. International Concrete Repair Institute (ICRI): 310.2, Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair with CSP Chips.
 - 5. Jacobs STEP Team GMP1 Technical Memorandum, Aeration Basin Rehabilitation Product Prequalification.

1.02 DEFINITIONS

- A. Abrasive Blasting: Surface preparation method that uses compressed air intermixed with an abrasive medium to clean surface of substrate concrete, exposed steel, and steel reinforcement. Compressed air and abrasive medium is projected at high speed through a nozzle directly at the surface. Method is used to remove corrosion by-products, laitance, or other materials that may inhibit bond of repair concrete.

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- B. Defective Area:
1. At exposed concrete, defective areas also include texture irregularities, stains, and other color variations that cannot be removed by cleaning.
 2. Cold joints.
 3. Surface defects that include honeycomb, rock pockets, indentations, and surface voids greater than 3/16-inch deep, surface voids greater than 3/4-inch in diameter, cracks in liquid containment structures and belowgrade habitable spaces that are 0.005-inch wide and wider, and cracks in other structures with visible leakage or that are 0.010-inch wide and wider, spalls, chips, embedded debris, sand streaks, mortar leakage from form joints, deviations in formed surface that exceed specified tolerances and include but are not limited to fins, form pop-outs, and other projections.
- C. High-Pressure Water Blasting: Sometimes referred to as hydro-demolition. Uses water that may contain an abrasive medium, projected under high pressure and high velocity. Used for demolition, cutting, partial or full depth removal, cleaning, scarifying, or roughening of concrete surfaces, or removing existing coatings, for preparation of substrate concrete surfaces.
- D. Low-Pressure Spray Mortar: Mortar suitable to be applied by low-pressure spraying, and in small areas may be applied by hand troweling.
- E. New Concrete: Concrete less than 60 days old forming structures constructed as part of the Work.
- F. Rebound: Shotcrete material, mostly aggregates, that bounce off a surface against which shotcrete was projected.
- G. Shotcrete: Mortar pumped through hose and projected at high velocity.
- H. Submerged: Location at or below top of wall of open water-holding structure, such as a basin or channel, or wall, ceiling, or floor surface inside a covered water-holding structure, or exterior belowgrade wall or roof surface of water-holding structure, open or covered.
- I. Surface Void Ratio (SVR): The ratio of the total surface void area to the total concrete surface area after stripping forms and no subsequent applied surface treatment.
- J. Unsound Concrete: Concrete with a pH less than 10, concrete that is deteriorating, carbonated, honeycombed, chloride content less than 0.25 percent, otherwise defective, or which sounds hollow when sounded, as determined by Owner.

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1.03 SUBMITTALS

A. Action Submittals:

1. Product data sheets for each material supplied.
2. Samples: Mesh reinforcement and mesh anchor.
3. Product data sheet and description of operation for high-pressure water blasting equipment. Include description of how equipment will be adjusted to account for varying concrete strength and hardness.
4. Procedure for installing pins to track the existing concrete surface and procedure for placing piano wire to verify final finish thickness.
5. Procedure for protecting adjacent surfaces that are not subject to repair.

B. Informational Submittals:

1. Repair Mortar System Option: Manufacturer's preparation and installation instructions.
2. Mesh manufacturer's installation instructions and allowable load criteria.
3. Written description of equipment proposed for concrete removal and surface preparation.
4. Written description of equipment proposed for repair mortar installation.
5. Certificates:
 - a. Shotcrete Nozzleman: Current ACI Certification for each proposed nozzleman.
 - b. Mortar Manufacturer's Certificate of Proper Installation.
6. Statements of Qualification:
 - a. Contractor.
 - b. Contractor's superintendent.
 - c. Hydrodemolition Contractor.
 - d. Hydrodemolition superintendent.
 - e. Repair mortar system applicator.
 - f. Repair mortar system manufacturer's representative.
 - g. Independent Testing Laboratory.
7. Field and Laboratory Test Reports:
 - a. Compression test reports.
 - b. Tension test reports.
 - c. pH test reports. Submit field pH test reports weekly.
 - d. Letter from repair mortar manufacturer's representative stating that the surface preparation is adequate for the repair mortar.
8. Confirmation bonding agent conforms to ASTM standards.
9. Written description of expected waste during the application of shotcrete or low-pressure spray mortar repair systems.

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1.04 QUALITY ASSURANCE

A. Qualifications:

1. Contractor: Successfully completed to Client's satisfaction three projects of similar size and complexity within the last 5 years.
2. Contractor's Superintendent: Superintendent of a minimum of two of the projects used to qualify Contractor.
3. Hydrodemolition Contractor: Successfully completed to Client's satisfaction three projects of similar size and complexity within the last 5 years.
4. Hydrodemolition Contractor's Superintendent: Superintendent of a minimum of two of the projects used to qualify Contractor.
5. Repair Mortar System Applicator:
 - a. For Repair System A – Shotcrete Mortar, trained and experienced applicator recognized or certified by repair mortar system manufacturer.
 - b. For Repair System B and System C – Low-Pressure Spray Mortar, in lieu of recognition or certification, demonstrate application of repair mortar manufacturer's system and obtain Certification of Proper Installation, in accordance with Article Manufacturer's Services.
6. Repair Mortar System Manufacturer's Representative: Knowledgeable and experienced on technical data and application requirements for specified products.

B. Independent Testing Laboratory: Meet criteria stated in ASTM E699.

C. Demonstration Mockup for Repair System Option A – Shotcrete Mortar and Repair System Option B – Low-Pressure Spray Mortar Repair System:

1. For each noted type of repair mortar system to be used, prepare one demonstration repair of at least 10 feet long by full wall height in the Final Treatment facility as coordinated with Owner.
2. Repair Mortar System Manufacturer's Demonstration:
 - a. Schedule time for manufacturer's demonstration of repair system proposed for Project.
 - b. Install measurement system at centerline of demonstration area in accordance with Subsection 1.05 of this specification section.
 - c. Prepare concrete surface of the demonstration area in accordance with Subsection 3.04 through Subsection 3.06 of this specification section.
 - d. Surface preparation must be accepted by manufacturer's representative for each type of application.

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- e. Prepare mortar to specified consistency for testing and placement.
 - f. Cure portions of each type of surface to be repaired using proposed curing procedure and materials, including overhead and vertical applications.
 - g. Demonstrate the following:
 - 1) Mixing and application equipment capabilities and procedures, including flow of material from nozzle or sprayer.
 - 2) Nozzle operator and person in charge of low-pressure sprayer, capabilities and ability to follow prescribed application procedures and properly operate equipment and apply surface repair materials.
 - h. Compression Strength Test: Testing company must make compression test samples from wet mortar during demonstration placement and deliver to independent testing laboratory for testing at 7 days and 28 days.
 - i. Tensile Bond Test: Test in situ or take a core of demonstration placement and test as specified herein below for tensile bond at 7 days as specified in Paragraph Direct Tension Bond Test.
- D. Where Required by Engineer, demonstration Mockup for Repair System Option C – Polymer Modified Repair Mortar System:
- 1. Prepare one demonstration repair of at least 10 feet long by full wall height in the Final Treatment facility as coordinated with Owner.
 - 2. Repair Mortar System Demonstration:
 - a. Schedule time for demonstration of repair system proposed for Project.
 - b. Install measurement system at centerline of demonstration area in accordance with Subsection 1.05 of this specification section.
 - c. Prepare concrete surface of the demonstration area in accordance with Subsection 3.04 through Subsection 3.06 of this specification section.
 - d. Surface preparation must be accepted by manufacturer's representative for each type of application.
 - e. Prepare mortar to specified consistency, for testing and placement.
 - f. Cure portions of each type of surface to be repaired using proposed curing procedure and materials, including overhead and vertical applications.
 - g. Demonstrate mixing and application procedures.
 - h. Compression Strength Test: Make compression test samples from wet mortar during demonstration placement and deliver to independent testing laboratory for testing at 7 days and 28 days.

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- i. Tensile Bond Test: Test in situ or take a core of demonstration placement and test for tensile bond at 7 days as specified in Paragraph Direct Tension Bond Test.

E. Prerepair Conference:

1. Required Meeting Attendees:
 - a. Contractor.
 - b. Repair Subcontractor.
 - c. Technical representative for repair material manufacturer.
 - d. Engineer.
 - e. Testing agency.
 - f. Owner.
2. Schedule and conduct prior to incorporation of respective products into Project. Notify Engineer and Owner of location and time.
3. Agenda must include, but not limited to:
 - a. Review of field conditions. Conduct field observations of the Work to be performed.
 - b. Based on above observations, repair material manufacturer's technical representative must confirm material selection and make Project specific repair method recommendations.
 - c. Technical representative for repair material manufacturer must review proposed surface preparation, material application, consolidation, finishing, curing, and protection of repair material from weather conditions.
 - d. Review of protection measures for adjacent surfaces not subject to repair.
 - e. Other specified requirements requiring coordination.

1.05 MEASUREMENT AND PAYMENT

A. Measurement for vertical and overhead concrete surface removal and repair pay items must be determined per the following procedure:

1. Prior to removal of existing concrete, install 1/4-inch diameter Type 316, stainless steel rods into face of existing walls (at right angle to wall) in a vertical row at 20 feet on center horizontally. Each vertical row must consist of three anchor rods equally spaced. The rods must be located 12 inches below top of wall, mid-height of the wall, and 12 inches above bottom of wall. Drill and epoxy these stainless steel rods a minimum of 3 inches into the existing wall.

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2. After installation of steel rods, cut rods flush with the face of existing concrete. Rods will subsequently be used for measurement purposes. Prior to rod placement, Contractor must prepare a rod layout grid with grid naming convention to allow uniform reference to each area of concrete repair and submit for Engineer's approval. All measurement and payment must follow this rod layout and naming convention.
3. Remove existing concrete as indicated herein.
4. Following removal of existing concrete, install additional, new 1/4-inch diameter x minimum 6-inch long Type 316 stainless steel rods 12 inches away from and adjacent to all existing rods. Cover rod ends with rubber bulb to reduce risk of accidental injury after installation. Drill and epoxy new rods a minimum of 3 inches beyond face of demolished concrete. String a steel piano wire between the new rods at the depth of the original existing concrete surface (i.e., with piano wire just touching end of rods placed flush with original concrete surface) and to meet the tolerances listed herein.
5. Screed final product as indicated to original existing concrete surface profile unless a maximum of 1/2-inch of additional build out is required to provide a minimum of 2 inches of clearance over exposed reinforcing.
6. Payment for removal will be based upon measured thickness of removed concrete at rods. The thickness will be determined by averaging the measured depth of removal over each 100-square foot area to determine total quantities for each pay item.
7. Payment for installation of repair will be based upon the measured thickness determined for removal of each 100-square foot area plus any anticipated build out to provide clearance over exposed reinforcing as described in this section. The thickness will be determined by averaging the measured depth of application over each 100-square foot area to determine total quantity for payment.
8. Contractor may submit alternate methods of measurement subject to Owner and Engineer's approval.
9. Pay Items and Unit of Measurement:
 - a. Vertical and Overhead Concrete Surface Removal and Repair;
Square Foot:
 - 1) 0-Inch to Expected Depth Noted on the Drawings Removal Depth and Repair Layer Thickness: Lump Sum.
 - 2) Expected Depth to Expected Depth Plus 1/2-Inch Removal Depth and Repair Layer Thickness: Unit Price.
 - 3) Greater Than Expected Depth Plus 1/2-Inch Removal Depth and Repair Layer Thickness Where Approved by Engineer: Unit Price.

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- 4) Greater Than Expected Depth Plus 1/2-Inch Removal Depth and Repair Layer Thickness Where Not Approved by Engineer: Considered Contractor's means and methods and will not be paid.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package repair mortar system products in moisture-resistant bags, pails, or moisture-resistant bulk bags.
- B. Deliver, store, and handle repair materials in accordance with manufacturer's printed instructions.

1.07 EXISTING FACILITIES

A. Clarifier Rehabilitation:

1. Prior to turnover to the Contractor, Owner will drain and wash down the Clarifier launder, removing residual sludge, grit, and scum on the walls. Wash down water will be drained from the launder by Owner, leaving less than 4 inches of standing water remaining. Contractor must provide final cleaning prior to allowing entry of personnel into the basins.
2. Dispose of water after handover from Owner. Coordinate with plant staff for disposal requirements.
3. Coordinate removal and re-installation of the clarifier covers as required.
4. Protect existing clarifier coatings on the main clarifier slab and walls.

B. Final Treatment Rehabilitation:

1. Prior to turnover to the Contractor, Owner will drain and wash down the basin, removing residual sludge, grit, and scum on the walls. Wash down water will be drained from the channel by Owner, leaving less than 4 inches of standing water remaining. Contractor must provide final cleaning prior to allowing entry of personnel into the basins.
2. Dispose of water after handover from Owner. Coordinate with plant staff for disposal requirements.

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PART 2 PRODUCTS

2.01 REPAIR SYSTEM A – SHOTCRETE MORTAR

A. Mortar Materials:

1. Blend of selected portland cements, microsilica, and specially graded aggregates and fibers applicable for vertical and overhead surfaces.
2. Materials must not contain asbestos, chlorides, nitrates, added gypsum, added lime, or high aluminum cements.
3. Noncombustible before and after cure.
4. Furnish in factory proportioned unit.
5. Workability from 1/4-inch in depth and greater.

B. Mixed Mortar Properties:

1. Working Time: 5 minutes to 10 minutes.
2. Finishing Time: 10 minutes to 20 minutes.
3. Color: Dark gray.

C. Cured Mortar Properties:

1. Compressive strength for 2-inch cubes in accordance with ASTM C109/C109M, or 3-inch cubes in accordance with manufacturer's modification to ASTM C109/C109M:
 - a. 7 Days: 4,000 pounds per square inch minimum.
 - b. 28 Days: 6,000 pounds per square inch minimum.
2. Flexural Strength (Modulus of Rupture), ASTM C78/C78M or ASTM C348 (Modified) at 28 Days: 750 pounds per square inch minimum.
3. Splitting Tensile Strength, ASTM C496/C496M at 28 Days: 400 pounds per square inch minimum.
4. Slant Shear Bond Strength, ASTM C882/C882M Test Method Modified with No Bonding Agent, at 28 Days: 2,000 pounds per square inch minimum.
5. Drying Shrinkage, ASTM C157/C157M Modified at 28 Days or ASTM C531: 0.1 percent maximum.
6. Chloride Ion Permeability Based on Charge Passed, ASTM C1202: 1,100 coulombs maximum.
7. Mortar must not produce a vapor barrier.

D. Mortars that exceed the 1,100 coulombs maximum chloride ion permeability requirement on submerged surfaces must be coated with an epoxy.

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2.02 REPAIR SYSTEM B – LOW-PRESSURE SPRAY MORTAR

- A. One-component or two-component, cement based, fiber reinforced, shrinkage compensated, gray in color, with a minimum 30-minute working time.
- B. Cured materials mixed in accordance with manufacturer's instructions must conform to the following criteria:
 - 1. Compressive Strength, ASTM C109/C109M at 7 Days: 4,000 pounds per square inch minimum.
 - 2. Compressive Strength, ASTM C109/C109M at 28 Days: 6,000 pounds per square inch minimum.
 - 3. Flexural Strength, ASTM C348 at 28 Days: 750 pounds per square inch minimum.
 - 4. Slant Shear Bond Strength, ASTM C882/C882M Test Method Modified with No Bonding Agent, at 28 Days: 2,000 pounds per square inch minimum.
 - 5. Splitting Tensile Strength, ASTM C496/C496M at 28 Days: 400 pounds per square inch minimum.
 - 6. Drying Shrinkage, ASTM C157/C157M Modified at 28 Days or ASTM C531: 0.1 percent maximum.
 - 7. Chloride Ion Permeability Based on Charge Passed, ASTM C1202: 1,100 coulombs maximum.
 - 8. System must not produce a vapor barrier.
 - 9. Sprayable, extremely low permeability, sulfate resistant, easy to use and requiring only addition of water.
 - 10. Free of chlorides and other chemicals causing corrosion.
- C. Mortars that exceed the 1,100 coulombs maximum chloride ion permeability requirement on submerged surfaces must be coated with an epoxy.

2.03 REPAIR SYSTEM C – POLYMER-MODIFIED REPAIR MORTAR

- A. Polymer-modified, one-component or two-component, cementitious based, chloride resistant, flowable, gray in color, working time of 20 minutes minimum, surface renovation mortar.
- B. Cured Mortar Properties:
 - 1. Compressive Strength, ASTM C109/C109M at 7 Days: 4,000 pounds per square inch minimum.
 - 2. Compressive Strength, ASTM C109/C109M at 28 Days: 6,000 pounds per square inch minimum.
 - 3. Flexural Strength, ASTM C348 at 28 Days: 750 pounds per square inch minimum.

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4. Slant Shear Bond Strength, ASTM C882/C882M Test Method Modified with No Bonding Agent, at 28 Days: 2,000 pounds per square inch minimum.
 5. Splitting Tensile Strength, ASTM C496/C496M at 28 Days: 400 pounds per square inch minimum.
 6. Drying Shrinkage, ASTM C157/C157M Modified at 28 Days or ASTM C531: 0.1 percent maximum.
 7. Chloride Ion Permeability Based on Charge Passed, ASTM C1202: 1,100 coulombs maximum.
 8. System must not produce a vapor barrier.
- C. Mortars that exceed the 1,100 coulombs maximum chloride ion permeability requirement on submerged surfaces must be coated with an epoxy.

2.04 WATER

- A. Clean and free from oil, acid, alkali, organic matter, or other deleterious substances, meeting federal drinking water standards.

2.05 REINFORCEMENT

- A. Deformed Steel Reinforcement:
1. ASTM A615/A615M or ASTM A706/A706M, Grade 60, where welding is not required.
 2. ASTM A706/A706M, Grade 60, for steel reinforcement to be welded.
- B. Tie Wire: 16-gauge, galvanized.

2.06 CEMENTITIOUS BONDING AGENT

- A. Cementitious adhesive, specifically formulated for bonding plastic portland cement concrete or mortar to hardened portland cement concrete.
1. Mixed Bonding Agent Properties:
 - a. Pot Life: 75 minutes to 105 minutes.
 - b. Contact Time: 24 hours.
 2. Cured Cementitious Adhesive Properties:
 - a. Splitting Tensile Strength, ASTM C496/C496M at 28 Days: 500 pounds per square inch minimum.
 - b. Flexural Strength, ASTM C348: 1,000 pounds per square inch minimum.

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- c. Slant Shear Bond Strength, ASTM C882/C882M at 14 Days:
 - 1) 2-Hour Open Time: 2,500 pounds per square inch minimum.
 - 2) 24-Hour Open Time: 2,000 pounds per square inch minimum.
 - 3. Bonding agent must not produce a vapor barrier.
 - 4. Compatible with and from same manufacturer as the repair system used.
- B. Product must match what was installed in the test repair. Systems that used a bonding agent must use the bonding agent when applied in the Work. The test repair system that did not use a bonding agent must not use a bonding agent when applied in the Work.

2.07 REINFORCING CORROSION INHIBITOR

- A. Cementitious epoxy coating with corrosion inhibitor.
- B. Compatible with repair mortar being used.
- C. Manufacturers and Products:
 - 1. Sika Chemical Corp., Lyndhurst, NJ; Armatec 110 EpoCem.
 - 2. Euclid Chemical Co., Cleveland, OH; Duralprep A.C.
 - 3. Master Builder Solutions, Beachwood, OH; MasterEmaco P124.

2.08 EVAPORATION RETARDANT

- A. As specified in specification Section 03 39 00, Concrete Curing.

2.09 CURING COMPOUND

- A. As specified in specification Section 03 39 00, Concrete Curing. Curing compound must not be used on surfaces that will receive a coating.

2.10 FIELD PH TESTING

- A. Manufacturers and Products:
 - 1. Micro Essential Laboratory, Brooklyn, NY: Hydrion Insta-check 0-13 Mechanical pH pencil.
 - 2. Germann Instruments Inc, Evanston, IL: Rainbow Indicator Spray.
 - 3. Germann Instruments Inc, Evanston, IL: Deep Purple Spray.

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PART 3 EXECUTION

3.01 GENERAL

- A. Existing Concrete Work: Repair concrete as identified in Contract Documents.

3.02 APPLICATION

- A. Apply repair mortar in accordance with manufacturer's recommendations.
- B. Where a mortar pump is used, provide operable backup mortar pump of equal or better performance than the primary mortar pump. Backup pump must be onsite and available at all times. Provide spare parts onsite for commonly broken or worn items to minimize pump down time.

3.03 SURFACE VOID RATIO EVALUATION AND LIMITS

- A. SVR Evaluation:
1. Void area is the summation of the areas of all voids within a sample space of 24-inch by 24-inch. Voids with an average diameter of less than 3/32-inch are excluded.
 2. Surface void ratio is only required to be determined if the entire impression of the surface does not meet the contract expectation as set by the Mock-up Panels.
- B. SVR Limits:
1. Void area not to exceed 1.2 percent of test area.
 2. Maximum allowed void diameter: 1/2-inch.

3.04 PREPARATION

- A. At the Rehabilitation locations, remove unsound concrete to the minimum depth indicated in the Contract Documents. Using pH field testing and sounding, remove additional concrete with a pH of less than 10. Perform field pH tests per testing product manufacturer's instructions. Perform one test every 25 square feet for the first 3 days of concrete removal and every 250 square feet thereafter. Retest as required to expose concrete with a pH greater than 10. Record the pH at each test location in a log for submittal. Test must be performed within 7 hours of concrete demolition to prevent surface carbonation.

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- B. At the Rehabilitation locations, place pins to mark the existing surface prior to commencing hydrodemolition. The surface control pins must be reviewed and verified with the onsite inspector prior to removal of existing surface. Once the existing surface has been removed, verify with the onsite inspector the accuracy of piano wire or equivalent method for the final finish thickness.

- C. Remove unsound concrete from work areas.
 - 1. Use 8,000 pounds per square inch minimum high-pressure water blasting machine as required for Site conditions.
 - 2. Hydrodemolition equipment and the pressure used must be selected such that the machine operator and the inspector can immediately observe the demolished area and ensure that the maximum demolition depth is not being exceeded. Equipment must be able to account for varying concrete strength and hardness.
 - 3. Remove concrete to abrade substrate concrete surfaces to a minimum amplitude as required by the repair mortar manufacturer's product literature.
 - 4. Where final surface is required to be flush with existing adjacent surface remove existing concrete depth as required for application of minimum thickness of repair mortar.
 - 5. Sound concrete by tapping with maximum 24-ounce mason's hammer after hydrodemolition and remove fins and loose aggregate that were left behind.
 - 6. Following removal of unsound concrete, check substrate concrete surface by sounding techniques to identify unsound concrete remaining or resulting from use of chipping hammer.

- D. Do not use power-driven jackhammers, chipping hammers, or scabblers unless water blasting is not permitted or practical because of Site conditions or may cause other damage to equipment or facilities. In such cases where chipping hammers are required, limit size of chipping hammer to 16 pounds or lighter, or use small electric chipping hammer, to reduce formation of micro-fractures in substrate concrete surface.

- E. Pressure wash areas with likely surface voids to remove laitance and expose underlying voids.

- F. Remove unsound concrete. Repair system manufacturer's representative, Engineer, or Engineer's representative must confirm that unsound concrete has been removed.

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- G. Square edges of patch areas by sawing or chipping to avoid tapered shoulders or feather edges. Avoid cutting embedded steel reinforcement. Roughen polished saw-cut edge by high-pressure water blasting.
- H. Remove concrete adjacent to steel reinforcement to a minimum of 3/4-inch clearance around steel reinforcement for application and bonding of new repair mortar to circumference of exposed steel reinforcement if it is evident that bond between existing concrete and steel reinforcement has been destroyed or has deteriorated as determined by Engineer.
- I. Clean exposed steel reinforcement of loose rust and concrete splatter per recommendations of repair material manufacturer and in accordance with ASTM D4258 and coat with the specified corrosion inhibitor. Do not exceed the manufacturer's open time for the corrosion inhibitor.
- J. Keep areas from which concrete has been removed free of dirt, dust, and water blasting waste slurry. Remove laitance and other bond inhibiting contamination from prepared areas.
- K. Dampen repair areas at least 6 inches beyond area to receive repair mortar for at least 24 hours to provide saturated surface dry (SSD) condition without standing water at time of application of mortar as required by and in accordance with repair mortar manufacturer's printed instructions.
- L. Collect spent water and concrete debris from removal operations and dispose of offsite in manner and location acceptable to Owner.

3.05 REINFORCEMENT INSTALLATION

- A. Provide steel reinforcement when existing reinforcement is not exposed, and when mortar application is more than 3 inches deep, unless otherwise shown on the Drawings.
- B. Replace deteriorated steel reinforcement that is missing 25 percent or greater of the steel area with new steel reinforcement equivalent in cross-sectional area to the lost sectional area. Extend the new steel reinforcement a lap length past the corroded area. New steel reinforcing must have at least 2-inches of concrete cover after placement of the repair mortar. Coat the new reinforcing with corrosion inhibitive coating.
- C. Provide steel mesh reinforcing and anchors where required by repair mortar manufacturer's installation instructions.

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- D. Coat exposed new and existing steel reinforcement with cementitious reinforcement coating at same time as substrate concrete is coated with cementitious bonding agent, as specified below, per repair mortar and cementitious reinforcement coating manufacturers' printed instructions. Ensure the open time of the coating and bonding agent is not exceeded.

3.06 PROTECTION

- A. If cementitious coating, reinforcing corrosion inhibitor, or bonding agent is used, protect adjacent surfaces from over application. Promptly remove cementitious coating, reinforcing corrosion inhibitor, or bonding agent applied beyond repair area.
- B. Protect adjacent surfaces, and equipment from overshooting, rebound, and dust, as applicable for repair mortar system used.
- C. Protect existing expansion joints during hydrodemolition and mortar application. Document the location of expansion joints to ensure no expansion joints are covered during mortar application.

3.07 REPAIR SYSTEM A – SHOTCRETE MORTAR PLACEMENT

- A. Apply shotcrete mortar in accordance with manufacturer's instructions.
- B. Track quantity of repair mortar applied by taking depth measurements based on the previously placed piano wire guides. Depth measurement exceeding 1/2 inches beyond approved removal depth, unless authorized by Engineer and Owner, are considered Contractor's means and methods. The number of bags used is not an acceptable measurement of the quantity of mortar applied. The rate of material waste is considered part of the Contractor's means and methods.
- C. Do not reuse rebound materials.
- D. Apply mortar using dry mix process, in accordance with ACI 506.2.
- E. Shotcrete mortar must emerge from nozzle in a steady, uninterrupted flow. If flow becomes intermittent, direct flow away from the Work until flow of mortar becomes constant.
- F. Applied Shotcrete Mortar: Minimum thickness to return wall to original design thickness as noted on the Drawings.

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- G. Nozzle Position: Hold nozzle approximately at right angles to and at a distance from surface in accordance with shotcrete repair mortar system manufacturer's instructions for type of application, nozzle, and air pressure used.
- H. Steel Reinforcement Encasement:
 - 1. Modify procedure of shooting shotcrete mortar to better direct material around reinforcement bars.
 - 2. Prevent shotcrete mortar from building up on reinforcement steel when shooting on, around, through, and behind steel to eliminate voids.
 - 3. Provide dense void-free encasement of reinforcement steel.
- I. Application of multiple layers must be done in accordance with shotcrete repair mortar system manufacturer's printed instructions.
- J. Slice off excess material with a wire screed 5 minutes to 10 minutes after initial set.
- K. Apply smooth form-like finish to exposed shotcrete mortar surface and in accordance with manufacturer's instructions. Apply full strength evaporation retardant.
- L. Remove rebound, sand, and miscellaneous debris continuously throughout shotcrete mortar application, and dispose of offsite at an approved disposal facility.
- M. Cure in accordance with Article Curing of this specification section.

3.08 REPAIR SYSTEM B – LOW-PRESSURE SPRAY MORTAR PLACEMENT

- A. Mix mortar in accordance with manufacturer's printed instructions.
- B. After priming prepared substrate concrete surface per manufacturer's recommendations, apply mortar by low-pressure spraying equipment, unless noted otherwise. At small repair areas, low-pressure spray mortar may be applied by troweling if allowed per the manufacturer's recommendations.
- C. Track quantity of repair mortar applied by taking depth measurements based on the previously placed piano wire guides. Depth measurement exceeding 1/2 inches beyond approved removal depth, unless authorized by Engineer and Owner, are considered Contractor's means and methods. The number of bags used is not an acceptable measurement of the quantity of mortar applied. The rate of material waste is considered part of the Contractor's means and methods.

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D. Bonding Agent:

1. Use bonding agent when used in demonstration repair for hand applied areas, in accordance with repair mortar manufacturer's instructions.
2. Application of repair mortar over bonding agent must be completed within time frame recommended by bonding agent manufacturer.
3. Consult with manufacturer for optimum and minimum acceptable degrees of surface tackiness of coat.

E. Work mortar firmly and quickly into repair area.

F. Finish repair mortar to match adjacent concrete surface.

G. Provide evaporation retardant at full strength.

H. Cure in accordance with Article Curing of this specification section.

3.09 REPAIR SYSTEM C – POLYMER-MODIFIED REPAIR MORTAR
PLACEMENT

A. Mix mortar in accordance with manufacturer's printed instructions.

B. Bond Coat: Apply to prepared substrate concrete surface before application of mortar if applied during demonstration repair in accordance with repair mortar manufacturer's printed instructions. Do not apply more bond coat than can be covered with mortar before bond coat dries. Do not retemper bond coat.

C. Place mortar by hand or low-pressure spray and trowel to specified surface finish, in accordance with requirements of repair material's printed instructions.

D. Cure in accordance with Article Curing of this specification section, and in accordance with manufacturer's printed instructions.

3.10 FINISH

A. Finish repair mortar to smooth even surface to match adjacent concrete surface or with a smooth trowel finish if there is no adjacent finished concrete.

B. Tolerances:

1. Wall must be plumb to within 1/4-inch in 10 feet.
2. Depressions in wall surface must not exceed 1/4-inch when 10-foot straightedge is placed on high points in all directions.

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3.11 CURING

- A. Prior to curing, apply water fog to repair mortar system in accordance with repair mortar system manufacturer's printed instructions.
- B. Cure in accordance with repair mortar manufacturer's printed instructions.
- C. Where permitted by repair mortar manufacturer's printed instructions, commence water curing after repair mortar system application and when curing will not cause erosion of mortar.
- D. Continuously water cure repair mortar system for the length of time it takes the repair mortar to reach 4,000 pounds per square inch or the manufacturer's required cure period, whichever is greater.
- E. Do not cure using curing compound or membrane, unless method is part of repair mortar system manufacturer's printed instructions and approval is obtained from Engineer. Do not use curing compound on surfaces that will receive a future coating.
- F. Cure intermediate layers of repair mortar in accordance with repair mortar manufacturer's printed instructions.
- G. Where curing compound is permitted by repair mortar system manufacturer, apply curing compound in accordance with specification Section 03 39 00, Concrete Curing.

3.12 FIELD QUALITY CONTROL

- A. Sounding for Hollow Areas:
 - 1. Light hammer tap repaired areas listening for hollow sound to determine areas that have not properly bonded to substrate concrete.
 - 2. Mark hollow areas for removal and replacement.
- B. Testing laboratory retained by Owner will provide the following:
 - 1. Compression Strength Test:
 - a. Testing will follow a ASTM C109/C109M.
 - b. Cure test samples as specified.
 - c. A minimum of three production samples of mixed material will be obtained from each 500 square feet of mortar repair, and a minimum of three samples in total, whichever is greater, for testing at 7 days, and 28 days.

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- d. Record location where repair mortar is being applied at time production samples are obtained.
- 2. Direct Tension Bond Test:
 - a. In situ Bond Testing: Perform tension bond test in accordance with ASTM C1583/C1583M.
 - b. Perform three tests for each 2,000 square feet of repair work but not less than three tests on each of the six long walls and one test on each of the end walls of the chlorine contact basins.
 - c. Record locations of Bond Tests on each type of applied repair mortar tested.
 - d. Conduct test 10 days minimum after placement of mortar or as recommended by the repair manufacturer's representative.
 - e. Measure the expected mortar depth at the core locations prior to installing mortar.
 - f. Locate wall reinforcing prior to drilling core holes. Avoid cutting existing reinforcing.
 - g. Tests that have the failure in the concrete substrate pass. Tests that have the failure at the interface between the concrete substrate and the repair mortar or within the repair mortar fail.
- C. Retest mortar repairs that do not meet test requirements.
- D. Repair and fill holes using same repair mortar where core samples have been removed.

3.13 MORTAR REPAIR FAILED TEST

- A. Remove and replace unacceptable Work.
- B. Hollow Sounding Areas: Saw cut hollow sounding areas to a new square edge. Remove unsound mortar repair. Prepare substrate surface and reapply repair mortar as specified herein.
- C. Failed Compression Strength Test: Remove affected areas of repair mortar represented by failed compression strength test results. Prepare substrate surface and reapply repair mortar as specified herein.
- D. Failed Bond Tests: Remove affected areas of repair mortar represented by failed bond test results. Prepare substrate surface and reapply repair mortar as specified herein.
- E. Retest areas where repair mortar was removed and replaced, in accordance with test requirements specified herein.

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3.14 MANUFACTURER'S SERVICES

- A. Provide repair mortar system manufacturer's representative at Site to review acceptability of surface preparation, mixing and installation assistance, training of repair mortar system applicators, inspection, and certification of proper installation.
- B. The representative must be onsite daily during the first 3 days of repair mortar application and at least weekly thereafter as required to confirm surface preparation and mortar application procedures.

3.15 CLEANING

- A. Remove overshoot shotcrete, Repair System A and low-pressure spray, Repair System B repair mortar and rebound materials as the Work proceeds. Remove waste materials, unsound material from concrete surfaces, material chipped from structure, and water used in preparation of or repair areas, finishing, and curing, and dispose offsite at an approved disposal site.

END OF SECTION

**SECTION 03 39 00
CONCRETE CURING**

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Concrete Institute (ACI): 308.1, Specification for Curing Concrete.
 2. ASTM International (ASTM):
 - a. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - b. C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.

1.02 SUBMITTALS

- A. Action Submittals:
1. Manufacturers' data indicating compliance with the requirements specified herein for the following products:
 - a. Evaporation retardant.
 - b. Curing compound.
 2. Curing methods proposed for each type of element such as slab, walls, beams, and columns in each facility.
- B. Informational Submittals:
1. Manufacturer's Certificate of Compliance, in accordance with Section 01 43 33, Manufacturers' Field Services, for the following:
 - a. Curing compound showing moisture retention requirements.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Curing Compound:
1. Water-based, high-solids content, nonyellowing, curing compound meeting requirements of ASTM C1315, Class A.

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2. Manufacturers and Products:
 - a. Euclid Chemical Co., Cleveland, OH; Super Diamond Clear VOX.
 - b. WR Meadows, Inc., Hampshire, IL; VOCOMP-30.
 - c. Vexcon Chemical, Inc.; Philadelphia, PA; Starseal 1315.
 - d. Dayton Superior; Safe Cure and Seal 1315 EF.
- B. Evaporation Retardant:
 1. Optional: Fluorescent fugitive dye color tint that disappears completely upon drying.
 2. Manufacturers and Products:
 - a. BASF Construction Chemicals, Shakopee, MN; MasterKure ER 50.
 - b. Euclid Chemical Co., Cleveland, OH; Eucobar.
- C. Water: Clean and potable, containing less than 500 ppm of chlorides.

PART 3 EXECUTION

3.01 CONCRETE CURING

- A. General:
 1. Cure all concrete in accordance with project specifications and ACI308.1.
 2. Where surfaces are to receive coatings, painting, cementitious material, or other similar finishes, use only water curing procedures.
 3. Use only water curing on potable water structures.
 4. Where curing compound cannot be used, water curing as described below or special methods using moisture must be agreed upon by Engineer prior to placing concrete.
 5. If result of 7-day concrete strength test is less than 50 percent of specified 28-day strength, extend period of moist curing specified below, by 7 additional days.
- B. Use one of the following methods as approved by Engineer:
 1. Vertical Surfaces:
 - a. Method 1: Leave concrete forms in place and keep surfaces of forms and concrete wet for 7 days.
 - b. Method 2: Continuously sprinkle with water 100 percent of exposed surfaces for 7 days starting immediately after removal of forms.

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- c. Method 3: Apply curing compound, where allowed, immediately after removal of forms.
- 2. Horizontal Surfaces:
 - a. Method 1: Protect surface by water ponding for 7 days.
 - b. Method 2: Cover with burlap or cotton mats and keep continuously wet for 7 days.
 - c. Method 3: Cover with 1-inch layer of wet sand, earth, or sawdust, and keep continuously wet for 7 days.
 - d. Method 4: Continuously sprinkle exposed surface for 7 days.
 - e. Method 5: Apply curing compound, where allowed, immediately after final finishing when surface will no longer be damaged by traffic.

3.02 EVAPORATION RETARDANT APPLICATION

- A. Use on flatwork when environmental conditions are anticipated to cause rapid drying of the concrete surface. Do not use evaporation retardant on potable water structures, unless product is NSF 61 approved.
- B. Spray onto surface of fresh flatwork concrete immediately after screeding to react with surface moisture.
- C. Reapply as needed to ensure a continuous moist surface until final finishing is completed.

3.03 MANUFACTURER'S SERVICES

- A. Provide manufacturer's representative at Site for installation assistance, inspection, and certification of proper installation for products specified in accordance with Section 01 43 33, Manufacturers' Field Services.
- B. Provide curing compound manufacturer's representative to demonstrate proper application of curing compound to show coverage in one coat in accordance with Section 01 43 33, Manufacturers' Field Services.

END OF SECTION

SECTION 03 63 00
CONCRETE DOWELING

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).
 2. ASTM International (ASTM):
 - a. C881/C881M, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
 - b. E488, Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements.
 3. International Code Council (ICC):
 - a. 2024 International Building Code (IBC).
 - b. Evaluation Services Reports.

1.02 DEFINITIONS

- A. ICC Evaluation Services Report: Published by ICC for products provided by concrete adhesive anchor manufacturers.
- B. Special Inspection: As defined in the ICC IBC and indicated on the Statement of Special Inspection (Plan) on the Drawings.

1.03 SUBMITTALS

- A. Action Submittals:
1. Product Data: Manufacturer's catalog information.
- B. Informational Submittals:
1. Manufacturer's instructions for preparation, placement, drilling of holes, installation of anchors and adhesive, and handling of cartridges, nozzles, and equipment.
 2. ICC Evaluation Services Report: Specific to proposed doweling system manufacturer.

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1.04 DELIVERY, STORAGE, AND HANDLING

- A. Container Markings: Include manufacturer's name, product name, batch number, product expiration date, ANSI hazard classification, and appropriate ANSI handling precautions.
- B. Store adhesive components in accordance with manufacturer's written instructions.
- C. Dispose of when:
 - 1. Shelf life has expired.
 - 2. Stored other than per manufacturer's instructions.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Adhesive:
 - 1. Approved by an ICC Evaluation Services Report for conformance to 2024 IBC requirements for doweling of steel reinforcing bars in cracked concrete.
 - 2. Suitable for long-term loads as well as for wind and seismic loads.
 - 3. Meet requirements of ASTM C881/C881M.
 - 4. Two-component, insensitive to moisture, designed to be used in adverse freeze/thaw environments.
 - 5. Disposable, Self-Contained Cartridge System:
 - a. Capable of dispensing both components in proper mixing ratio.
 - b. Fit into manually or pneumatically operated caulking gun.
 - 6. Mixed Adhesive: Nonsag, light paste consistency with ability to remain in a 1-inch diameter overhead drilled hole without runoff.
 - 7. Manufacturers and Products:
 - a. Hilti, Inc., Tulsa, OK; HIT-RE 500 V3 (ESR-3814) or HIT-HY 200 (ESR 3187) Adhesive Anchors.
 - b. Powers Fasteners, Brewster, NY; Power PURE220+ Epoxy Adhesive Anchor System (ESR-5144).
 - c. Simpson Strong-Tie Co., Inc., Pleasanton, CA; SET-3G Epoxy Adhesive Anchors (ESR-4057).
- B. Mixing Nozzles: Disposable, manufactured in several sizes to accommodate size of reinforcing dowels.

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- C. Reinforcing Dowels: As specified in Section 03 01 32, Repair of Vertical and Overhead Concrete Surfaces.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Drilling Equipment:
 - 1. Drilling Hammers for Dowel Holes:
 - a. Electric or pneumatic rotary type with medium or light impact.
 - b. Hollow drills with flushing air systems are preferred.
 - 2. Where edge distances are less than 2 inches, use lighter impact equipment to prevent microcracking and concrete spalling during drilling process.
- B. Hole Diameter: Use drill bit diameter meeting ICC Evaluation Services Report requirements and as recommended by manufacturer.
- C. Obstructions in Drill Path: When existing steel reinforcement is encountered during drilling, obtain Engineer approval for proposed fix.
- D. Doweling:
 - 1. Install per details shown on the Drawings and in accordance with adhesive manufacturer's instructions.
 - 2. When using epoxy anchors, dowels may be prebent prior to installation to 15 degrees to align with other bars. Do not heat dowels to bend.
 - 3. Bent Bar Dowels: Where edge distances are critical and intersection with steel reinforcement or other obstruction is likely, slant drill to address edge distance or to clear obstruction. If drill must be slanted more than indicated in the manufacturer's installation instructions to clear obstruction, notify Engineer for direction on how to proceed.
- E. Adhesive:
 - 1. Install in accordance with written manufacturer's instructions.
 - 2. Dispense components through specially designed static mixing nozzle that thoroughly mixes components and places mixed adhesive at base of predrilled hole.

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3.02 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with IBC Chapter 17 requirements, is provided in the Statement of Special Inspection (Plan) on the Drawings. Contractor responsibilities and related information on special inspection and testing are included in Section 01 45 33, Special Inspection, Observation, and Testing.
1. Special inspection will be performed by the Special Inspector in accordance with ICC ESR requirements and as specified in Section 01 45 33, Special Inspection, Observation, and Testing.
 2. Continuous inspection required where noted on the Drawings and where concrete dowels are installed in overhead applications.
 3. Periodic inspection required where continuous inspection is not specified.
 4. Special Inspector will observe installation in accordance with requirements of the ICC Evaluation Services Report and will submit report including the following:
 - a. Product Description: Product name, rod diameter, and length.
 - b. Drill bit compliance.
 - c. Hole diameter, diameter, and depth and cleanliness.
 - d. Adhesive expiration date.
 5. Verification of dowel installation in accordance with manufacturer's published instructions.
- B. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16, Field Quality Control Procedures.

END OF SECTION

SECTION 03 64 23
EPOXY RESIN INJECTION GROUTING

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. ASTM International (ASTM):
 - a. C882, Standard Specification for Test Method for Bond Strength of Epoxy Resin System Used with Concrete by Slant Shear.
 - b. D570, Standard Test Method for Water Absorption of Plastics.
 - c. D638, Standard Test Method for Tensile Properties of Plastics.
 - d. D648, Standard Test Method for Deflection Temperature of Plastics under Flexural Load in the Edgewise Position.
 - e. D695, Standard Test Method for Compressive Properties of Rigid Plastics.
 - f. D790, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 2. National Sanitation Foundation (NSF):
 - a. Standard 60, Standard for Drinking Water Treatment and Chemicals – Health Effects.
 - b. Standard 61, Standard for Drinking Water System Components – Health Effects.

1.02 DEFINITIONS

- A. Crack: Complete or incomplete separation of concrete into two or more parts produced by breaking or fracturing.
- B. Defective Area: As defined in Section 03 01 32, Repair of Vertical and Overhead Concrete Surfaces.
- C. Hydraulic Structure: Liquid containment structure and/or structure designed to mitigate liquid infiltration.
- D. Injection: Method of bonding together, addressing or eliminating leakage through cracks or joints by installing resin under pressure to fill the void in crack or joint.

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- E. Joint: A planned and formed discontinuity in concrete structure at junction of adjacent and sequential concrete placements and may contain embedded waterstops.
- F. Leak or Leakage: Crack or joint exhibiting presence of moisture, sign of efflorescence, intermittently wet to touch, or continuous flow of liquid.
- G. Narrow Cracks: Width equal to or less than 0.015-inch.
- H. Wide Cracks: Wider than 0.015-inch.

1.03 SUBMITTALS

A. Action Submittals:

- 1. Physical and chemical properties for epoxy resin.
- 2. Technical data for metering, mixing, and injection equipment.
- 3. Depth of penetration, length, material used, and procedures where epoxy is approved for use.
- 4. Marked up drawings of proposed epoxy injection repair crack locations, widths, and lengths and direction on structure.
- 5. Sample bottle.
- 6. Pot Life Test.
- 7. Slant Shear Test (Bond Strength).

B. Informational Submittals:

- 1. Manufacturer's recommended surface preparation procedures and application instructions for epoxy resins.
- 2. Manufacturer's Certificate of Compliance in accordance with Section 01 43 33, Manufacturers' Field Services. Certified test results for each batch of epoxy resin.
- 3. Statements of Qualification for Epoxy Resin:
 - a. Manufacturer's Site representative.
 - b. Injection applicator.
 - c. Injection pump operating technician.
- 4. Sample of epoxy resin two component ratio and injection pressure test records for concrete crack repair work.
- 5. Installation instructions for repairing core holes with repair mortar.
- 6. Health and Safety Plans for confined space entry. Test results of epoxy resin bond tests.
- 7. Epoxy resin two component ratio and injection pressure test records for concrete crack repair work.

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1.04 QUALITY ASSURANCE

A. Qualifications for Injection Staffs:

1. Manufacturer's Site Representative:
 - a. Capable of instructing successful methods of epoxy injection process for concrete structure.
 - b. Understands and is capable of explaining technical aspects of correct material selection and use.
 - c. Experienced in operation, maintenance, and troubleshooting of application equipment.
2. Injection Crew and Job Foreman:
 - a. Provide written and verifiable evidence showing compliance with the following requirements:
 - 1) Licensed or certified by epoxy resin material manufacturer.
 - 2) Minimum 3 years' experience in successful epoxy injection for at least 10,000 linear feet of successful crack injection, including 2,000 linear feet of wet crack injection to stop water leakage.

B. Injected Epoxy Resin:

1. Fill cracks and joints with minimum resin depth penetration no less than 90 percent of:
 - a. Full thickness of concrete section for cracks or joints.
 - b. Depth between waterstop and inside face of structure for joints with an embedded waterstop.

C. Injected cracks and joints which leak must be considered deficient work irrespective of depth of penetration. Reinjection of deficient work or, with approval of Engineer, provide other repairs to eliminate leakage.

D. Bond Strength Test for Epoxy Resin:

1. Concrete failure before resin failure.
2. 1,500 pounds per square inch minimum bond strength per ASTM C882 test requirements with no failure of either concrete or epoxy resin.

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1.05 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping:

1. Package resin material in new sealed containers and label with following information:
 - a. Manufacturer's name.
 - b. Product name and lot number.

B. Storage and Protection: Store epoxy resin material containers in accordance with manufacturer's printed instructions and at ambient temperatures below 110 degrees F and above 45 degrees F.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Materials and accessories specified in this section must be products of:

1. BASF Construction Chemicals, LLC-Building Systems, Shakopee, MN; SCB Concrete Series products that meet properties indicated in sub-section 2.2.B.
2. Sika Corp., Lyndhurst, NJ; Sikadur Series products that meet properties below.
3. Euclid Chemical Co., Cleveland, OH; Euco Series (No. 452) products that meet properties below.

2.02 EPOXY INJECTION RESIN

A. Two-component A and B structural epoxy resin for injection into cracks or joints or other voids in concrete structures for bonding or grouting.

B. Uncured Resin Properties:

1. When mixed in ratio specified on resin container label:

	Test Method	Wide Cracks or Joints	Narrow Cracks or Joints
Pot Life (60-gram mass) @ 77, plus or minus 4 deg F	As specified in Article Source Quality Control	13 to 25 minutes	15 to 30 minutes
Pot Life (60-gram mass) @ 100, plus or minus 4 deg F	As specified in Article Source Quality Control	3 to 10 minutes	10 to 20 minutes

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	Test Method	Wide Cracks or Joints	Narrow Cracks or Joints
Viscosity @ 40, plus or minus 3 deg F	Brookfield RVT Spindle No. 4 @ 20 rpm	4,400 cps	600 cps
Viscosity @ 75 to 77 deg F	Brookfield RVT Spindle No. 2 @ 20 rpm	375 cps to 350 cps	175 cps to 140 cps

- C. Epoxy Resin Properties: When cured for 7 days at 77-degree F, plus or minus 3 degrees F and conditioned at test temperature 12 hours prior to test, unless otherwise specified.

	Test Method	Wide Cracks or Joints	Narrow Cracks or Joints
Ultimate Tensile Strength, psi	ASTM D368	8,000 min.	5,000 min.
Tensile Elongation @ Break, percent	ASTM D638	4.2 max.	3.0 max.
Flexural Strength, psi	ASTM D790	10,000 min.	10,000 min.
Flexural Modulus, psi	ASTM D790	5.5 x 10 ⁵ min.	4.5x10 ⁵ min.
Compressive Yield Strength, psi	ASTM D695*	15,000 min.	12,000 min.
Compressive Modulus, psi	ASTM D695*	4.0x10 ⁵ min.	4.0x10 ⁵ min.
Heat Deflection Temperature	ASTM D648*	130 deg F min.	140 deg F min.
Cured 3 days @ 40 deg F – Wet Concrete		3,500 psi min.	3,500 psi min.
Cured 1 day @ 77 deg F – Dry Concrete		5,000 psi min.	5,000 psi min.
Cured 3 days @ 77 deg plus or minus 3 deg F		5,000 psi min.	5,000 psi min.
*Cure test specimens so that peak exothermic temperature of resin does not exceed 100 degrees F.			
Note: See referenced specifications for preparation method of test specimens.			

2.03 SURFACE SEAL

- A. Sufficient strength and adhesion for holding injection fittings firmly in place and to resist pressures preventing leakage during injection.

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2.04 WATER

- A. Clean and free from oil, acid, alkali, organic matter, or other deleterious substances, meeting federal drinking water standards.

2.05 SAMPLE BOTTLE

- A. Five-inch natural wide mouth HDPE bottle or 4-ounce clear PVC cylinder bottle; supplied with caps.

2.06 SOURCE QUALITY CONTROL

- A. Test Requirements: Perform tests for each batch of epoxy resin.
- B. Pot Life Test:
 - 1. Condition Component A and Component B to required temperature.
 - 2. Measure components in ratio of Component B as stated on manufacturer's label into an 8-fluid ounce paper cup.
 - 3. Mix components for 60 seconds using non-metallic stirring instrument. Scrape sides and bottom of cup periodically.
 - 4. Probe mixture once with non-metallic stirring instrument every 30 seconds, starting 2 minutes prior to minimum specified pot life.
 - 5. Pot Life Definition: Time at which a soft stringy mass forms in center of cup.
- C. Slant Shear Test: Prepare specimens and perform tests in accordance with ASTM C882.

PART 3 EXECUTION

3.01 GENERAL

- A. Unless permitted otherwise, structurally repair cracks or joints listed below:
 - 1. Cracks considered to be defective as defined in Section 03 01 32, Repair of Vertical and Overhead Concrete Surfaces.
 - 2. All horizontal joints with leaks and dampness.
 - 3. All cracks caused by construction overloading.
- B. Do not proceed with injection work until submittals have been reviewed and approved by Engineer.

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- C. Perform cracks or joints injection work after removing defective surface materials and after performing surface preparation, but prior to applying surface repair material unless otherwise noted. See Section 03 01 32, Repair of Vertical and Overhead Concrete Surfaces, for concrete surface repair system.
- D. Width of cracks may vary along length and through thickness of concrete section.
- E. Remove all excess, unused epoxy resin materials on concrete surfaces exposed to view prior to end of Work.

3.02 EQUIPMENT

- A. Portable, positive displacement type pumps with in-line metering to meter and mix two epoxy resin components and inject mixture into cracks or joints.
- B. Pumps:
 - 1. Electric or air powered with interlocks providing positive ratio control of proportions for the two components at nozzle.
 - 2. Primary injection pumps for each material of different mix ratio, including a standby backup pump of similar ratio.
 - 3. Capable of immediate compensation for changes in resins.
 - 4. Do not use batch mix pumps.
- C. Discharge Pressure: Automatic pressure controls capable of discharging mixed epoxy resin at pressures in accordance with epoxy resin manufacturer's printed instruction and able to maintain pressure.
- D. Automatic Shutoff Control: Provide sensors on both Component A and Component B reservoirs for stopping machine automatically when only one component is being pumped to mixing head.
- E. Proportioning Ratio Tolerance: Maintain epoxy resin manufacturer's prescribed mix ratio within a tolerance of plus or minus 5 percent by volume at discharge pressure up to 160 pounds per square inch.
- F. Ratio/Pressure Check Device:
 - 1. Two independent valve nozzles capable of controlling flow rate and pressure by opening or closing valve to restrict material flow.
 - 2. Pressure gauge capable of sensing pressure behind each valve.

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3.03 PREPARATION

- A. Free cracks or joints from loose matter, dirt, laitance, oil, grease, efflorescence, salt, and other contaminants.
- B. Clean cracks or joints in accordance with epoxy resin manufacturer's instructions.
- C. Clean surfaces adjacent to cracks or joints from dirt, dust, grease, oil, efflorescence, and other foreign matter detrimental to bond of surface seal system and to expose the full extent of cracks and joints in accordance with manufacturer's printed instruction.
- D. Do not use acids and corrosives for cleaning, other than those specified herein unless neutralized prior to injecting epoxy resin.
- E. During installation and curing of materials, if ambient temperature is expected to drop below manufacturer's recommended minimum temperature, provide enclosures and heat as required.
- F. Provide work platforms as required.
- G. Dry out cracks or joints if required by manufacturer's instructions.

3.04 APPLICATION

- A. All liquid is to be removed from hydraulic structure prior to commencing with epoxy injection, unless approved otherwise.
- B. Entry Ports:
 - 1. Establish openings for epoxy resin entry in surface seal along crack.
 - 2. Determine space between entry ports equal to thickness of concrete member to allow epoxy resin to penetrate to the full thickness of the member.
 - 3. Drill injection holes at an angle between 45 degrees and 60 degrees from surface of concrete and perpendicular to alignment of cracks or joints, to intersect crack or joint at midpoint of concrete section, and intersect joints at midpoint between waterstop and interior concrete surface, except as noted otherwise.
 - 4. Locate drill holes on alternate sides of crack or joint where possible, unless orientation of crack or joint is known or has been verified by non-destructive testing techniques or core drilling.
 - 5. Drill Hole Spacing: Do not to exceed concrete thicknesses or 12 inches maximum, except as noted otherwise.

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6. Adjust location and angle of drill holes to suit orientation of crack or joint and at commencement of drilling holes for injection.
7. Take measures to prevent drilling holes for injection too shallow or too deep, or damaging existing waterstop in joints.
8. Remove dust and debris in drill holes and on surface of structure resulting from drilling operation, by flushing with water prior to installing the injection packers or ports.
9. Space entry ports closer together to allow adjustment of injection pressure to obtain minimum loss of epoxy to soil at locations where:
 - a. Cracks or joints extend entirely through concrete element.
 - b. Backfill of walls on one side.
 - c. Slab-on-grade.
 - d. Difficult to excavate behind wall to seal both surfaces of crack.
10. Install injection packers or ports in drill holes in accordance with manufacturer's printed instructions with zerk coupling or other one-way ball or check valve, to permit testing for watertightness of cracks and joints.

C. Application of Surface Seal along Cracks and Joints:

1. Apply surface seal in accordance with manufacturer's instructions to designated cracks and joints face prior to injection. Seal surface of cracks or joints to contain and prevent escape of injection epoxy.
2. Cure surface seal in accordance with manufacturer's printed instructions before commencing inject work.

D. Epoxy Injection:

1. Ensure zerk coupling is not installed in ports or packers next to the one being injected.
2. Start injection into each crack or joint at lowest elevation entry port or packer along vertical or diagonal crack or joint, and at one end of horizontal crack or joint.
3. Where injection entry ports or packers are used, continue injection at first port or packer until resin begins to flow out of port or packer at next highest elevation. Plug first port or packer and start injection at second port or packer until resin flows from next port or packer.
4. Inject entire crack or joint with same sequence.
5. At no time inject more than 6 feet length of first vertical crack or joint before verifying resin in sample bottle has start to set and cure.

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6. Prior to commencing injection work along a horizontal crack or joint in structure when processed using ports or packers with zerk couplings are used, remove zerk couplings from injection ports or packers except for two ports or packers located where injection work will commence. Commence injection work in first two ports or packers. Once clean resin is vented from third injection port or packer, cease injection at first port or packer, and install zerk coupling and commence injection at third port or packer. Repeat process for fourth and subsequent ports or packers until full length of crack or joint has been injected.

E. Finishing:

1. Allow epoxy resin to cure in accordance with manufacturer's instruction after cracks or joints have been completely injected to allow surface seal removal without draining or runback of uncured epoxy resin material from cracks or joints.
2. Remove surface seal and injection packers or ports from cured injection resin along crack.
3. Finish crack or joint faces flush with adjacent concrete.
4. Indentations or protrusions caused by placement of entry ports, packers, drill holes, or damage from removal of surface seal is not acceptable.
5. Grind off protrusions and patch indentations and holes from injection packers and entry ports with a suitable patch material to satisfaction of Engineer.
6. Remove surplus surface seal material splatters and injection resin material runs and spills from concrete surfaces.

3.05 FIELD QUALITY CONTROL

A. Epoxy Resin Two Component Ratio Tests:

1. Disconnect mixing head and pump two resin components simultaneously through ratio check device.
2. Adjust discharge pressure to 160 pounds per square inch for both resin components.
3. Simultaneously discharge both resin components into separate calibrated containers.
4. Compare amounts simultaneously discharged into calibrated containers during same time period to determine mix ratio.
5. Complete test at 160 pounds per square inch discharge pressure and repeat procedure for 0-pound per square inch discharge pressure.

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6. Run ratio test for each injection unit at beginning and end of each injection work day, and when injection work has stopped for more than 1-hour.
7. Document and maintain complete accurate records of ratios and pressure checks.

B. Injection Pressure Test:

1. Disconnect mixing head of injection equipment and connect two resin component delivery lines to pressure check device.
2. Pressure Check Device:
 - a. Two independent valved nozzles capable of controlling flow rate and pressure by opening or closing of valve.
 - b. Pressure gauge capable of sensing pressure buildup behind each valve.
3. Close valves on pressure check device and operate equipment until gauge pressure on each line reads 160 pounds per square inch.
4. Stop pumps and observe pressure; do not allow pressure gauge to drop below 150 pounds per square inch within 3 minutes.
5. Run pressure test for each injection equipment unit:
 - a. Beginning and end of each injection work day.
 - b. When injection work stop for more than 45 minutes.
6. Check tolerance to verify equipment capable of meeting specified ratio tolerance.

C. Bottled Sample Tests:

1. During injection operation, provide at least one sample of mixed epoxy resin for each injection pump per shift per injection work day in a sample bottle.
2. Provide sufficient sample to demonstrate sample material epoxy resin will set and cure correctly.
3. Label each bottled sample with Contractor's name, date, and time sample was taken, and location in structure where sample was taken. Record details of bottle sample tests.
4. Place filled sample bottle upright in a container and allow sample to cure.
5. After sample has been allowed to cure, cut bottled sample open and visually inspect contents to verify that epoxy resin material has completely reacted and cured.

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6. Evaluation and Assessment of Test:
 - a. Should bottled sample(s) indicate a problem; such as epoxy resin not cured or foreign liquid in sample bottle, take verifying core sample immediately from cracks or joints, where material was used.
 - b. Should above-referenced bottle sample(s) and core sample(s) indicate a problem with epoxy resin, arrange to have a Technical Representative of the epoxy resin manufacturer come to Site to review bottled sample(s) and core drilled sample(s) with Engineer and provide technical advice on corrective measures.
 - c. Carry out further investigation work or corrective measures recommended by Technical Representative of epoxy resin manufacturer.

END OF SECTION

SECTION 03 64 24
POLYURETHANE INJECTION GROUTING

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards that may be referenced in this section:
1. ASTM International (ASTM):
 - a. D638, Standard Test Method for Tensile Properties of Plastics.
 - b. D1622, Standard Test Method for Apparent Density of Rigid Cellular Plastics.
 - c. D1623, Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
 - d. D3574, Standard Test Method for Flexible Cellular Material Slab, Bonded, and Molded Urethane Foams.
 2. National Sanitation Foundation (NSF):
 - a. Standard 60, Standard for Drinking Water Treatment and Chemicals—Health Effects.
 - b. Standard 61, Standard for Drinking Water System Components—Health Effects.

1.02 DEFINITIONS

- A. Crack: Complete or incomplete separation of concrete into two or more parts produced by breaking or fracturing.
- B. Injection: Method of bonding together; method of addressing or eliminating leakage through cracks or joints by installing polymer under pressure to fill the void in crack or joint.
- C. Joint: Planned and formed discontinuity in concrete structure at junction of adjacent and sequential concrete placements, and may contain embedded waterstops.
- D. Leak or Leakage: Crack or joint exhibiting moisture, sign of efflorescence, intermittent wet to touch, or continuous flow of liquid.
- E. Narrow Cracks: Width equal to or less than 0.015-inch.
- F. Wide Crack: Wider than 0.015-inch.

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1.03 SUBMITTALS

A. Action Submittals:

1. Physical and chemical properties for polyurethane injection resin.
2. Technical data for metering, mixing, and injection equipment.
3. Submit:
 - a. Marked up drawings showing locations of proposed polyurethane injection work, including the following:
 - 1) Exact locations for injection.
 - 2) Depth of penetration or crack.
 - 3) Width of crack measured every 4 feet minimum.
 - 4) Length of penetration or crack.
 - b. Proposed materials.
 - c. Injection procedure, including the following:
 - 1) Preparation of penetration for polyurethane.
 - 2) Fittings for installation for injection.
 - 3) Temperature of installation.
 - 4) Measurement and monitoring of injection pressure.
 - 5) Surface cleaning and repair.
4. Sample bottle.

B. Informational Submittals:

1. Manufacturer's recommended surface preparation procedures and application instructions for polyurethane resin injection.
2. Manufacturer's Certificate of Compliance in accordance with Section 01 43 33, Manufacturers' Field Services. Certified test results for each batch of polyurethane.
3. Statements of Qualification for Polyurethane Resin Injection:
 - a. Manufacturer's Site representative.
 - b. Injection applicator.
 - c. Injection pump operating technician.
4. Sample of polyurethane resin mix ratio and injection pressure test records for concrete crack and joint injection work.
5. Installation instructions for repairing core holes with repair mortar.
6. Polyurethane resins injection pressure test records for concrete crack and joint injection work.

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1.04 QUALITY ASSURANCE

A. Qualifications for Injection Staff:

1. Manufacturer's Site Representative:
 - a. Capable of instructing successful methods of polyurethane injection process for concrete structures.
 - b. Understands and is capable of explaining technical aspects of correct material selection and use.
 - c. Experienced in the operation, maintenance, and troubleshooting of application equipment.
2. Injection crew and job foreman must provide written and verifiable evidence showing compliance with the following requirements:
 - a. Licensed or certified by polyurethane resin manufacturer.
 - b. Minimum 3 years' experience in successful polyurethane injection.

1.05 PERFORMANCE REQUIREMENTS

- A. Injected polyurethane resin must fill cracks and joints, and in no case must depth of penetration of injection material be less than 90 percent of:
 1. Full thickness of the concrete section for cracks.
 2. Depth between the waterstop and the inside face of the structure for joints.
- B. In cured state, injected polyurethane resin forms a dense rubber-like closed cell flexible foam compression gasket-type seal material.
- C. Notwithstanding the foregoing, injected cracks or joints which exhibit leakage are considered deficient work irrespective of the depth of penetration observed in quality control core drilled samples. Reinject deficient work as required to meet the performance requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping:

1. Package adhesive material in new sealed containers and label with following information:
 - a. Manufacturer's name.
 - b. Product name and lot number.

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- B. Storage and Protection: Store polyurethane resin material containers in accordance with manufacturer's printed instructions or in the absence of such information at ambient temperatures below 110 degrees F and above 68 degrees F.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sika Corp., Lyndhurst, NJ; SikaFix HH Hydrophilic.
- B. Euclid Chemical Co., Cleveland, OH; DURAL Aqua-Fil.
- C. Prime Resins, Inc., Conyers, GA; Prime Flex 900 XLV.

2.02 POLYURETHANE RESIN

- A. Single-component, water-activated, hydrophilic polyurethane injection resin.
- B. Elongation: Minimum 350 percent, in accordance with ASTM D3574 or ASTM D638 test method.
- C. Tensile Strength: Minimum 150 pounds per square inch, in accordance with ASTM D3574 or ASTM D638 test method.

2.03 SURFACE SEAL

- A. Provide seal with sufficient strength and adhesion for holding injection fittings firmly in place, and to resist pressures preventing leakage during injection.
- B. Capable of removal after injection resin has cured.

2.04 WATER

- A. Clean and free from oil, acid, alkali, organic matter, or other deleterious substances, meeting federal drinking water standards.

2.05 SAMPLE BOTTLE

- A. 5 inches natural wide mouth HDPE bottle or 4 ounces clear PVC cylinder bottle, supplied with caps.

2.06 SOURCE QUALITY CONTROL

- A. Test Requirements: Perform tests for each batch of polyurethane resins.

PART 3 EXECUTION

3.01 GENERAL

- A. Use of polyurethane injection must be limited to locations as determined by Structural Engineer.
- B. Do not proceed with injection work until action submittals have been reviewed and approved by the Structural Engineer of Record.
- C. Perform injection work after performing surface preparation.
- D. Width of the cracks shown may vary along the length and through the thickness of the concrete section.
- E. Remove all excess unused polyurethane resins materials inside the structure prior to the end of the work.

3.02 EQUIPMENT

- A. Portable, positive displacement type pumps with in-line metering to meter mixed components, and inject mixture into crack or joint.
- B. Pumps: Positive displacement type pump.
- C. Discharge Pressure: Automatic pressure controls capable of discharging mixed polyurethane resin at pressures in accordance with polyurethane resin manufacturer's printed instructions, and able to maintain such pressure.
- D. Proportioning Ratio Tolerance: Maintain polyurethane manufacturer's prescribed mix ratio within a tolerance in accordance with polyurethane resin manufacturer's printed instructions.
- E. Pressure gauge capable of sensing pressure behind valve.

3.03 PREPARATION

- A. Free cracks and joints from loose matter, dirt, laitance, oil, grease, salt, and other contaminants.
- B. Clean cracks and joints in accordance with polyurethane resins manufacturer's printed instructions.

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- C. Clean surfaces adjacent to cracks and joints from dirt, dust, grease, oil, efflorescence, encrustation, and other foreign matter detrimental to bond of surface seal system and to expose the full extent of cracks and joints in accordance with manufacturer's printed instructions.
- D. Do not use acids and corrosives for cleaning, other than those specified herein, unless neutralized prior to injecting polyurethane resin.
- E. During installation and curing of materials, if the ambient temperature is expected to drop below the manufacturer's recommended minimum temperature, provide enclosures and heat as required.
- F. Provide work platforms as required.

3.04 APPLICATION

A. Injection Ports:

1. Drill holes must be installed along cracks and joints designated for injection as required to meet the performance requirements for injection.
2. The requirements for installing drill holes for injection provided below represent acceptable minimum standards of practice.
3. Drill holes for injection at an angle between 45 degrees and 60 degrees from the surface of the concrete and perpendicular to the cracks or joints alignment, to intersect the cracks at the midpoint of the concrete section, and intersect the joints at the midpoint between the waterstop and interior concrete surface, except as noted otherwise.
4. Locate drill holes on alternate sides of the crack or joint where possible, unless orientation of the crack or joint is known or has been verified by nondestructive testing techniques or core drilling.
5. The spacing of drill holes not to exceed the concrete thickness or 12 inches (maximum), except as noted otherwise.
6. Adjust location and angle of drill holes to suit orientation of crack or joint and at required angle, such as using a template, during the Work especially at the commencement of drilling holes for injection.
7. Take measures to prevent drilling holes for injection too shallow, or too deep, and/or damaging the existing waterstop in the joints. Shallow hole injections lead to concrete spalls. Repair spalls at Contractor's expense.
8. Remove dust and debris in drill holes and on interior surface of the structure resulting from drilling operation, by flushing with water prior to installing injection packers or ports.

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9. Install injection packers or ports in drill holes in accordance with manufacturer's printed instructions with zerk coupling, or other one-way ball or check valve, to permit testing for watertightness and acid flushing of cracks and joints.

B. Application of Surface Seal Along Cracks and Joints:

1. Apply surface seal along the length of the cracks and joints designated for injection on the top side and underside of slabs, or both sides of walls, where possible in order to contain, confine, and prevent escape of the injected polyurethane resin, in accordance with manufacturer's printed instructions.
2. Cure the surface seal in accordance with the material's manufacturer's printed instructions.

C. Polyurethane Injection of Cracks and Joints:

1. Inject polyurethane resins, mixed with accelerator or in a neat form, into cracks and joints in a sequential manner, and reinjection as required, to meet the performance requirements.
2. Start injection into each crack or joint at lowest elevation entry port for vertical or diagonal cracks and joints and at one end for horizontal cracks and joints in vertical structure. Continue injection at first port until pure uncontaminated resin begins to flow out of next port. Plug first port and start injection at second port until polyurethane resin flows from next port. Inject crack or joint in a sequential manner until the full length of the crack or joint has been injected. At no time inject more than 6 feet length of vertical crack or joint before verifying that the first 12 inches of injected crack or joint is set and cured.
3. Prior to commencing the injection work along a crack or joint in horizontal structure when packers with zerk couplings are used, remove the zerk couplings from the injection packers or ports except for the two packers located where the injection work will commence. Commence injection work in the first two packers. Once clean resin is vented from the third injection packer, cease injection at the first packer, and install the zerk coupling and commence injection at the third packer. Repeat the process for the fourth and subsequent packers until the full length of the crack or joint has been injected.

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D. Finishing:

1. Cure polyurethane resins after crack or joints has been completely filled without draining or runback of polyurethane resin material from crack or joints.
2. Remove surface seal and injection packers or ports from along the crack or joints.
3. Finish surface flush and to match surrounding concrete.
4. Indentations or protrusions caused by placement of entry ports drill holes, or damage from removal of surface seal, is not acceptable.
5. Grind off protrusions, and patch indentations and holes from packers and ports with a suitable patch material to the satisfaction of the Engineer.
6. Remove surplus surface seal material on splatters and injection material runs and spills from concrete surfaces.

3.05 FIELD QUALITY CONTROL

A. Injection Pressure Test:

1. Disconnect mixing head of injection equipment and connect polyurethane component delivery line to pressure check device.
2. Pressure Check Device:
 - a. Two independent valved nozzles capable of controlling flow rate and pressure by opening or closing of valve.
 - b. Pressure gauge capable of sensing pressure buildup behind each valve.
3. Close valves on pressure check device and operate equipment until gauge pressure on each line reads 160 pounds per square inch.
4. Stop pumps and observe pressure; do not allow pressure gauge to drop below 150 pounds per square inch within 3 minutes.
5. Run pressure Test for Each Injection Equipment Unit:
 - a. Beginning and end of each injection work day.
 - b. When injection work has stopped for more than 45 minutes.
6. Check tolerance to verify equipment capable of meeting specified ratio tolerance.

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B. Bottled Samples:

1. During the injection operation, provide at least one sample of the mixed polyurethane injection resins per shift per injection pump in a sample bottle.
2. Half fill each sample bottle, containing a small amount of water (5 percent by volume) with polyurethane injection resin material from the pump discharge hose. Swirl or lightly shake sample to thoroughly mix resin with the water. When foaming rises near the top of the bottle, install the cap to contain the expanding resin material.
3. Label each bottled sample with Contractor's name, date and time sample was taken, and location in structure where sample was taken. Maintain a log of bottle samples.
4. Place filled sample bottle upright in a box or pail and allow sample to cure.
5. After sample cured, cut bottled sample open and visually inspect contents to verify that polyurethane injection resins material has completely reacted and cured.
6. Evaluation and Assessment of Test:
 - a. If a bottled sample(s) indicates a problem with the polyurethane injection resins, such as polyurethane resin not cured; take verifying core sample immediately from the cracks or joints, where the material was used.
 - b. If the above-referenced bottle sample(s) and core sample(s) indicate a problem with the polyurethane injection resins, have a Technical Representative of the polyurethane injection resins manufacturer come to site to review bottled sample(s) and core drilled sample(s) with Engineer and provide technical advice on corrective measures.
 - c. Carry out further investigation work or corrective measures recommended by the Technical Representative of the polyurethane injection resins manufacturer.

C. Visual Inspection:

1. Confirm injection of polyurethane has stopped the leaking material.
2. Confirm installation of material is in accordance with manufacturers' requirements.
3. Confirm installation of material is not damaging concrete.

END OF SECTION

SECTION 05 05 19
POST-INSTALLED ANCHORS

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Concrete Institute (ACI):
 - a. 318, Building Code Requirements for Structural Concrete.
 - b. 355.2, Qualification of Post-Installed Mechanical Anchors in Concrete.
 - c. 355.4, Qualification of Post-Installed Adhesive Anchors in Concrete.
 2. American Iron and Steel Institute (AISI): Stainless Steel Type 316.
 3. American National Standards Institute (ANSI).
 4. ASTM International (ASTM):
 - a. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - b. A193/A193M, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications.
 - c. A194/A194M, Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
 - d. E488/E488M, Standard Test Methods for Strength of Anchors in Concrete Elements.
 - e. F436/F436M, Standard Specification for Hardened Steel Washers.
 - f. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - g. F594, Standard Specification for Stainless Steel Nuts.
 - h. F1554, Standard Specification for Anchor Bolts, Steel, 36-ksi, 55-ksi, and 105-ksi Yield Strength.
 5. International Association of Plumbing and Mechanical Officials Uniform ES (IAPMO-UES): Evaluation Reports for Concrete and Masonry Anchors.
 6. International Code Council Evaluation Service (ICC-ES):
 - a. Evaluation Reports for Concrete and Masonry Anchors.
 - b. AC193, Acceptance Criteria for Mechanical Anchors in Concrete Elements.

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- c. AC308, Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements. Evaluation Reports for Concrete and Masonry Anchors.
- 7. Specialty Steel Industry of North America (SSINA):
 - a. Specifications for Stainless Steel.
 - b. Design Guidelines for the Selection and Use of Stainless Steel.
 - c. Stainless Steel Fabrication.
 - d. Stainless Steel Fasteners.

1.02 DEFINITIONS

- A. Corrosive Area: Containment area or area exposed to delivery, storage, transfer, or use of chemicals.
- B. Exterior Area: Location not protected from weather by a building or other enclosed structure to include buried roof structures.
- C. Interior Dry Area: Location inside building or structure where floor is not subject to liquid spills or wash down, and where wall or roof slab is not common to a water-holding or earth-retaining structure.
- D. Interior Wet Area: Location inside building or structure where floor is sloped to floor drains or gutters and is subject to liquid spills or wash down, or where wall, floor, or roof slab is common to a water-holding or earth-retaining structure.
- E. Submerged: Location at or below top of wall of open water-holding structure, such as a basin or channel, or wall, ceiling, or floor surface inside a covered water-holding structure, or exterior belowgrade wall or roof surface of water-holding structure, open or covered.

1.03 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings: Specific instructions for concrete anchor installation, including drilled hole size and depth, preparation, placement, procedures, and instructions for safe handling of anchoring systems.
- B. Informational Submittals:
 - 1. Concrete Anchors:
 - a. Manufacturer's product description and installation instructions.
 - b. Current ICC-ES or IAPMO-UES Report for each type of post-installed anchor to be used.

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2. Passivation method for stainless steel members.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Installers of adhesive anchors horizontally or upwardly inclined to support sustained tension loads must be certified by an applicable certification program. Certification must include written and performance tests in accordance with the ACI/CRSI Adhesive Installer Certification Program or equivalent.
2. Galvanized Coating Applicator: Company specializing in hot-dip galvanizing after fabrication and following procedures of Quality Assurance Manual of the American Galvanizers Association.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Package stainless steel items in a manner to provide protection from carbon impregnation.
- B. Protect hot-dip galvanized finishes from damage because of metal banding and rough handling.

PART 2 PRODUCTS

2.01 GENERAL

- A. Unless otherwise indicated, meet the following requirements:

Item	ASTM Reference
Stainless Steel:	
Threaded Rods	F593, AISI Type 316, Condition CW
Nuts*	F594, AISI Type 316, Condition CW
Carbon Steel:	
Threaded Rods	F1554, Grade 36 A193/A193M, Grade B7
Flat and Beveled Washers (Hardened)	F436/F436M
Nuts*	A194/A194M, Grade 2H

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Item	ASTM Reference
Galvanized Steel:	
All	A153/A153M
*Nuts of other grades and styles having specified proof load stresses greater than specified grade and style are also suitable. Nuts must have specified proof load stresses equal to or greater than minimum tensile strength of specified threaded rod.	

- B. Bolts, Washers, and Nuts: Use stainless steel, hot-dip galvanized steel, and zinc-plated steel material types as indicated in Fastener Schedule at the end of this section.

2.02 POST-INSTALLED CONCRETE ANCHORS

A. General:

1. AISI Type 316 stainless, hot-dip galvanized or zinc-plated steel, as shown in Fastener Schedule at the end of this section.
2. Post-installed anchor systems used in concrete must be approved by ICC Evaluation Services Report or equivalent for use in cracked concrete and for short-term and long-term loads including wind and earthquake.
3. Mechanical Anchors: Comply with the requirements of ICC-ES AC193 or ACI 355.2.
4. Adhesive Anchors: Comply with the requirements of ICC-ES AC308 or ACI 355.4.

B. Torque-Controlled Expansion Anchors (Wedge Anchors):

1. Manufacturers and Products:
 - a. Hilti, Inc., Tulsa, OK; KWIK Bolt-TZ2 Expansion Anchor Safe Set System with hollow drill bit and vacuum and SI-AT-A22 tool with adaptive torque for applicable sizes (ESR-4266).
 - b. DeWalt/Powers Fasteners, Brewster, NY; Power-Stud +SD1, +SD2, +SD4, or +SD6 Anchors (ESR-2502 and ESR-2818).
 - c. Simpson Strong-Tie Co., Inc., Pleasanton, CA; Strong-Bolt 2 Anchors (ESR-1771 and ESR-3037).

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C. Self-Tapping Concrete Screw Anchors:

1. Do not use for equipment anchorage unless specifically shown on the Drawings.
2. Manufacturers and Products:
 - a. DeWalt/Powers Fasteners, Brewster, NY; Screw-Bolt+ (ESR-3889).
 - b. DeWalt/Powers Fasteners, Brewster, NY; Hangermate+ Rod Hanger Screw Anchor (ESR-3889).
 - c. DeWalt/Powers Fasteners, Brewster, NY; Snake+ Flush Mount Screw Anchor (ESR-2272).
 - d. Hilti, Inc., Tulsa, OK; Kwik HUS, KH-EZ, KH-EZ CRC, KH-EZ SS316, KH-EZ C, KH-EZ E, KH-EZ I, and KH-EZ P Screw Anchor Safe Set System with hollow drill bit and vacuum (ESR-3027).
 - e. Simpson Strong-Tie Co., Inc., Pleasanton, CA; Titen HD Screw Anchor (ESR-2713 and IAPMO UES-493).

D. Adhesive Anchors:

1. Threaded Rod:
 - a. Diameter as shown on the Drawings.
 - b. Length as required to provide minimum depth of embedment indicated and thread projection required.
 - c. Clean and free of grease, oil, or other deleterious material.
2. Adhesive:
 - a. Two-component, insensitive to moisture, designed to be used in adverse freeze/thaw environments.
 - b. Cure Temperature, Pot Life, and Workability: Compatible for intended use and anticipated environmental conditions.
3. Packaging and Storage:
 - a. Disposable, self-contained system capable of dispensing both components in proper mixing ratio and fitting into a manually or pneumatically operated caulking gun.
 - b. Store adhesive on pallets or shelving in a covered storage area.
 - c. Package Markings: Include manufacturer's name, product name, batch number, product expiration date, ANSI hazard classification, and appropriate ANSI handling precautions.
 - d. Dispose of When:
 - 1) Shelf life has expired.
 - 2) Stored other than in accordance with manufacturer's instructions.

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4. Manufacturers and Products:
 - a. Hilti, Inc., Tulsa, OK; HIT Doweling Anchor System, HIT-HY 200 V3 Safe Set System with HAS threaded rod (ESR-4868), HIT-RE 500 V3 Safe Set System with HAS threaded rod (ESR-3814), or HIT-RE 500 V3 Safe Set System with Hilti Roughening Tool (HIT-RT) with HAS threaded rod (ESR-3814) for diamond cored holes.
 - b. Simpson Strong-Tie Co., Inc., Pleasanton, CA; SET-3G Epoxy Adhesive Anchors. (ESR-4057).
 - c. DeWalt/Powers Fasteners, Brewster NY; Pure 220+ Epoxy adhesive anchor system with Dust X+ System (ESR-5144).
- E. Adhesive Threaded Inserts:
 1. Type 316 stainless steel, internally threaded inserts.
 2. Manufacturer and Product: Hilti, Inc., Tulsa, OK; HIS-RN Insert with HIT-RE 500 V3 or HIT-HY 200 adhesive.

PART 3 EXECUTION

3.01 CONCRETE ANCHORS

- A. Begin installation only after concrete to receive anchors is a minimum of 21 days old or has attained design strength whichever requires a longer duration.
- B. Locate existing reinforcing with ground penetrating radar or other method approved by the Engineer prior to drilling. Coordinate with the Engineer to adjust anchor locations where installation would result in hitting reinforcing.
- C. Install in accordance with written manufacturer's instructions.
- D. Provide minimum embedment, edge distance, and spacing as indicated on the Drawings.
- E. Use only drill type, bit type, and diameter recommended by anchor manufacturer. Use rotary hammer drill unless otherwise approved by the Engineer. Core drilling may only be used if specifically allowed by the Engineer.
- F. Clean hole of debris and dust per manufacturer's requirements.

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- G. When unidentified embedded steel, rebar, or other obstruction is encountered in drill path, slant drill to clear obstruction. If drill must be slanted more than indicated in manufacturer's installation instructions to clear obstruction, notify the Engineer for direction on how to proceed.
- H. Adhesive Anchors:
 - 1. Unless otherwise approved by the Engineer and adhesive manufacturer:
 - a. Do not install adhesive anchors when temperature of concrete is below 40 degrees F or above 100 degrees F.
 - b. Do not install prior to concrete attaining an age of 21 days.
 - c. Remove any standing water from hole with oil-free compressed air. Inside surface of hole must be dry.
 - d. Do not disturb anchor during recommended curing time.
 - e. Do not exceed maximum torque as specified in manufacturer's instructions.
 - 2. Prestressed Concrete: Do not use drilled-in anchors in prestressed or post-tensioned concrete members without the Engineer's prior approval unless specifically shown on the Drawings.

3.02 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with IBC Chapter 17 requirements, is provided in the Statement of Special Inspections Plan as shown on the Drawings. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.
- B. Contractor-Furnished Quality Control: Inspection and testing as required in Section 01 45 16, Field Quality Control Procedures.

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3.03 FASTENER SCHEDULE

A. Unless indicated otherwise on the Drawings, provide fasteners as follows:

Service Use and Location	Product	Remarks
1. Post-Installed Anchors for Metal Components to Cast-in-Place Concrete (such as, Ladders, Handrail Posts, Electrical Panels, Platforms, and Equipment)		
Submerged, Exterior, Interior Wet, and Corrosive Areas	Stainless steel adhesive anchors	Verify product acceptability and manufacturer's requirements if anchor installation will occur in an overhead application
2. All Others		
All service uses and locations	Stainless steel fasteners	

B. Antiseizing Lubricant: Use on all stainless steel threads.

C. Do not use adhesive anchors to support fire-resistive construction or where ambient temperature will exceed 120 degrees F.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. The Aluminum Association, Inc. (AA): The Aluminum Design Manual.
 2. American Galvanizers Association (AGA):
 - a. Inspection of Hot-Dip Galvanized Steel Products.
 - b. Quality Assurance Manual.
 3. American Iron and Steel Institute (AISI): Stainless Steel Types.
 4. American National Standards Institute (ANSI).
 5. American Society of Safety Engineers (ASSE): A10.11, Safety Requirements for Personnel and Debris Nets.
 6. ASTM International (ASTM):
 - a. A36/A36M, Standard Specification for Carbon Structural Steel.
 - b. A48/A48M, Specification for Gray Iron Castings.
 - c. A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - d. A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
 - e. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - f. A143/A143M, Standard for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
 - g. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - h. A193/A193M, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
 - i. A194/A194M, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
 - j. A240/A240M, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - k. A276, Standard Specification for Stainless Steel Bars and Shapes.
 - l. A283/A283M, Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.

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- m. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 pounds per square inch Tensile Strength.
- n. A325, Standard Specification for Structural Bolts, Steel, Heat Treated 120/105 ksi Minimum Tensile Strength.
- o. A380, Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.
- p. A384/A384M, Standard Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies.
- q. A385/A385M, Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
- r. A489, Standard Specification for Carbon Steel Lifting Eyes.
- s. A500/A500M, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- t. A501, Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- u. A563, Standard Specification for Carbon and Alloy Steel Nuts.
- v. A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- w. A780/A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- x. A786/A786M, Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
- y. A793, Standard Specification for Rolled Floor Plate, Stainless Steel.
- z. A967, Standard Specification for Chemical Passivation Treatments for Stainless Steel Parts.
- aa. A992/A992M, Standard Specification for Structural Steel Shapes.
- bb. A1085, Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS).
- cc. B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- dd. B308/B308M, Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.
- ee. B429/B429M, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
- ff. B632/B632M, Standard Specification for Aluminum-Alloy Rolled Tread Plate.

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- gg. C881/C881M, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
- hh. D1056, Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.
- ii. F436, Standard Specification for Hardened Steel Washers.
- jj. F468, Standard Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use.
- kk. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
- ll. F594, Standard Specification for Stainless Steel Nuts.
- mm. F844, Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.
- nn. F1554, Standard Specification for Anchor Bolts, Steel, 36-ksi, 55-ksi, and 105-ksi Yield Strength.
- 7. American Welding Society (AWS):
 - a. D1.1/D1.1M, Structural Welding Code - Steel.
 - b. D1.2/D1.2M, Structural Welding Code - Aluminum.
 - c. D1.6/D1.6M, Structural Welding Code - Stainless Steel.
- 8. Specialty Steel Industry of North America (SSINA):
 - a. Specifications for Stainless Steel.
 - b. Design Guidelines for the Selection and Use of Stainless Steel.
 - c. Stainless Steel Fabrication.
 - d. Stainless Steel Fasteners.

1.02 DEFINITIONS

- A. Anchor Bolt: Cast-in-place anchor; concrete or masonry.
- B. Corrosive Area: Containment area or area exposed to delivery, storage, transfer, or use of chemicals. Corrosive area includes areas exposed to corrosive atmosphere such as hydrogen sulfide from wastewater.
- C. Exterior Area: Location not protected from weather by building or other enclosed structure.
- D. Interior Dry Area: Location inside building or structure where floor is not subject to liquid spills or washdown, nor where wall or roof slab is common to a water-holding or earth-retaining structure.
- E. Interior Wet Area: Location inside building or structure where floor is sloped to floor drains or gutters and is subject to liquid spills or washdown, or where wall, floor, or roof slab is common to a water-holding or earth-retaining structure.

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- F. Submerged: Location at or below top of wall of open water-holding structure, such as basin or channel, or wall, ceiling or floor surface inside a covered water-holding structure, or exterior belowgrade wall or roof surface of water-holding structure, open or covered.

1.03 SUBMITTALS

A. Action Submittals:

- 1. Shop Drawings: Metal fabrications, including welding and fastener information.

B. Informational Submittals: Passivation method for stainless steel members.

1.04 QUALITY ASSURANCE

A. Qualifications:

- 1. Galvanized Coating Applicator: Company specializing in hot-dip galvanizing after fabrication and following procedures of Quality Assurance Manual of the American Galvanizers Association.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Insofar as practical, factory assemble specified items. Package assemblies, which have to be shipped unassembled to protect materials from damage and tag to facilitate identification and field assembly.
- B. Package stainless steel items to provide protection from carbon impregnation.
- C. Protect painted coatings and hot-dip galvanized finishes from damage as a result of metal banding and rough handling. Use padded slings and straps.
- D. Store fabricated items in dry area, not in direct contact with ground.

PART 2 PRODUCTS

2.01 GENERAL

- A. Unless otherwise indicated, meet the following requirements:

Item	ASTM Reference
Steel Wide Flange and Channel Shapes	A992/992M

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Item	ASTM Reference
Other Steel Shapes and Plates	A572/A572M, Grade 50 or A992/A992M for other steel shapes
Steel Pipe	A500, Grade B
Hollow Structural Sections (HSS)	A500/A500M, Grade C
Aluminum:	
Aluminum Plates	B209, Alloy 6061-T6
Aluminum Structural Shapes	B308/B308M, Alloy 6061-T6
Stainless Steel:	
Bars and Angles	A276, AISI Type 316 (316L for welded connections)
Shapes	A276, AISI Type 304 (304L for welded connections)
Steel Plate, Sheet, and Strip	A240/A240M, AISI Type 316 (316L for welded connections)
Bolts, Threaded Rods, Anchor Bolts, and Anchor Studs	F593, AISI Type 316, Group 2, Condition SH
Nuts	F594, AISI Type 316, Condition CW
Steel Bolts and Nuts:	
Carbon Steel	A307 bolts, with A563 nuts
High-Strength	A325, Type 1 bolts, with A563 nuts
Anchor Bolts and Rods	F1554, Grade 55, with weldability supplement S1
Eyebolts	A489
Threaded Rods	A36/A36M
Flat Washers (Unhardened)	F844
Flat and Beveled Washers (Hardened)	F436

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Item	ASTM Reference
Thrust Ties for Steel Pipe:	
Threaded Rods	A193/A193M, Grade B7
Nuts	A194/A194M, Grade 2H
Plate	A283/A283M, Grade D
Welded Anchor Studs	A108, Grade C-1010 through Grade C-1020
Aluminum Bolts and Nuts	F468, Alloy 2024-T4
Cast Iron	A48/A48M, Class 35

- B. Bolts, Washers, and Nuts: Use stainless steel, hot-dip galvanized steel, zinc-plated steel, and aluminum material types as indicated in Fastener Schedule at end of this section.

2.02 ANCHOR BOLTS AND ANCHOR BOLT SLEEVES

A. Cast-In-Place Anchor Bolts:

1. Headed type, unless otherwise shown on the Drawings.
2. Material type and protective coating as shown in Fastener Schedule at end of this section.

B. Anchor Bolt Sleeves:

1. Plastic:
 - a. Single unit construction with corrugated sleeve.
 - b. Top of sleeve must be self-threading to provide adjustment of threaded anchor bolt projection.
 - c. Material: High-density polyethylene.
2. Fabricated Steel: ASTM A36/A36M.

2.03 POST-INSTALLED CONCRETE AND MASONRY ANCHORS

- A. See Section 05 05 19, Post-Installed Anchors.

2.04 ACCESSORIES

A. Antiseizing Lubricant for Stainless Steel Threaded Connections:

1. Resists washout.

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2. Manufacturers and Products:
 - a. Bostik, Middleton, MA; Neverseez.
 - b. Saf-T-Eze Div., STL Corp., Lombard, IL; Anti-Seize.
- B. Neoprene Gasket:
 1. ASTM D1056, 2C1, soft, closed-cell neoprene gasket material, suitable for exposure to sewage and sewage gases, unless otherwise shown on the Drawings.
 2. Thickness: Minimum 1/4-inch.
 3. Furnish without skin coat.
 4. Manufacturer and Product: Monmouth Rubber and Plastics Corporation, Long Branch, NJ; Durafoam DK1111LD.

2.05 FABRICATION

- A. General:
 1. Finish exposed surfaces smooth, sharp, and to well-defined lines.
 2. Furnish necessary rabbets, lugs, and brackets so work can be assembled in neat, substantial manner.
 3. Conceal fastenings where practical; where exposed, flush countersink.
 4. Drill metalwork and countersink holes as required for attaching hardware or other materials.
 5. Grind cut edges smooth and straight. Round sharp edges to small uniform radius. Grind burrs, jagged edges, and surface defects smooth.
 6. Fit and assemble in largest practical sections for delivery to Site.
- B. Materials:
 1. Use steel shapes, unless otherwise noted.
 2. Steel to be hot-dip galvanized: Limit silicon content to less than 0.04 percent or to between 0.15 percent and 0.25 percent.
 3. Fabricate aluminum in accordance with AA Specifications for Aluminum Structures–Allowable Stress Design.
- C. Welding:
 1. Weld connections and grind exposed welds smooth. When required to be watertight, make welds continuous.
 2. Welded fabrications must be free from twisting or distortion caused by improper welding techniques.
 3. Steel: Meet fabrication requirements of AWS D1.1/D1.1M, Section 5.
 4. Aluminum: Meet requirements of AWS D1.2/D1.2M.
 5. Stainless Steel: Meet requirements of AWS D1.6/D1.6M.

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6. Welded Anchor Studs: Prepare surface to be welded and weld with stud welding gun in accordance with AWS D1.1/D1.1M, Section 7, and manufacturer's instructions.
7. Complete welding before applying finish.

D. Painting:

1. Shop prime with rust-inhibitive primer as specified in Section 09 90 00, Painting and Coating, unless otherwise indicated.
2. Coat surfaces of galvanized steel and aluminum fabricated items to be in direct contact with concrete, grout, masonry, or dissimilar metals, as specified in Section 09 90 00, Painting and Coating, unless indicated otherwise.
3. Do not apply protective coating to galvanized steel anchor bolts or galvanized steel welded anchor studs, unless indicated otherwise.

E. Galvanizing:

1. Fabricate steel to be galvanized in accordance with ASTM A143/A143M, ASTM A384/A384M, and ASTM A385/A385M. Avoid fabrication techniques that could cause distortion or embrittlement of the steel.
2. Provide venting and drain holes for tubular members and fabricated assemblies in accordance with ASTM A385/A385M.
3. Remove welding slag, splatter, burrs, grease, oil, paint, lacquer, and other deleterious material prior to delivery for galvanizing.
4. Remove by blast cleaning or other methods surface contaminants and coatings not removable by normal chemical cleaning process in the galvanizing operation.
5. Hot-dip galvanize steel members, fabrications, and assemblies after fabrication in accordance with ASTM A123/A123M.
6. Hot-dip galvanize bolts, nuts, washers, and hardware components in accordance with ASTM A153/A153M. Oversize holes to allow for zinc alloy growth. Shop assemble bolts and nuts.
7. Galvanized steel sheets in accordance with ASTM A653/A653M.
8. Galvanize components of bolted assemblies separately before assembly. Galvanizing of tapped holes is not required.

- F. Electrolytic Protection: Coat surfaces of galvanized steel and aluminum fabricated items to be in direct contact with concrete, grout, masonry, or dissimilar metals, as specified in Section 09 90 00, Painting and Coating, unless indicated otherwise.

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- G. Watertight Seal: Where required or shown, furnish neoprene gasket of a type that is satisfactory for use in contact with sewage. Cover full bearing surfaces.
- H. Fitting: Where movement of fabrications is required or shown, cut, fit, and align items for smooth operation. Make corners square and opposite sides parallel.
- I. Accessories: Furnish as required for a complete installation. Fasten by welding or with stainless steel bolts or screws.

2.06 SOURCE QUALITY CONTROL

- A. Visually inspect all fabrication welds and correct deficiencies.
 - 1. Steel: AWS D1.1/D1.1M, Section 6 and Table 6.1, Visual Inspection Acceptance Criteria.
 - 2. Aluminum: AWS D1.2/D1.2M.
 - 3. Stainless Steel: AWS D1.6/D1.6M.

PART 3 EXECUTION

3.01 INSTALLATION OF METAL FABRICATIONS

- A. General:
 - 1. Install metal fabrications plumb and level, accurately fitted, free from distortion or defects.
 - 2. Install rigid, substantial, and neat in appearance.
 - 3. Install manufactured products in accordance with manufacturer's recommendations.
 - 4. Obtain Engineer approval prior to field cutting steel members or making adjustments not scheduled.
- B. Aluminum:
 - 1. Do not remove mill markings from concealed surfaces.
 - 2. Remove inked or painted identification marks on exposed surfaces not otherwise coated after installed material has been inspected and approved.
 - 3. Fabrication, mechanical connections, and welded construction must be in accordance with the AA Aluminum Design Manual.

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3.02 CAST-IN-PLACE ANCHOR BOLTS

- A. Locate and hold anchor bolts in place with templates at time concrete is placed.
- B. Use anchor bolt sleeves for location adjustment and provide two nuts and one washer per bolt of same material as bolt.
- C. Minimum Bolt Size: 1/2-inch diameter by 12 inches long, unless otherwise shown.

3.03 ELECTROLYTIC PROTECTION

- A. Aluminum and Galvanized Steel:
 - 1. Coat surfaces of galvanized steel and aluminum fabricated items to be in direct contact with concrete, grout, masonry, or dissimilar metals, as specified in Section 09 90 00, Painting and Coating, unless indicated otherwise.
 - 2. Do not apply protective coating to galvanized steel anchor bolts or galvanized steel welded anchor studs, unless indicated otherwise.
 - 3. Allow coating to dry before installation of the material.
 - 4. Protect coated surfaces during installation.
 - 5. Should coating become marred, prepare and touch up in accordance with paint manufacturer's written instructions.
- B. Stainless Steel:
 - 1. During handling and installation, take necessary precautions to prevent carbon impregnation of stainless steel members.
 - 2. After installation, visually inspect stainless steel surfaces for evidence of iron rust, oil, paint, and other forms of contamination.
 - 3. Remove contamination using cleaning and passivation methods in accordance with requirements of ASTM A380 and ASTM A967.
 - 4. Brushes used to remove foreign substances must utilize only stainless steel or nonmetallic bristles.
 - 5. After treatment, visually inspect surfaces for compliance.

3.04 PAINTING

- A. Painted Galvanized Surfaces: Prepare as specified in Section 09 90 00, Painting and Coating.

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B. Repair of Damaged Hot-Dip Galvanized Coating:

1. Conform to ASTM A780/A780M.
2. For minor repairs at abraded areas, use sprayed zinc conforming to ASTM A780/A780M.
3. For flame cut or welded areas, use zinc-based solder, or zinc sticks, conforming to ASTM A780/A780M.
4. Use magnetic gauge to determine thickness is equal to or greater than base galvanized coating.

3.05 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

A. Owner-Furnished Quality Assurance:

1. In accordance with IBC Chapter 17 requirements, is provided in the Statement of Special Inspections Plan on the Drawings.
2. Contractor responsibilities and related information on special inspection, observation, and testing are included in Section 01 45 33, Special Inspection, Observation, and Testing.

B. Contractor-Furnished Quality Control:

1. Inspection and testing required in Section 01 45 16, Field Quality Control Procedures.
2. Manufacturer's Certificate of Compliance per Section 01 43 33, Manufacturers' Field Services, for test results, or calculations, or drawings that ensure material and equipment design and design criteria meet requirements of Section 01 60 00, Product Requirements and Section 01 88 15, Anchorage and Bracing.

3.06 FASTENER SCHEDULE

A. Unless indicated otherwise on the Drawings, provide fasteners as follows:

Service Use and Location	Product	Remarks
1. Anchor Bolts Cast into Concrete for Structural Steel, Metal Fabrications and Castings.		
Submerged and Corrosive Areas	Stainless steel headed anchor bolts	

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Service Use and Location	Product	Remarks
2. Anchor Bolts Cast into Concrete for Equipment Bases		
Submerged and Corrosive Areas	Stainless steel headed anchor bolts, unless otherwise specified with equipment	
3. Post-Installed Anchors: See Section 05 05 19, Post-Installed Anchors.		
4. Connections of Aluminum Components.		
Submerged, Exterior and Interior Wet and Dry Areas	Stainless steel bolted connections, unless otherwise specified with equipment	
5. All Others.		
Exterior and Interior Wet and Dry Areas	Stainless steel fasteners	

- B. Antiseizing Lubricant: Use on stainless steel threads.

END OF SECTION

SECTION 09 90 00
PAINTING AND COATING

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Water Works Association (AWWA):
 - a. C209, Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines.
 - b. C210, Liquid-Epoxy Coatings and Linings for Steel Water Pipe and Fittings.
 - c. C214, Tape Coating Systems for the Exterior of Steel Water Pipelines.
 2. Environmental Protection Agency (EPA).
 3. NACE International (NACE): SP0188, Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.
 4. National Association of Pipe Fabricators (NAPF): 500-03, Surface Preparation Standard for Ductile Iron Pipe and Fittings in Exposed Locations Receiving Special External Coatings and/or Special Internal Linings.
 - a. 500-03-01: Solvent Cleaning.
 - b. 500-03-02: Hand Tool Cleaning.
 - c. 500-03-03: Power Tool Cleaning.
 - d. 500-03-04: Abrasive Blast Cleaning for Ductile Iron Pipe.
 - e. 500-03-05: Abrasive Blast Cleaning for Cast Ductile Iron Fittings.
 5. Occupational Safety and Health Act (OSHA).
 6. Research Council on Structural Connections (RCSC): Specification for Structural Joints using High-Strength Bolts.
 7. The Society for Protective Coatings (SSPC):
 - a. PA 2, Procedure for Determining Conformance to Dry Coating Thickness Requirements.
 - b. PA 10, Guide to Safety and Health Requirements for Industrial Painting Projects.
 - c. SP 1, Solvent Cleaning.
 - d. SP 2, Hand Tool Cleaning.
 - e. SP 3, Power Tool Cleaning.
 - f. SP 5, White Metal Blast Cleaning.
 - g. SP 6, Commercial Blast Cleaning.
 - h. SP 7, Brush-Off Blast Cleaning.
 - i. SP 10, Near-White Metal Blast Cleaning.

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- j. SP 11, Power Tool Cleaning to Bare Metal.
- k. SP 16, Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals.
- l. SP 13, Surface Preparation of Concrete.
- m. Guide 15, Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Substrates.

1.02 DEFINITIONS

A. Terms used in this section:

- 1. Coverage: Total minimum dry film thickness in mils or square feet per gallon.
- 2. FRP: Fiberglass Reinforced Plastic.
- 3. MDFT: Minimum Dry Film Thickness, mils.
- 4. MDFTPC: Minimum Dry Film Thickness per Coat, mils.
- 5. Mil: Thousandth of an inch.
- 6. PPDS: Paint Product Data Sheet.
- 7. PSDS: Paint System Data Sheet.
- 8. PVC: Polyvinyl Chloride.
- 9. SP: Surface Preparation.

1.03 SUBMITTALS

A. Action Submittals:

- 1. Shop Drawings:
 - a. Data Sheets:
 - 1) For each product, furnish a Paint Product Data Sheet (PPDS), the manufacturer's technical data sheets, and paint colors available (where applicable). The PPDS form is appended to the end of this section.
 - 2) For each paint system, furnish a Paint System Data Sheet (PSDS). The PSDS form is appended to the end of this section.
 - 3) Technical and performance information that demonstrates compliance with specification.
 - 4) Furnish copies of paint system submittals to the coating applicator.
 - 5) Indiscriminate submittal of only manufacturer's literature is not acceptable.
 - b. Detailed chemical and gradation analysis for each proposed abrasive material.

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B. Informational Submittals:

1. Applicator's Qualification: List of references substantiating experience.
2. Coating manufacturer's Certificate of Compliance, in accordance with Section 01 43 33, Manufacturers' Field Services.
3. Factory Applied Coatings: Manufacturer's certification stating factory applied coating system meets or exceeds requirements specified.
4. Manufacturer's written verification that submitted material is suitable for the intended use.
5. Coating for Faying Surfaces: Manufacturer's test results that show the proposed coating meets the slip resistance requirements of the AISC Specification for Structural Joints using ASTM A325 or ASTM A490 bolts.
6. If the manufacturer of finish coating differs from that of shop primer, provide finish coating manufacturer's written confirmation that materials are compatible.
7. Manufacturer's written instructions and special details for applying each type of paint.

1.04 QUALITY ASSURANCE

A. Applicator Qualifications: Minimum 5 years' experience in application of specified products.

B. Regulatory Requirements:

1. Meet federal, state, and local requirements limiting the emission of volatile organic compounds.

C. Surface Preparation and Application:

1. Perform surface preparation and painting in accordance with recommendations of the following:
 - a. Paint manufacturer's instructions.
 - b. SSPC PA 10.
 - c. Federal, state, and local agencies having jurisdiction.

D. Mockup:

1. Before proceeding with Work under this section, finish one complete space or item of each color scheme required showing selected colors, finish texture, materials, quality of work, and special details.
2. After Engineer approval, sample spaces or items shall serve as a standard for similar work throughout the Project.

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1.05 DELIVERY, STORAGE, AND HANDLING

A. Shipping:

1. Where precoated items are to be shipped to the Site, protect coating from damage. Batten coated items to prevent abrasion.
2. Protect shop painted surfaces during shipment and handling by suitable provisions including padding, blocking, and use of canvas or nylon slings.

B. Storage:

1. Store products in a protected area that is heated or cooled to maintain temperatures within the range recommended by paint manufacturer.
2. Primed surfaces shall not be exposed to weather for more than 2 months before being topcoated, or less time if recommended by coating manufacturer.

1.06 PROJECT CONDITIONS

A. Environmental Requirements:

1. Do not apply paint in temperatures or moisture conditions outside of manufacturer's recommended maximum or minimum allowable.
2. Do not perform final abrasive blast cleaning whenever relative humidity exceeds 85 percent, or whenever surface temperature is less than 5 degrees F above dew point of ambient air.

1.07 EXTRA MATERIALS

- ### A. Provide small quantity kits for touchup painting and for painting other small areas.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- ### A. Nationally recognized manufacturers of paints and protective coatings who are regularly engaged in the production of such materials for essentially identical service conditions.
- ### B. Minimum of 5 years' verifiable experience in manufacture of specified product.

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C. Each of the following manufacturers is capable of supplying most of the products specified herein:

1. Akzo Nobel (Devoe; International).
2. Carboline.
3. PPG.
4. Sherwin-Williams.
5. Tnemec.

2.02 ABRASIVE MATERIALS

A. Select abrasive type and size to produce surface profile that meets coating manufacturer's recommendations for specific primer and coating system to be applied.

2.03 PAINT MATERIALS

A. General:

1. Manufacturer's highest quality products suitable for intended service.
2. Compatibility: Only compatible materials from a single manufacturer shall be used in the Work. Particular attention shall be directed to compatibility of primers and finish coats.
3. Thinners, Cleaners, Driers, and Other Additives: As recommended by coating manufacturer.

B. Products:

Product	Definition
Acrylic Latex	Single-component, finish as required
Epoxy Primer— Ferrous Metal	Anticorrosive, converted epoxy primer containing rust-inhibitive pigments
High Build Epoxy	Polyamidoamine epoxy, minimum 69 percent volume solids, capability of 4 to 8 MDFT per coat
Epoxy, High Solids	Polyamidoamine epoxy, 80 percent volume solids, minimum, suitable for immersion service
Polyurethane Enamel	Two-component, aliphatic or acrylic based polyurethane; high gloss finish

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2.04 MIXING

- A. Multiple-Component Coatings:
 - 1. Prepare using each component as packaged by paint manufacturer.
 - 2. No partial batches will be permitted.
 - 3. Do not use multiple-component coatings that have been mixed beyond their pot life.
 - 4. Furnish small quantity kits for touchup painting and for painting other small areas.
 - 5. Mix only components specified and furnished by paint manufacturer.
 - 6. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.
- B. Colors: Formulate paints with colorants free of lead, lead compounds, or other materials that might be affected by presence of hydrogen sulfide or other gas likely to be present at Site.

2.05 SHOP FINISHES

- A. Shop Blast Cleaning: Reference Paragraph Shop Coating Requirements.
- B. Surface Preparation: Provide Engineer minimum 7 days' advance notice to start of shop surface preparation work and coating application work.
- C. Shop Coating Requirements:
 - 1. When required by equipment specifications, such equipment shall be primed and finish coated in shop by manufacturer and touched up in field with identical material after installation.
 - 2. Where manufacturer's standard coating is not suitable for intended service condition, Engineer may approve use of a tie-coat to be used between manufacturer's standard coating and specified field finish. In such cases, tie-coat shall be surface tolerant epoxy as recommended by manufacturer of specified field finish coat. Coordinate details of equipment manufacturer's standard coating with field coating manufacturer.

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- D. Pipe:
1. Ductile Iron Pipe:
 - a. Use SSPC standards as a guide for desired prepared surface. Follow recommendations of pipe and coating manufacturers for means and methods to achieve SSPC-equivalent surface.
 - b. The surface preparation and application of the primer and finish coats shall be performed by pipe manufacturer.
 - c. For high performance (epoxy) coatings, follow additional recommendations of pipe and coating manufacturers.
 - d. Prior to blast cleaning, grind smooth surface imperfections, including, but not limited to delaminating metal or oxide layers.
 2. Steel Pipe:
 - a. Surface preparation and application of primer and finish coats shall be performed by pipe manufacturer.
 - b. For pipe with epoxy lining, do not place end cap seals until pipe lining material has sufficiently dried.

PART 3 EXECUTION

3.01 GENERAL

- A. Provide Engineer minimum 7 days' advance notice to start of field surface preparation work and coating application work.
- B. Perform the Work only in presence of Engineer, unless Engineer grants prior approval to perform the Work in Engineer's absence.
- C. Schedule inspection of cleaned surfaces and all coats prior to succeeding coat in advance with Engineer.

3.02 EXAMINATION

- A. Factory Finished Items:
 1. Schedule inspection with Engineer before repairing damaged factory-finished items delivered to Site.
 2. Repair abraded or otherwise damaged areas on factory-finished items as recommended by coating manufacturer. Carefully blend repaired areas into original finish. If required to match colors, provide full finish coat in field.

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- B. Surface Preparation Verification: Inspect and provide substrate surfaces prepared in accordance with these Specifications and printed directions and recommendations of paint manufacturer whose product is to be applied. The more stringent requirements shall apply.

3.03 PROTECTION OF ITEMS NOT TO BE PAINTED

- A. Remove, mask, or otherwise protect hardware, lighting fixtures, switchplates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not specified elsewhere to be painted.
- B. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces.
- C. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process.
- D. Mask openings in motors to prevent paint and other materials from entering.
- E. Protect surfaces adjacent to or downwind of Work area from overspray.

3.04 SURFACE PREPARATION

- A. Field Abrasive Blasting:
 - 1. Perform blasting for items and equipment where specified and as required to restore damaged surfaces previously shop or field blasted and primed or coated.
 - 2. Refer to coating systems for degree of abrasive blasting required.
 - 3. Where the specified degree of surface preparation differs from manufacturer's recommendations, the more stringent shall apply.
- B. Surface Contamination Testing:
 - 1. A surface contamination analysis test shall be performed every 500 square feet by means of a Chlor Test CSN Salts, or approved equivalent.
 - 2. Surface with chloride levels exceeding 3 µg/square centimeter for submerged surfaces and 5 µg/square centimeter for exposed surfaces shall be treated with a liquid soluble salt remover equivalent to CHLOR*RID (CHLOR*RID International, Chandler, AZ).
 - 3. Follow manufacturer's recommendations and procedures for the use of this product to remove the surface contamination.

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C. Steel Surface Preparation:

1. Where indicated, meet requirements of SSPC Specifications summarized below:
 - a. SP 1, Solvent Cleaning: Removal of visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants by cleaning with solvent.
 - b. SP 2, Hand Tool Cleaning: Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, using nonpower hand tools.
 - c. SP 3, Power Tool Cleaning: Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, using power-assisted hand tools.
 - d. SP 5, White Metal Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter by blast cleaning.
 - e. SP 6, Commercial Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter, except for random staining limited to no more than 33 percent of each unit area of surface which may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coatings.
 - f. SP 7, Brush-Off Blast Cleaning: Removal of visible rust, oil, grease, soil, dust, loose mill scale, loose rust, and loose coatings. Tightly adherent mill scale, rust, and coating may remain on surface.
 - g. SP 10, Near-White Metal Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter, except for random staining limited to no more than 5 percent of each unit area of surface which may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coatings.
 - h. SP 11, Power Tool Cleaning to Bare Metal: Removal of visible oil, grease, dirt, dust, mill scale, rust, paint, oxide, corrosion products, and other foreign matter using power-assisted hand tools capable of producing suitable surface profile. Slight residues of rust and paint may be left in lower portion of pits if original surface is pitted.

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- i. SP 16, Brush Blasting of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals: A brush-off blast cleaned non-ferrous metal surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, metal oxides (corrosion products), and other foreign matter. Intact, tightly adherent coating is permitted to remain. A coating is considered tightly adherent if it cannot be removed by lifting with a dull putty knife. Bare metal substrates shall have a minimum profile of 19 micrometers (0.75 mil).
2. The words “solvent cleaning”, “hand tool cleaning”, “wire brushing”, and “blast cleaning”, or similar words of equal intent in these Specifications or in paint manufacturer’s specification refer to the applicable SSPC Specification.
3. Where OSHA or EPA regulations preclude standard abrasive blast cleaning, wet or vacu-blast methods may be required. Coating manufacturers’ recommendations for wet blast additives and first coat application shall apply.
4. Hand tool clean areas that cannot be cleaned by power tool cleaning.
5. Round or chamfer sharp edges and grind smooth burrs, jagged edges, and surface defects.
6. Welds and Adjacent Areas:
 - a. Prepare such that there is:
 - 1) No undercutting or reverse ridges on weld bead.
 - 2) No weld spatter on or adjacent to weld or any area to be painted.
 - 3) No sharp peaks or ridges along weld bead.
 - b. Grind embedded pieces of electrode or wire flush with adjacent surface of weld bead.
7. Preblast Cleaning Requirements:
 - a. Remove oil, grease, welding fluxes, and other surface contaminants prior to blast cleaning.
 - b. Cleaning Methods: Steam, open flame, hot water, or cold water with appropriate detergent additives followed with clean water rinsing.
 - c. Clean small isolated areas as above or solvent clean with suitable solvent and clean cloth.
8. Blast Cleaning Requirements:
 - a. Type of Equipment and Speed of Travel: Design to obtain specified degree of cleanliness. Minimum surface preparation is as specified herein and takes precedence over coating manufacturer’s recommendations.
 - b. Select type and size of abrasive to produce surface profile that meets coating manufacturer’s recommendations for particular primer to be used.

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- c. Use only dry blast cleaning methods.
 - d. Do not reuse abrasive, except for designed recyclable systems.
 - e. Meet applicable federal, state, and local air pollution and environmental control regulations for blast cleaning, confined space entry (if required), and disposition of spent aggregate and debris.
9. Post-Blast Cleaning and Other Cleaning Requirements:
- a. Clean surfaces of dust and residual particles from cleaning operations by dry (no oil or water vapor) air blast cleaning or other method prior to painting. Vacuum clean enclosed areas and other areas where dust settling is a problem and wipe with a tack cloth.
 - b. Paint surfaces the same day they are blasted. Reblast surfaces that have started to rust before they are painted.

D. Ductile Iron Surface Preparation:

- 1. Provide ductile iron pipe to be painted without asphalt coating.
- 2. Grind smooth surface imperfections, including delaminating metal and annealing oxide that is not tightly adhered.
- 3. Remove oil, grease, and other surface contaminants in accordance with NAPF 500-03-01, Solvent Cleaning.
- 4. Abrasive blast clean in accordance with the following:
 - a. Ductile Iron Pipe: NAPF 500-03-04.
 - b. Cast Ductile Iron Fittings: NAPF 500-03-05.
 - c. Exposed surfaces of metal at small coating defects may be prepared by Hand Tool Cleaning NAPF 500-03-02 or Power Tool Cleaning NAPF 500-03-03. Small coating defects are defined as a defect that exposes two square inches or less of bare metal.
- 1. Plastic and FRP Surface Preparation: Hand sand plastic surfaces to be coated with medium grit sandpaper to provide tooth for coating system.
- 2. Large areas may be power sanded or brush-off blasted, provided sufficient controls are employed so surface is roughened without removing excess material.

3.05 SURFACE CLEANING

A. Brush-off Blast Cleaning:

- 1. Equipment, procedure, and degree of cleaning shall meet requirements of SSPC SP 7.
- 2. Abrasive: Either wet or dry blasting sand, grit, or nutshell.

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3. Select various surface preparation parameters, such as size and hardness of abrasive, nozzle size, air pressure, and nozzle distance from surface such that surface is cleaned without pitting, chipping, or other damage.
4. Verify parameter selection by blast cleaning a trial area that will not be exposed to view.
5. Engineer will review acceptable trial blast cleaned area and use area as a representative sample of surface preparation.
6. Repair or replace surface damaged by blast cleaning.

B. Solvent Cleaning:

1. Consists of removal of foreign matter such as oil, grease, soil, drawing and cutting compounds, and any other surface contaminants by using solvents, emulsions, cleaning compounds, steam cleaning, or similar materials and methods that involve a solvent or cleaning action.
2. Meet requirements of SSPC SP 1.

3.06 APPLICATION

A. General:

1. The intention of these Specifications is for existing and new metal surfaces to be painted, whether specifically mentioned or not, except as specified otherwise. Do not paint exterior concrete surfaces, unless specifically indicated.
2. For coatings subject to immersion, obtain full cure for completed system. Consult coatings manufacturer's written instructions for these requirements. Do not immerse coating until completion of curing cycle.
3. Apply coatings in accordance with these Specifications and paint manufacturers' printed recommendations and special details. The more stringent requirements shall apply. Allow sufficient time between coats to assure thorough drying of previously applied paint.
4. Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.
5. Coat units or surfaces to be bolted together or joined closely to structures or to one another prior to assembly or installation.
6. On pipelines, terminate coatings along pipe runs to 1 inch inside pipe penetrations.
7. Keep paint materials sealed when not in use.
8. Where more than one coat is applied within a given system, alternate colors to provide a visual reference showing required number of coats have been applied.
9. See Section 09 96 35, Chemical-Resistant Coatings, for coating and lining concrete with special chemical resistant coatings.

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B. Film Thickness and Coverage:

1. Number of Coats:
 - a. Minimum required without regard to coating thickness.
 - b. Additional coats may be required to obtain minimum required paint thickness, depending on method of application, differences in manufacturers' products, and atmospheric conditions.
2. Application Thickness:
 - a. Do not exceed coating manufacturer's recommendations.
 - b. Measure using a wet film thickness gauge to ensure proper coating thickness during application.
3. Film Thickness Measurements and Electrical Inspection of Coated Surfaces:
 - a. Perform with properly calibrated instruments.
 - b. Recoat and repair as necessary for compliance with specification.
 - c. Coats are subject to inspection by Engineer and coating manufacturer's representative.
4. Visually inspect concrete, masonry, nonferrous metal, plastic, and wood surfaces to ensure proper and complete coverage has been attained.
5. Give particular attention to edges, angles, flanges, and other similar areas, where insufficient film thicknesses are likely to be present, and ensure proper millage in these areas.
6. Apply additional coats as required to achieve complete hiding of underlying coats. Hiding shall be so complete that additional coats would not increase the hiding.

3.07 PROTECTIVE COATINGS SYSTEMS AND APPLICATION SCHEDULE

- A. Unless otherwise shown or specified, paint surfaces in accordance with the following application schedule. In the event of discrepancies or omissions in the following, request clarification from Engineer before starting work in question.

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B. System No. 2 Submerged Metal—Domestic Sewage:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 5, White Metal Blast Cleaning Ductile Iron: NAPF 500-03-04, Abrasive Blast Cleaning.	High Build Epoxy	2 coats, 16 MDFT

1. Use on the following items or areas:
 - a. Submerged metal surfaces and metal surfaces below tops of clarifier or final treatment basins walls.
 - b. Existing iron and steel piping in the primary clarifiers and final treatment basins.
2. For existing coated surfaces, remove existing coatings entirely before application of new coatings.

C. System No. 25 Exposed FRP, PVC:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Plastic and FRP Surface Preparation	Acrylic Latex Semigloss	2 coats, 320 SFPGPC

1. Use on the following items or areas:
 - a. All exposed to view PVC, CPVC, and FRP surfaces without integral UV gel coat.
 - b. Existing plastic piping above the waterline in the final treatment basins.
2. For existing coated surfaces, remove existing coatings entirely before application of new coatings.

3.08 COLORS

- A. Provide as selected by Owner.

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3.09 FIELD QUALITY CONTROL

A. Testing Equipment:

1. Provide calibrated electronic type dry film thickness gauge to test coating thickness specified in mils.
2. Provide low-voltage wet sponge electrical holiday detector to test completed coating systems, 20 mils dry film thickness or less, except zinc primer, high-build elastomeric coatings, and galvanizing, for pinholes, holidays, and discontinuities, as manufactured by Tinker and Rasor, San Gabriel, CA, Model M-1.
3. Provide high-voltage spark tester to test completed coating systems in excess of 20 mils dry film thickness. Unit as recommended by coating manufacturer.

B. Testing:

1. Thickness and Continuity Testing:
 - a. Measure coating thickness specified in mils with a magnetic type, dry film thickness gauge, in accordance with SSPC PA 2. Check each coat for correct millage. Do not make measurement before a minimum of 8 hours after application of coating.
 - b. Holiday detect coatings 20 mils thick or less, except zinc primer and galvanizing, with low voltage wet sponge electrical holiday detector in accordance with NACE SP0188.
 - c. Holiday detect coatings in excess of 20 mils dry with high voltage spark tester as recommended by coating manufacturer and in accordance with NACE SP0188.
 - d. After repaired and recoated areas have dried sufficiently, retest each repaired area. Final tests may also be conducted by Engineer.

C. Inspection: Leave staging and lighting in place until Engineer has inspected surface or coating. Replace staging removed prior to approval by Engineer. Provide additional staging and lighting as requested by Engineer.

D. Unsatisfactory Application:

1. If item has an improper finish color or insufficient film thickness, clean surface and topcoat with specified paint material to obtain specified color and coverage. Obtain specific surface preparation information from coating manufacturer.
2. Evidence of runs, bridges, shiners, laps, or other imperfections is cause for rejection.
3. Repair defects in accordance with written recommendations of coating manufacturer.

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E. Damaged Coatings, Pinholes, and Holidays:

1. Hand or power sand visible areas of chipped, peeled, or abraded paint, and feather edges. Follow with primer and finish coat. Depending on extent of repair and appearance, a finish sanding and topcoat may be required.
2. Remove rust and contaminants from metal surface. Provide surface cleanliness and profile in accordance with surface preparation requirements for specified paint system.
3. Feather edges and repair in accordance with recommendations of paint manufacturer.
4. Apply finish coats, including touchup and damage-repair coats in a manner that will present a uniform texture and color-matched appearance.

3.10 MANUFACTURER'S SERVICES

- A. In accordance with Section 01 43 33, Manufacturers' Field Services, coating manufacturer's representative shall be present at Site as follows:
1. On first day of application of any coating system.
 2. A minimum of two additional Site inspection visits, each for a minimum of 4 hours, in order to provide Manufacturer's Certificate of Proper Installation.
 3. As required to resolve field problems attributable to or associated with manufacturer's product.
 4. To verify full cure of coating prior to coated surfaces being placed into immersion service.

3.11 CLEANUP

- A. Place cloths and waste that might constitute a fire hazard in closed metal containers or destroy at end of each day.
- B. Upon completion of the Work, remove staging, scaffolding, and containers from Site or destroy in a legal manner.
- C. Remove paint spots, oil, or stains upon adjacent surfaces and floors and leave entire job clean.

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3.12 SUPPLEMENTS

- A. The supplements listed below, following “End of Section,” are a part of this specification:
1. Paint System Data Sheet (PSDS).
 2. Paint Product Data Sheet (PPDS).

END OF SECTION

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PAINT SYSTEM DATA SHEET (PSDS)

Complete this PSDS for each coating system, include all components of the system (surface preparation, primer, intermediate coats, and finish coats). Include all components of a given coating system on a single PSDS.

Paint System Number (from Spec.):		
Paint System Title (from Spec.):		
Coating Supplier:		
Representative:		
Surface Preparation:		
Paint Material (Generic)	Product Name/Number (Proprietary)	Min. Coats, Coverage

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PAINT PRODUCT DATA SHEET (PPDS)

Complete and attach manufacturer's Technical Data Sheet to this PPDS for each product submitted. Provide manufacturer's recommendations for the following parameters at temperature (F)/relative humidity:

Temperature/RH	50/50	70/30	90/25
Induction Time			
Pot Life			
Shelf Life			
Drying Time			
Curing Time			
Min. Recoat Time			
Max. Recoat Time			

Provide manufacturer's recommendations for the following:

Mixing Ratio: _____

Maximum Permissible Thinning: _____

Ambient Temperature Limitations: min.: _____ max.: _____

Surface Temperature Limitations: min.: _____ max.: _____

Surface Profile Requirements: min.: _____ max.: _____

SECTION 09 96 35
CHEMICAL-RESISTANT COATINGS

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. ASTM International (ASTM):
 - a. D4138, Standard Practices for Measurement of Dry Film Thickness of Protective Coating Systems by Destructive Cross-Sectioning Means.
 - b. D4263, Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
 - c. D4787, Standard Test Method for Continuity Verification of Liquid or Sheet Linings Applied to Concrete Substrates.
 - d. D7234, Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers.
 - e. F1869, Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
 - f. F2170, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probes.
 2. International Concrete Restoration Institute (ICRI): Guideline 03732, Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymers.
 3. The Society for Protective Coatings (SSPC):
 - a. PA 10, Guide to Safety and Health Requirements for Industrial Painting Projects.
 - b. P13/NACE 6, Surface Preparation of Concrete.

1.02 ABBREVIATIONS

- A. CRC: Chemical Resistant Coating.
- B. CRCPDS: CRC Product Data Sheet.
- C. CRCSDS: CRC System Data Sheet.
- D. CSP: Concrete Surface Profile.
- E. MDFT: Minimum Dry Film Thickness.

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- F. Mil: One thousandth of an inch.
- G. SDS: Safety Data Sheet.
- H. SSPC SP: The Society for Protective Coatings.

1.03 SUBMITTALS

A. Action Submittals:

1. Furnish CRC System Data Sheet (CRCSDS) and CRC Product Data Sheet (CRCPDS) for each CRC system. The CRCSDS and CRCPDS forms are appended to the end of this section.
2. Indiscriminate submittal of manufacturer's literature only is not acceptable.
3. The following information shall be appended to each CRCSDS:
 - a. Manufacturer's technical data sheets.
 - b. Manufacturer's application specification.
 - c. Chemical-resistance test results for exposure to service conditions.
 - d. Configuration details for the following:
 - 1) Expansion joints and structural isolation joints.
 - 2) Construction joints.
 - 3) Cracks.
 - 4) Wall base details.
 - 5) Gate frames.
 - 6) Hardware (when installed before or after CRC application).
 - 7) Metal angle frames at trenches, gratings, or hatches.
 - 8) Floor drains.
 - 9) Transition and termination detail at edge of CRC system.
 - 10) Horizontal to vertical transitions.
 - 11) Pipe penetrations (vertical and horizontal).
 - 12) Other details specific to the structure being coated.

B. Informational Submittals:

1. Letter from CRC manufacturer stating that:
 - a. Applicator has notified manufacturer of proposed installation.
 - b. Manufacturer agrees with intended application.
 - c. Applicator is qualified to do the Work and meets quality assurance minimum experience requirements.

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2. Applicator Qualifications:
 - a. List of references substantiating experience. Include projects with at least 3 years of successful service history, including project name and location, application dates, contactable names of project staff from the Owner and Engineer, and descriptions of products used, substrates coated, and application procedures.
 - b. Certification from coating manufacturer showing current status as an approved applicator.
3. Manufacturer's Product Qualifications: List of projects substantiating successful application and performance of the proposed products to the specific exposure and process conditions. Include project name and location, application dates, and contactable names of project staff from the Owner, Engineer, and Applicator.
4. Independent Third Party Inspector's Qualifications: List of projects substantiating coatings inspection experience with proposed products, substrates, and process conditions. Include project names and location, application dates, and contactable names of project staff from the Owner, Engineer, and Applicator.
5. Installation instructions.
6. Field inspection and test reports submitted daily throughout duration of Work.
 - a. Environmental conditions will be recorded at the beginning of the workday, every two hours, and at the end of the workday.
7. Completed field quality control forms submitted as they become available, including results of amine blush, adhesion, film thickness, and holiday testing.
8. Manufacturer's Certificate of Proper Installation in accordance with Section 01 43 33, Manufacturer's Field Services.
9. Safety Data Sheets (SDS) for each product. Provide SDS sheets as a separate, independent attachment.

1.04 QUALITY ASSURANCE

- A. Manufacturer's Experience: Minimum 5 years manufacturing proposed products.
- B. Applicator's Experience: Minimum 3 years applying proposed products.
- C. Applicator Quality Control Plan: Applicator shall maintain an in-house quality assurance program that monitors surface preparation, coating application, and quality control testing for coating and lining operations. Level of experience, quality assurance program, and quality control testing by applicator shall meet minimum requirements specified herein, in coating manufacturer's instructions, and related government regulations.

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- D. Subcontractor is solely responsible for quality control inspection and testing. Subcontractor shall monitor and be responsible for all environmental, surface preparation, application, and quality control testing compliance at locations where coating work is undertaken.
- E. Mockups:
1. One mockup required for each area to receive a coating system.
 2. Before proceeding with Work under this section, finish one complete space or area, size as specified below, showing selected colors, finish texture, materials, quality of work, and special details.
 3. Mockup components will vary, depending on CRC system. All components of CRC system, including surface preparation, must be exposed in mockup.
 4. Example Mockup Procedure:
 - a. Prepare, prime, and coat one section of concrete, 10 feet by 10 feet, at a location mutually agreed upon by the Contractor and Engineer. Use a “step” down mockup as follows:
 - 1) Leave one-quarter of the surface exposed to allow observation of surface preparation.
 - 2) Apply resurfacing mortar three-quarters of remaining surface.
 - 3) Apply filler/surfacer and primer to one-half of the surface, over resurfacing mortar, leaving one-quarter of the surface exposed with resurfacing mortar.
 - 4) Apply finish coat to filler/surfacer with primer, leaving one-quarter of surface exposed with surfacer/filler/primer.
 - b. Mockup shall include concrete cuts for coating terminations and one example of a penetration.
 5. Mockup shall be tested for amine blush as specified herein.
 6. Completed Mockup shall be tested for adhesion as specified herein.
 7. After Engineer’s review and approval, sample spaces or items shall serve as a standard for similar work throughout Project.
 8. Leave Mockup in place to serve as a reference and standard for the remaining Work.
 9. At completion of the Project, and if the mockup is located within the Work area, clean, prepare, and finish the mockup as required for incorporation into the Work.

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F. Independent QC Inspection:

1. An independent third party inspector shall be retained by the Contract Manager.
2. The inspector shall be onsite for the full duration of all CRC work, including surface preparation and coatings application,
3. The inspector shall be certified by The Association for Materials, Protection and Performance (AMPP) as a Senior Certified Coatings Inspector.

1.05 PREINSTALLATION MEETING

A. Prior to beginning painting Work, schedule meeting and be prepared to discuss the following subjects, as a minimum:

1. Required schedule.
2. Sequence of critical path work items.
3. Use of Site, access, office and storage areas, security, and temporary facilities.
4. Major product delivery and priorities.
5. Safety plan.

B. Attendees shall include:

1. Owner's representatives.
2. Contractor's office representative.
3. Contractor's resident superintendent.
4. Contractor's quality control representative.
5. Subcontractors' representatives whom Contractor may desire or Engineer may request to attend.
6. Engineer's representative.
7. Paint manufacturer's technical representative.
8. Others as appropriate.

1.06 REGULATORY REQUIREMENTS

A. Meet applicable federal, state, and local requirements for coating product selection, surface preparation, and painting activities.

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1.07 SURFACE PREPARATION AND COATING APPLICATION

- A. Perform surface preparation and painting in accordance with recommendations of the following:
 - 1. These Specifications.
 - 2. Coating manufacturer's instructions.
 - 3. SSPC PA 10.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original, unopened containers.
- B. Storage:
 - 1. Maintain materials in clean and dry condition.
 - 2. Maintain storage temperatures within the manufacturer's requirements.
 - 3. Follow manufacturer's instructions.
- C. Shelf Life: Do not use any coating materials that have exceeded the manufacturer's specified shelf life.

1.09 ENVIRONMENTAL REQUIREMENTS

- A. Temporary Facilities: Provide temporary facilities that may be required for proper installation of the complete chemical resistant coating system, such as covers, enclosures, air heating or cooling and dehumidification.
- B. Temperature: Apply surfacing materials and coatings only when substrate, ambient air, and coating material are within the manufacturer's recommended range.
- C. Substrate: Moisture content shall be within the manufacturer's recommended range for product application.
- D. Ventilation: Provide during and after application to meet all applicable safety and health regulations.

1.10 EXTRA MATERIALS

- A. Furnish minimum 2 gallons of unopened topcoating material for future use by Owner.

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1.11 SPECIAL GUARANTEE

- A. Furnish extended guarantee or warranty. Special guarantee shall provide for correction, or at option of Owner, removal and replacement of Work specified in this specification section found defective during a period of 2 years after date of Substantial Completion. Duties and obligations for correction or removal and replacement of defective Work as specified in Section 00 72 00, General Conditions of the Contract.
1. 24-Month Warranty Period Inspection: Owner will conduct inspection of interior and exterior coated surfaces prior to the end of warranty period. Owner will notify Contractor in advance of inspection and Contractor may attend at its option. Owner will prepare list of coating defects and failures identified during inspection and transmit to Contractor. List shall serve as notice of repairs required under warranty.
 2. Repairs:
 - a. If repairs are required, requirements of Contract shall apply including, but not limited to, requirements to remove standing water and perform repair work.
 - b. Repair defective coatings using coating materials, equipment, and methods similar to those used in original work. Materials shall be of fresh manufacture and within manufacturer's stated shelf life at time of application.
 - c. Provide extended warranty of 1-year for repairs.
 - d. Complete repairs within 30 calendar days of Warranty Period Inspection.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Akzo Nobel (Davoe International).
- B. Carboline.
- C. PPG.
- D. Tnemec.
- E. Sherwin Williams.
- F. Raven.

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- G. Sauereisen.
- H. Warren Environmental.

2.02 MATERIALS

- A. Chemical-Resistant Coatings:
 - 1. Mixture of liquid resin-based material, setting agent, and filler designed to be troweled into place to cure to a hard state.
 - 2. As described in coating systems. Provide manufacturer's highest quality products suitable for the intended service.
- B. Product Service Experience: Minimum 3 years of verifiable successful product performance in the listed exposure and process condition.
- C. Meet federal, state, and local requirements limiting the emission of volatile organic compounds.
- D. Materials shall not contain lead or lead compounds.
- E. Joints:
 - 1. Provide joint filler material type, size, and composition as recommended by CRC manufacturer for joint condition.
 - 2. Joint Materials: Designed to maintain liquid-tight joint for life of coating system.
 - 3. Chemical Resistance of Joint: Same or better than coating system.
 - 4. Backing Material: As recommended by CRC manufacturer.

2.03 COATING SYSTEMS

- A. Coating System CRC-1, Epoxy Polymer, Trowel or Spray Applied:
 - 1. Description: Chemical-resistant barrier lining suitable for application to new and existing concrete structures.
 - 2. Service Conditions: Immersion and headspace exposure to raw wastewater and subject to hydrogen sulfide and dilute sulfuric acid, expected pH values below 3.
 - 3. CRC Components:
 - a. Primer: One coat of manufacturer's recommended moisture-resistant epoxy primer, 2 MDFT. As required by CRC manufacturer.

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- b. Surfacer/Filler: One coat of 100 percent solids, epoxy surfacer, application rate as required to fill level 100 percent of the concrete surface in preparation for coating. 1/16-inch nominal thickness.
- c. Corrosion Barrier Lining: One coat of 100 percent solids, chemically resistant amine-cured epoxy lining material, 100 MDFT.

2.04 MIXING

- A. Thoroughly mix until homogeneous following manufacturer's instructions.
- B. Mix only components furnished by coating manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Surface Preparation:
 - 1. Inspect and provide substrate surfaces prepared in accordance with these Specifications and the printed directions and recommendations of the system manufacturer whose product is to be applied.
 - 2. Provide Engineer minimum 3 days' advance notice of start of surface preparation and system application Work.
 - 3. Perform Work only in presence of Engineer unless Engineer grants prior approval to perform Work in Engineer's absence.
- B. Schedule inspection with Engineer in advance for cleaned surfaces and system application Work.

3.02 PREPARATION

- A. As specified herein and in accordance with the manufacturer's printed directions and recommendations.
- B. Fill holes and cracks with manufacturer's recommended materials. Secure the manufacturer's recommendations for additional preparation if required for excessive bug holes exposed after blasting.
- C. Concrete Surfaces:
 - 1. Do not begin surface preparation activities until 30 days after new concrete has been placed, or longer if required to meet coating manufacturer's limit for moisture in the concrete.

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2. Remove grease, oil, dirt, salts, chemicals, loose materials, or other foreign matter by solvent, detergent, or other suitable cleaning methods.
3. Prepare surfaces and provide a concrete profile by abrasive blasting, SSPC SP 13, or by high pressure water blasting, 4,000 pounds per square inch minimum. Minimum surface profile shall meet ICRI CSP 3 to 5, or higher if required by coating manufacturer.
4. Secure coating manufacturer's recommendations for additional preparation if required by the coating manufacturer.
5. Unless otherwise required for proper adhesion, ensure surfaces are dry prior to painting.
 - a. Test for moisture using plastic sheets in accordance with ASTM D4263.
 - b. If the test indicates moisture is present, conduct tests to determine moisture content in accordance with ASTM F1869. If the moisture content exceeds 3 pounds per 1,000 square feet in a 24-hour period, provide the manufacturer's recommendations for mitigation of moisture effect on lining application and long term lining performance.
 - c. All tests using electronic moisture meters shall conform to ASTM F2170.

3.03 APPLICATION

A. General:

1. This specification section is intended for coating and lining concrete with special chemical resistant coatings. See Section 09 90 00, Painting and Coating, for ferrous metal and other general painting requirements.
2. Surfacers/Filler: Apply the surfacer/filler to concrete with methods recommended by the coating manufacturer as required to provide a surface that is continuous, smooth, void-free surface. Force material into voids and irregularities and remove excess filler before the material sets.
3. Spray or trowel apply coating systems components in accordance with manufacturer's written instructions.
4. Cove corners at vertical and horizontal intersections and reinforce as specified in Paragraph Joints, this section.
5. Lightly back roll finish coat as recommended by CRC manufacturer to eliminate pinholes.
6. Provide minimum number of coats required for each coating system, regardless of application method. Do not apply succeeding coats until previous coat has cured in accordance with coating manufacturer's recommendations.

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7. Observe manufacturer's published recoat windows. If recoat window is exceeded mechanically abrade before recoating in accordance with manufacturer's directions and as approved by Engineer.
- B. Priming and Holiday Prevention on Concrete and Substrates:
1. Follow manufacturer's written instructions related to application during decreasing substrate temperature conditions, adequate surface preparation and other application techniques that may be necessary to reduce the potential for outgassing and formation of pinholes during coating application and cure.
 2. If required by the coating manufacturer, apply manufacturer's recommended epoxy penetrating primer to minimize the effects of vapor transmission from the concrete.
- C. Film Thickness: Provide specified thickness of material. Use screeds or wet film gauges to monitor thickness during application.
- D. Joints:
1. Provide continuous sealant, backing material and joint-lining treatment recommended by the coating manufacturer at all expansion, isolation, and construction joints.
 2. Provide continuous sealant bead at joints between different coating systems.
 3. Provide fiberglass or synthetic fabric reinforcement at construction joints and large substrate cracks to maintain liquid-tight requirements under the specified service conditions.
- E. Penetrations: Coat over or around equipment anchors, base plate, pipes, and similar item installed in areas receiving CRC to maintain continuous liquid-tight seal.
- F. Terminations:
1. Conform to manufacturer's details.
 2. For coatings exposed to wastewater or vapor space above wastewater liquid levels, terminate leading edges in beveled saw cuts 1/4-inch wide by 1/4-inch deep, or as required by manufacturer. Prime and extend coating into the saw cut. Do not fill saw cut with epoxy surfacer. Saw cut shall be provided by CRC subcontractors.

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3.04 UNSATISFACTORY APPLICATION

- A. If any item has an improper appearance or insufficient film thickness, the surface shall be cleaned, prepared, and top coated as required to achieve proper appearance and/or thickness. Provide specific procedures in writing from manufacturer prior to cleaning and preparation.
- B. Evidence of pinholes or discontinuities is cause for rejection.
- C. Repair defects in accordance with written recommendations of coating manufacturer.

3.05 DAMAGED COATINGS

- A. Hand or power sand visible areas of chipped, peeled, or abraded paint, and feather edges. Follow with primer and finish coat. Depending on extent of repair and appearance, a finish sanding and topcoat may be required.
- B. Remove contaminants from concrete surface. Provide surface cleanliness and profile in accordance with surface preparation requirements for specified paint system.
- C. Feather edges and repair in accordance with recommendations of paint manufacturer.
- D. Apply finish coats, including touchup and damage-repair coats in manner that will present a uniform texture and color-matched appearance.

3.06 FIELD QUALITY CONTROL

- A. Inspection: Inspect finished system for complete, uniform coverage of specified area. Evidence of defects include improper thickness, hardness, and appearance.
- B. Amine Blush Testing:
 - 1. Amine blush testing required only for amine-cured epoxies to be coated. Testing is not required for other coating types, or amine-cured coatings that will not receive any additional coatings.
 - 2. Perform amine blush testing using a carbamate compound detector. Amine blush testing with pH indicators is not allowed.
 - a. Manufacturer and Product:
 - 1) Elcometer; 139.
 - 2) "Or-equal."

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3. Perform amine blush testing in accordance with manufacturer's instructions.
4. Perform one amine blush test per 100 square feet of lined surface.
5. Perform additional testing if any one measurement shows the presence of amine blush.
 - a. Perform additional measurements in the area where amine blush is found to determine extent.
6. Repair any damaged coatings associated with amine blush testing in accordance with manufacturer's written instructions.

C. Adhesion Testing:

1. Perform adhesion testing in accordance with ASTM D7234.
2. Perform one adhesion test per 1,000 square feet of lined surface. A minimum of three tests is required for areas smaller than 1,000 square feet.
3. Adhesion strength shall be a minimum of 400 pounds per square inch.
4. Adhesion failure mode shall be Substrate Failure A, Substrate Failure B, or a combination of the two, as defined by ASTM D7234. Substrate Failure C and glue failures are cause for retesting. Perform an additional one measurement in the area where glue failure occurs.
5. Perform additional testing if any one measurement does not meet the minimum adhesion strength or specified failure mode.
 - a. Perform an additional two measurements in the area where additional testing is required. Both additional measurements shall meet the minimum adhesion strength and specified failure mode.
6. Repair all damaged coatings associated with adhesion testing in accordance with manufacturer's written instructions.

D. Film Thickness:

1. Perform destructive dry film thickness measurements in accordance with ASTM D4138.
2. Perform one film thickness measurement per 500 square feet of lined surface.
3. Perform additional testing if any one measurement does not meet specified thickness requirement.
 - a. Perform additional four measurements in the area where inadequate thickness is found. No single measurement shall be less than specified dry film thickness.
4. Provide additional coats of barrier lining as required to meet specified film thickness. Abrade surface by brush blasting if manufacturer's recommended recoat window is exceeded.

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5. Repair all damaged coatings associated with film thickness testing in accordance with manufacturer's written instructions.

E. Holiday Testing:

1. All surfaces provided with a barrier lining shall be electrically checked with high-voltage holiday test equipment to determine location of discontinuities:
 - a. Do not perform electrical inspection until the barrier lining is sufficiently cured, as determined by the manufacturer.
 - b. All electrical inspection testing shall be performed in accordance with ASTM D4787.
2. Repair all lining defects in accordance with the manufacturer's written instructions.
3. After repaired and recoated areas have dried sufficiently, retest each.

3.07 MANUFACTURER'S SERVICES

- A. Coating manufacturer's representative shall be present at Site in accordance with Section 01 43 33, Manufacturer's Field Services, and as follows:
1. On first day of application of any coating system.
 2. A minimum of two additional Site inspection visits, each for a minimum of 4 hours, in order to provide Manufacturer's Certificate of Proper Installation.
 3. As required to resolve filed problems attributable to or associated with manufacturer's product.
 4. To verify full cure of coating prior to coated surfaces being placed into immersion service.
 5. Review paint product data sheet is filled out and constant with product's technical data and that the applicator is qualified and is using appropriate application tools in good working order.
 6. Prior to application of each product, observe surface preparation and all ambient conditions are met.

3.08 APPLICATION SCHEDULE

- A. Unless otherwise shown or specified, apply coatings in accordance with the following application schedule. In the event of discrepancies or omissions in the following, request clarification from Engineer before starting Work in question.

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B. Coating System CRC-1:

1. Use in the following areas:
 - a. Interior concrete surfaces as shown on the Drawings and as detailed below:
 - 1) Walls and floors of launder troughs in covered clarifiers, as shown on the Drawings.

3.09 SUPPLEMENTS

- A. The supplements listed below, following “End of Section,” are a part of this specification:
1. Chemical-Resistant Coating Data Sheet (CRCDS).
 2. Chemical-Resistant Coating Product Data Sheet (CRCPDS).

END OF SECTION

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CHEMICAL-RESISTANT COATING SYSTEM DATA SHEET (CRCSDS)

Complete this CRCSDS for each coating system, include all components of the system (surface preparation, primer, intermediate coats, and finish coats). Include all components of a given coating system on a single CRCSDS.

CRC Number (from Spec.):		
CRC System Title (from Spec.):		
Coating Supplier:		
Representative:		
Surface Preparation:		
CRC Material (Generic)	Product Name/Number (Proprietary)	Min. Coats, Coverage

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CHEMICAL-RESISTANT COATING PRODUCT DATA SHEET (CRCPDS)

Complete and attach manufacturer's Technical Data Sheet to this CRCPDS for each product submitted. Provide manufacturer's recommendations for the following parameters at temperature (F)/relative humidity:

Temperature/RH	50/50	70/30	90/25
Induction Time			
Pot Life			
Shelf Life			
Drying Time			
Curing Time			
Min. Recoat Time			
Max. Recoat Time			

Provide manufacturer's recommendations for the following:

Mixing Ratio: _____

Maximum Permissible Thinning: _____

Ambient Temperature Limitations: min.: _____ max.: _____

Surface Temperature Limitations: min.: _____ max.: _____

Surface Profile Requirements: min.: _____ max.: _____

SECTION 40 05 15
PIPING SUPPORT SYSTEMS

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Society of Civil Engineers (ASCE): 7, Minimum Design Loads for Buildings and Other Structures.
 2. American Society of Mechanical Engineers (ASME): B31.1, Power Piping.
 3. ASTM International (ASTM):
 - a. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - b. A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
 - c. E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
 4. International Code Council (ICC):
 - a. International Building Code (IBC).
 - b. International Mechanical Code (IMC).
 5. Manufacturers' Standardization Society (MSS):
 - a. SP 58, Pipe Hangers and Supports—Materials, Design and Manufacture.
 - b. SP 127, Bracing for Piping Systems Seismic-Wind-Dynamic Design, Selection, and Application.

1.02 DEFINITIONS

- A. Wetted or Submerged: Submerged, less than 1-foot above liquid surface, below top of channel wall, under cover or slab of channel or tank, or in other damp locations.

1.03 SUBMITTALS

- A. Action Submittals:
1. Catalog information and drawings of piping support system, locating each support, sway brace, seismic brace, hanger, guide, component, and anchor for piping 4 inches and smaller. Identify support, hanger, guide, and anchor type by catalog number and Shop Drawing detail number.

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2. Calculations for each type of pipe support, attachment and anchor.
3. Revisions to support systems resulting from changes in related piping system layout or addition of flexible joints.
4. Seismic anchorage and bracing drawings and cut sheets, as required by Section 01 88 15, Anchorage and Bracing.

B. Informational Submittals:

1. Seismic anchorage and bracing calculations as required by Section 01 88 15, Anchorage and Bracing. Note Article Design and Performance Requirements, as some of the supported piping is small diameter and if supported individually may not require engineered supports.
2. Component and attachment testing seismic certificate of compliance as required by Section 01 45 33, Special Inspection, Observation, and Testing.
3. Maintenance information on piping support system.

1.04 QUALIFICATIONS

- A. Piping support systems shall be designed and Shop Drawings prepared and sealed by a Registered Professional Engineer in the state where the Work is to be installed.

1.05 DESIGN REQUIREMENTS

A. General:

1. Design, size, and locate piping support systems throughout facility, whether shown or not.
2. Piping Smaller than 6 Inches: Supports are shown only where specific types and locations are required; additional pipe supports may be required.
3. Meet requirements of MSS SP 58 and ASME B31.1 or as modified by this section.

B. Pipe Support Systems:

1. Design pipe support systems for gravity and thrust loads imposed by weight of pipes or internal pressures, including insulation and weight of fluid in pipes.
2. Seismic loads in accordance with governing codes.
3. Wind loads in accordance with governing codes.

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4. Maximum Support Spacing and Minimum Rod Size: In accordance MSS SP 58 Table 3 and Table 4.
 - a. Ductile-iron Pipe 8 Inches and Under: Maximum span limited to that for standard weight steel pipe for water service.
 - b. Ductile-iron Pipe 10 Inches and Larger: Maximum span limited to 20 feet.
- C. Anchoring Devices: Design, size, and space support anchoring devices, including anchor bolts, inserts, and other devices used to anchor support, to withstand shear and pullout loads imposed by loading and spacing on each particular support.
- D. Vertical Sway Bracing: 10-foot maximum centers or as shown.
- E. Existing Support Systems: Use existing supports systems to support new piping only if Contractor can show they are adequate for additional load, or if they are strengthened to support additional load.

PART 2 PRODUCTS

2.01 GENERAL

- A. When specified items are not available, fabricate pipe supports of correct material and to general configuration specified below.
- B. Special support and hanger details may be required for cases where standard catalog supports are not applicable.
- C. Materials: Type 316 stainless steel.

2.02 HANGERS

- A. Clevis: MSS SP 58, Type 1:
 1. Anvil; Figure 260 for steel pipe and Figure 590 for ductile-iron pipe, sizes 1/2-inch through 30 inches.
 2. Insulated Steel Pipe: Anvil; Figure 260 with insulated saddle system (ISS), sizes 1/2-inch through 16 inches.
 3. B-Line; Figure B3100, sizes 1/2-inch through 30 inches.

2.03 WALL BRACKETS, SUPPORTS, AND GUIDES

- A. Welded Steel Wall Bracket: MSS SP 58, Type 33 (heavy-duty):
 1. Anvil; Figure 199, 3,000-pound rating.
 2. B-Line; Figure B3067, 3,000-pound rating.

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B. Offset Pipe Clamp: Anvil; Figure 103, sizes 3/4-inch through 8 inches.

C. Channel Type:

1. Unistrut.
2. Anvil; Power-Strut.
3. B-Line; Strut System.
4. Aickinstrut (FRP).

2.04 PIPE SADDLES

A. Provide 90-degree to 120-degree pipe saddle for pipe 6 inches and larger with baseplates drilled for anchors bolts.

1. In accordance with Standard Detail 4005-515.
2. Sizes 20 inches through 60 inches, Piping Technology & Products, Inc.; Figure 2000.

B. Saddle Supports, Pedestal Type:

1. Minimum standard weight pipe stanchion, saddle, and anchoring flange.
2. Nonadjustable Saddle: MSS SP, Type 37 with U-bolt.
 - a. Anvil; Figure 259, sizes 4 inches through 36 inches with Figure 63C base.
 - b. B-Line; Figure B3095, sizes 1-inch through 36 inches with B3088S base.
 - c. B-Line; Figure B3092, sizes 3/4-inch through 36 inches with Figure B3088S base.

2.05 CHANNEL TYPE SUPPORT SYSTEMS

A. Channel Size: 12-gauge, 1-5/8-inch wide minimum Type 316 stainless steel, or 1-1/2-inch wide, minimum FRP.

B. Members and Connections: Design for loads using one-half of manufacturer's allowable loads.

C. Fasteners: Vinyl ester fiber, polyurethane base composite nuts and bolts, or encapsulated steel fasteners.

D. Manufacturers and Products:

1. B-Line; Strut System.
2. Unistrut.
3. Anvil; Power-Strut.

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4. Aickinstrut (FRP System).
5. Enduro-Durostrut (FRP Systems).

2.06 PIPE CLAMPS

- A. Riser Clamp: MSS SP 58, Type 8.
 1. Anvil; Figure 261, sizes 3/4-inch through 24 inches.
 2. B-Line; Figure B3373, sizes 1/2-inch through 30 inches.

2.07 ELBOW AND FLANGE SUPPORTS

- A. Elbow with Adjustable Stanchion: Sizes 2 inches through 18 inches, Anvil; Figure 62C base.
- B. Elbow with Nonadjustable Stanchion: Sizes 2-1/2 inches through 42 inches, Anvil; Figure 63A or Figure 63B base.
- C. Flange Support with Adjustable Base: Sizes 2 inches through 24 inches, Standon; Model S89.

2.08 INTERMEDIATE PIPE GUIDES

- A. Type: Hold down pipe guide.
 1. Manufacturer and Product: B-Line; Figure B3552, 1-1/2 inches through 30 inches.
- B. Type: U-bolts with double nuts to provide nominal 1/8-inch to 1/4-inch clearance around pipe; MSS SP 58, Type 24.
 1. Anvil; Figure 137 and Figure 137S.
 2. B-Line; Figure B3188 and Figure B3188NS.

2.09 PIPE ALIGNMENT GUIDES

- A. Type: Spider.
- B. Manufacturers and Products:
 1. Anvil; Figure 255, sizes 1/2-inch through 24 inches.
 2. B-Line; Figure B3281 through Figure B3287, sizes 1/2-inch through 24 inches.

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2.10 PIPE ANCHORS

- A. Type: Anchor chair with U-bolt strap.
- B. Manufacturer and Product: B-Line; Figure B3147A or Figure B3147B.

2.11 SEISMIC RESTRAINTS

- A. Solid pipe bracing attachment to pipe clevis with clevis cross brace and angle rod reinforcement.
- B. Manufacturers:
 - 1. Mason Industries.
 - 2. B-Line.
 - 3. Anvil.

2.12 ACCESSORIES

- A. Anchor Bolts:
 - 1. Size and Material: Sized by Contractor for required loads, and as specified in Section 05 50 00, Metal Fabrications.
 - 2. Bolt Length (Extension Above Top of Nut):
 - a. Minimum Length: Flush with top of nut preferred. If not flush, shall be no more than one thread recessed below top of nut.
 - b. Maximum Length: No more than a full nut depth above top of nut.
- B. Dielectric Barriers:
 - 1. Plastic coated hangers, isolation cushion, or tape.
 - 2. Manufacturer and Products:
 - a. B-Line; B1999 Vibra Cushion.
 - b. B-Line; Iso Pipe, Isolation Tape.
- C. Insulation Shields:
 - 1. Type: Stainless steel, MSS SP 58, Type 40.
 - 2. Manufacturers and Products:
 - a. Anvil; Figure 167, sizes 1/2-inch through 24 inches.
 - b. B-Line; Figure B3151, sizes 1/2-inch through 24 inches.

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- D. Welding Insulation Saddles:
1. Type: MSS SP 58, Type 39.
 2. Manufacturers and Products:
 - a. Anvil; Figure Series 160, sizes 1-inch through 36 inches.
 - b. B-Line; Figure Series B3160, sizes 1/2-inch through 24 inches.
- E. Plastic Pipe Support Channel:
1. Type: Continuous support for plastic pipe and to increase support spacing.
 2. Manufacturer and Product: B-Line; Figure Series B3106V, sizes 1/2-inch through 6 inches with Figure B3106 Vee bottom hanger.
- F. Hanger Rods, Clevises, Nuts, Sockets, and Turnbuckles: In accordance with MSS SP 58.
- G. Attachments:
1. I-Beam Clamp: Concentric loading type, MSS SP 58, Type 21, Type 28, Type 29, or Type 30, which engage both sides of flange.
 2. Concrete Insert: MSS SP 58, Type 18, continuous channel insert with load rating not less than that of hanger rod it supports.
 3. Welded Beam Attachment: MSS SP 58, Type 22.
 - a. Anvil; Figure 66.
 - b. B-Line; Figure B3083.
 4. U-Channel Concrete Inserts: As specified in Section 05 50 00, Metal Fabrications.
 5. Concrete Attachment Plates:
 - a. Anvil; Figure 47, Figure 49, or Figure 52.
 - b. B-Line; Figure B3084, Figure B3085, or Figure B3086.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General:
1. Install support systems in accordance with MSS SP 58, unless shown otherwise.
 2. Install pipe hanger rods plumb, within 4 degrees of vertical during shut down, start up or operations.
 3. Support piping connections to equipment by pipe support and not by equipment.

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4. Support large or heavy valves, fittings, and appurtenances independently of connected piping.
5. Support no pipe from pipe above it.
6. Support pipe at changes in direction or in elevation, adjacent to flexible joints and couplings, and where shown.
7. Do not use adhesive anchors for attachment of supports to ceiling or walls.
8. Do not install pipe supports and hangers in equipment access areas or bridge crane runs.
9. Brace hanging pipes against horizontal movement by both longitudinal and lateral sway bracing and to reduce movement after startup.
10. Install lateral supports for seismic loads at changes in direction.
11. Install pipe anchors where required to withstand expansion thrust loads and to direct and control thermal expansion.
12. Repair mounting surfaces to original condition after attachments are completed.

B. Standard Pipe Supports:

1. Horizontal Suspended Piping:
 - a. Single Pipes: Clevis hangers or adjustable swivel split-ring.
 - b. Grouped Pipes: Trapeze hanger system.
2. Horizontal Piping Supported from Walls:
 - a. Single Pipes: Wall brackets, or attached to wall, or to wall mounted framing with anchors.
 - b. Stacked Piping: Wall mounted framing system and “J” hangers acceptable for pipe smaller than 3-inch.
 - c. Pipe clamp that resists axial movement of pipe through support is not acceptable. Use pipe rollers supported from wall bracket.
3. Horizontal Piping Supported from Floors:
 - a. Saddle Supports:
 - 1) Pedestal Type, elbow and flange.
 - 2) Provide minimum 1-1/2-inch grout beneath baseplate.
 - b. Floor Mounted Channel Supports:
 - 1) Use for pipe smaller than 3-inch running along floors and in trenches at pipe elevations lower than can be accommodated using pedestal pipe supports.
 - 2) Attach channel framing to floors with baseplate on minimum 1-1/2-inch nonshrink grout and with anchor bolts.
 - 3) Attach pipe to channel with clips or pipe clamps.
 - c. Concrete Cradles: Use for pipe larger than 3 inches along floor and in trenches at pipe elevations lower than can be accommodated using stanchion type.

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4. Insulated Pipe:
 - a. Pipe hanger and support shall be on outside of insulation. Do not enclose within insulation.
 - b. Provide precut 120-degree sections of rigid insulation (minimum length same as shield), shields and oversized hangers or insulated saddle system (ISS).
 - c. Wall-mounted pipe clips not acceptable for insulated piping.
 5. Vertical Pipe: Support with wall bracket and elbow support, or riser clamp on floor penetration.
- C. Standard Attachments:
1. Concrete Walls: Concrete inserts or brackets or clip angles with concrete anchors.
 2. Concrete Beams: Concrete inserts, or if inserts are not used attach to vertical surface similar to concrete wall. Do not drill into beam bottom.
- D. Intermediate and Pipe Alignment Guides:
1. Provide pipe alignment guides, or pipe supports that provide same function, at expansion joints and loops.
 2. Guide pipe on each side of expansion joint or loop at 4 pipe and 14 pipe diameters from each joint or loop.
 3. Install intermediate guides on metal framing support systems not carrying pipe anchor or alignment guide.
- E. Accessories:
1. Insulation Shield: Install on insulated piping with oversize rollers and supports.
 2. Welding Insulation Saddle: Install on insulated steel pipe with oversize rollers and supports.
 3. Dielectric Barrier:
 - a. Provide between painted or galvanized carbon steel members and copper or stainless steel pipe or between stainless steel supports and nonstainless steel ferrous metal piping.
 - b. Install rubber wrap between submerged metal pipe and oversized clamps.

END OF SECTION

SECTION 40 27 00
PROCESS PIPING—GENERAL

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section and any supplemental Data Sheets:
1. Air Force: A-A-58092, Tape, Antiseize, Polytetrafluorethylene.
 2. American Association of State Highway and Transportation Officials (AASHTO): HB-17, Standard Specifications for Highway Bridges.
 3. American Petroleum Institute (API): SPEC 5L, Specification for Line Pipe.
 4. American Society of Mechanical Engineers (ASME):
 - a. Boiler and Pressure Vessel Code, Section IX, Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators.
 - b. B1.20.1, Pipe Threads, General Purpose (Inch).
 - c. B16.1, Gray Iron Pipe Flanges and Flanged Fittings Class 25, Class 125, and Class 250.
 - d. B16.3, Malleable Iron Threaded Fittings Class 150 and Class 300.
 - e. B16.5, Pipe Flanges and Flanged Fittings NPS 1/2 through NPS 24 Metric/Inch Standard.
 - f. B16.9, Factory-Made Wrought Buttwelding Fittings.
 - g. B16.11, Forged Fittings, Socket-Welding and Threaded.
 - h. B16.15, Cast Copper Alloy Threaded Fittings Class 125 and Class 250.
 - i. B16.21, Nonmetallic Flat Gaskets for Pipe Flanges.
 - j. B16.22, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - k. B16.24, Cast Copper Alloy Pipe Flanges and Flanged Fittings Class 150, Class 300, Class 600, Class 900, Class 1500, and Class 2500.
 - l. B16.25, Buttwelding Ends.
 - m. B16.42, Ductile Iron Pipe Flanges and Flanged Fittings Class 150 and Class 300.
 - n. B31.1, Power Piping.
 - o. B31.3, Process Piping.
 - p. B31.9, Building Services Piping.
 - q. B36.10M, Welded and Seamless Wrought Steel Pipe.

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5. American Society for Nondestructive Testing (ASNT): SNT-TC-1A, Recommended Practice for Personal Qualification and Certification in Nondestructive Testing.
6. American Water Works Association (AWWA):
 - a. C153/A21.53, Ductile-Iron Compact Fittings.
 - b. C606, Grooved and Shouldered Joints.
7. American Welding Society (AWS):
 - a. Brazing Handbook.
 - b. A5.8M/A5.8, Specification for Filler Metals for Brazing and Braze Welding.
 - c. D1.1/D1.1M, Structural Welding Code - Steel.
 - d. QC1, Standard for AWS Certification of Welding Inspectors.
8. ASTM International (ASTM):
 - a. A135/A135M, Standard Specification for Electric-Resistance-Welder Steel Pipe.
 - b. A139/A139M, Standard Specification for Electro-Fusion (Arc)-Welded Steel Pipe (NPS 4 Inches and Over).
 - c. A194/A194M, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
 - d. A216/A216M, Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service.
 - e. A234/A234M, Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
 - f. A240/A240M, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - g. A276, Standard Specification for Stainless Steel Bars and Shapes.
 - h. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - i. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 pounds per square inch Tensile Strength.
 - j. A312/A312M, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
 - k. A320/A320M, Standard Specification for Alloy-Steel and Stainless Steel Bolting for Low-Temperature Service.
 - l. A351/A351M, Standard Specification for Castings, Austenitic, for Pressure-Containing Parts.
 - m. A395/A395M, Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.
 - n. A403/A403M, Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings.

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- o. A409/A409M, Standard Specification for Welded Large Diameter Austenitic Steel Pipe for Corrosive or High-Temperature Service.
- p. A536, Standard Specification for Ductile Iron Castings.
- q. A563, Standard Specification for Carbon and Alloy Steel Nuts.
- r. A587, Standard Specification for Electric-Resistance-Welded Low-Carbon Steel Pipe for the Chemical Industry.
- s. A743/A743M, Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application.
- t. A744/A744M, Standard Specification for Castings, Iron-Chromium-Nickel, Corrosion Resistant, for Severe Service.
- u. A774/A774M, Standard Specification for As-Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Service at Low and Moderate Temperatures.
- v. A778, Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products.
- w. B32, Standard Specification for Solder Metal.
- x. B43, Standard Specification for Seamless Red Brass Pipe, Standard Sizes.
- y. B61, Standard Specification for Steam or Valve Bronze Castings.
- z. B62, Standard Specification for Composition Bronze or Ounce Metal Castings.
- aa. B75/B75M, Standard Specification for Seamless Copper Tube.
- bb. B88, Standard Specification for Seamless Copper Water Tube.
- cc. B98/B98M, Standard Specification for Copper-Silicon Alloy Rod, Bar and Shapes.
- dd. B462, Standard Specification for Forged or Rolled UNS N06030, UNS N06022, UNS N06035, UNS N06200, UNS N06059, UNS N10362, UNS N06686, UNS N08020, UNS N08024, UNS N08026, UNS N08367, UNS N10276, UNS N10665, UNS N10675, UNS N10629, UNS N08031, UNS N06045, UNS N06025, and UNS R20033 Alloy Pipe Flanges, Forged Fittings, and Valves and Parts for Corrosive High-Temperature Service.
- ee. B464, Standard Specification for Welded UNS N08020 Alloy Pipe.
- ff. B474, Standard Specification for Electric Fusion Welded Nickel and Nickel Alloy Pipe.
- gg. C582, Standard Specification for Contact-Molded Reinforced Thermosetting Plastic (RTP) Laminates for Corrosion-Resistant Equipment.
- hh. D412, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.

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- ii. D413, Standard Test Methods for Rubber Property-Adhesion to Flexible Substrate.
- jj. D543, Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents.
- kk. D1248, Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.
- ll. D1330, Standard Specification for Rubber Sheet Gaskets.
- mm. D1784, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
- nn. D1785, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedule 40, Schedule 80, and Schedule 120.
- oo. D2000, Standard Classification System for Rubber Products in Automotive Applications.
- pp. D2310, Standard Classification for Machine-Made “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.
- qq. D2464, Standard Specification for Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
- rr. D2466, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
- ss. D2467, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
- tt. D2564, Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
- uu. D2837, Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products.
- vv. D2996, Standard Specification for Filament-Wound “Fiberglass” (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe.
- ww. D3222, Standard Specification for Unmodified Poly(Vinylidene Fluoride) (PVDF) Molding Extrusion and Coating Materials.
- xx. D3350, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
- yy. D4101, Standard Specification for Polypropylene Injection and Extrusion Materials.
- zz. D4894, Standard Specification for Polytetrafluoroethylene (PTFE) Granular Molding and Ram Extrusion Materials.
- aaa. D4895, Standard Specification for Polytetrafluoroethylene (PTFE) Resin Produced from Dispersion.
- bbb. F423, Standard Specification for Polytetrafluoroethylene (PTFE) Plastic-Lined Ferrous Metal Pipe, Fittings, and Flanges.
- ccc. F436, Standard Specification for Hardened Steel Washers.
- ddd. F437, Standard Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.

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- eee. F439, Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
 - fff. F441/F441M, Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedule 40 and Schedule 80.
 - ggg. F493, Standard Specification for Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.
 - hhh. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
 - iii. F656, Standard Specification for Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
- 9. FM Global (FM).
 - 10. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS): SP 43, Wrought and Fabricated Butt-Welding Fittings for Low-Pressure, Corrosion Resistant Applications.
 - 11. NSF International (NSF): 61 Drinking Water System Components—Health Effects.
 - 12. National Electrical Manufacturers Association (NEMA): LI 1, Industrial Laminating Thermosetting Products.
 - 13. National Fire Protection Association (NFPA): 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances.

1.02 DEFINITIONS

- A. Submerged or Wetted: Zone below elevation of top face of channel walls and cover slabs.

1.03 DESIGN REQUIREMENTS

- A. Where pipe diameter, thickness, pressure class, pressure rating, or thrust restraint is not shown or specified, design piping system in accordance with the following:
 - 1. Process Piping: ASME B31.3, normal fluid service unless otherwise specified.

1.04 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Fabricated Piping:
 - a. Detailed pipe fabrication or spool drawings showing special fittings and bends, dimensions, coatings, and other pertinent information.

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- b. Layout drawing showing location of each pipe section and each special length; number or otherwise designate laying sequence on each piece.
2. Pipe Wall Thickness: Identify wall thickness and rational method or standard applied to determine wall thickness for each size of each different service including exposed, submerged, buried, and concrete-encased installations for Contractor-designed piping.
3. Pipe Corrosion Protection: Product data.
4. Anchorage and bracing drawings and cut sheets, as required by Section 01 88 15, Anchorage and Bracing.

B. Informational Submittals:

1. Manufacturer's Certification of Compliance, in accordance with Section 01 60 00, Product Requirements.
 - a. Pipe and fittings.
 - b. Factory applied resins and coatings.
2. Anchorage and bracing calculations as required by Section 01 88 15, Anchorage and Bracing.
3. Component and attachment testing seismic certificate of compliance as required by Section 01 45 33, Special Inspection, Observation, and Testing.
4. Torquing requirements and procedures, including torque values, for flanged piping assemblies.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. In accordance with Section 01 61 00, Common Product Requirements, and:
1. Flanges: Securely attach metal, hardboard, or wood protectors over entire gasket surface.
 2. Threaded or Socket Welding Ends: Fit with metal, wood, or plastic plugs or caps.
 3. Linings and Coatings: Prevent excessive drying.
 4. Cold Weather Storage: Locate products to prevent coating from freezing to ground.
 5. Handling: Use heavy canvas or nylon slings to lift pipe and fittings.

PART 2 PRODUCTS

2.01 PIPING

- A. As specified on Piping Data Sheet(s) located at the end of this section.

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B. Diameters Shown:

1. Standardized Products: Nominal size.
2. Fabricated Steel Piping (Except Cement-Lined): Outside diameter, ASME B36.10M.
3. Cement-Lined Steel Pipe: Lining inside diameter.

2.02 JOINTS

A. Grooved End System:

1. Rigid type.
2. Use of flexible grooved joints allowed where shown on the Drawings or with prior approval by Engineer.
3. Flanges: When required, furnish with grooved type flange adapters of same manufacturer as grooved end couplings.

B. Flanged Joints:

1. Flat-faced, carbon steel, or alloy flanges when mating with flat-faced cast or ductile iron flanges.
2. Higher pressure rated flanges as required to mate with equipment when equipment flange is of higher-pressure rating than required for piping.

C. Threaded Joints: NPT taper pipe threads in accordance with ASME B1.20.1.

D. Mechanical connections of high-density polyethylene pipe to auxiliary equipment such as valves, pumps, tanks, and other piping systems shall be through-flanged connections consisting of the following:

1. Polyethylene stub end thermally butt-fused to end of pipe.
2. ASTM A240/A240M, Type 304 stainless steel backing flange, 125-pound, ASME B16.1 standard. Use insulating flanges where shown.
3. Bolts and nuts of sufficient length to show a minimum of three complete threads when joint is made and tightened to manufacturer's standard. Retorque nuts after 4 hours.
4. Gaskets as specified on Data Sheet.

2.03 GASKET LUBRICANT

- A. Lubricant shall be supplied by pipe manufacturer and no substitute or “or-equal” will be allowed.

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2.04 PIPE CORROSION PROTECTION

- A. Coatings: See Section 09 90 00, Painting and Coating, for details of coating requirements.

2.05 VENT AND DRAIN VALVES

- A. Pipeline 2-Inch Diameter and Smaller: 1/2-inch vent, 1-inch drain, unless shown otherwise.
- B. Pipelines 2-1/2-Inch Diameter and Larger: 3/4-inch vent, 1-inch drain, unless shown otherwise.

2.06 FABRICATION

- A. Mark each pipe length on outside with the following:
 - 1. Size or diameter and class.
 - 2. Manufacturer's identification and pipe serial number.
 - 3. Location number on laying drawing.
 - 4. Date of manufacture.
- B. Code markings according to approved Shop Drawings.
- C. Shop fabricate flanged pipe in shop, not in field, and delivered to Site with flanges in place and properly faced. Threaded flanges shall be individually fitted and machine tightened on matching threaded pipe by manufacturer.

2.07 FINISHES

- A. Factory prepare, prime, and finish coat in accordance with Pipe Data Sheet(s) and Piping Schedule.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify size, material, joint types, elevation, horizontal location, and pipe service of existing pipelines to be connected to new pipelines or new equipment.
- B. Inspect size and location of structure penetrations to verify adequacy of wall pipes, sleeves, and other openings.

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3.02 PREPARATION

- A. See Piping Schedule and Section 09 90 00, Painting and Coating, for additional requirements.
- B. Notify Engineer at least 2 weeks prior to field fabrication of pipe or fittings.
- C. Inspect pipe and fittings before installation, clean ends thoroughly, and remove foreign matter and dirt from inside.
- D. Damaged Coatings and Linings: Repair using original coating and lining materials in accordance with manufacturer's instructions.

3.03 INSTALLATION—GENERAL

- A. Join pipe and fittings in accordance with manufacturer's instructions, unless otherwise shown or specified.
- B. Remove foreign objects prior to assembly and installation.
- C. Threaded and Coupled Joints:
 - 1. Conform to ASME B1.20.1.
 - 2. Produce sufficient thread length to ensure full engagement when screwed home in fittings.
 - 3. Countersink pipe ends, ream and clean chips and burrs after threading.
 - 4. Make connections with not more than three threads exposed.
 - 5. Lubricate male threads only with thread lubricant or tape as specified on Piping Data Sheets.
- D. Grooved-End Joints:
 - 1. Piping shall be grooved in accordance with manufacturer's latest published instructions and shall be accurately cut with tools conforming to coupling manufacturer's standards and to AWWA C606.
 - 2. Install grooved joint couplings and gaskets in accordance with manufacturer's latest published installation instructions.
- E. Soldered Joints:
 - 1. Use only solder specified for particular service.
 - 2. Cut pipe ends square and remove fins and burrs.
 - 3. After thoroughly cleaning pipe and fitting of oil and grease using solvent and emery cloth, apply noncorrosive flux to the male end only.

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4. Wipe excess solder from exterior of joint before hardened.
5. Before soldering, remove stems and washers from solder joint valves.

F. PVC and CPVC Piping:

1. Provide Schedule 80 threaded nipple where necessary to connect to threaded valve or fitting.
2. Use strap wrench for tightening threaded plastic joints. Do not overtighten fittings.
3. Do not thread Schedule 40 pipe.

G. High-Density Polyethylene Piping:

1. Join pipes, fittings, and flange connections by means of thermal butt-fusion.
2. Perform butt-fusion in accordance with pipe manufacturer's recommendations as to equipment and technique.

3.04 INSTALLATION—EXPOSED PIPING

A. Piping Runs:

1. Parallel to building or column lines and perpendicular to floor, unless shown otherwise.
2. Piping upstream and downstream of flow measuring devices shall provide straight lengths as required for accurate flow measurement.

B. Supports: As specified in Section 40 05 15, Piping Support Systems.

C. Group piping wherever practical at common elevations; install to conserve building space and not interfere with use of space and other work.

D. Unions or Flanges: Provide at each piping connection to equipment or instrumentation on equipment side of each block valve to facilitate installation and removal.

E. Install piping so that no load or movement in excess of that stipulated by equipment manufacturer will be imposed upon equipment connection; install to allow for contraction and expansion without stressing pipe, joints, or connected equipment.

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- F. Piping clearance, unless otherwise shown:
1. Over Walkway and Stairs: Minimum of 7 feet 6 inches, measured from walking surface or stair tread to lowest extremity of piping system including flanges, valve bodies or mechanisms, insulation, or hanger/support systems.
 2. Between Equipment or Equipment Piping and Adjacent Piping: Minimum 3 feet, measured from equipment extremity and extremity of piping system including flanges, valve bodies or mechanisms, insulation, or hanger/support systems.
 3. From Adjacent Work: Minimum 1-inch from nearest extremity of completed piping system including flanges, valve bodies or mechanisms, insulation, or hanger/support systems.
 4. Do not route piping in front of or to interfere with access ways, ladders, stairs, platforms, walkways, openings, doors, or windows.
 5. Headroom in front of openings, doors, and windows shall not be less than the top of the opening.
 6. Do not install piping containing liquids or liquid vapors in transformer vaults or electrical equipment rooms.
 7. Do not route piping over, around, in front of, in back of, or below electrical equipment including controls, panels, switches, terminals, boxes, or other similar electrical work.
- G. Provide stainless steel bird screen on open pipe ends connected to process piping (such as, vent piping), unless otherwise indicated on the Drawings. Attach bird screen with ring flange, threaded connection or other applicable pipe fitting.
- H. PVC, CPVC, or HDPE Pipe Placement:
1. Lay pipe snaking from one side of trench to other.
 2. Offset: As recommended by manufacturer for maximum temperature variation between time of solvent welding and during operation.
 3. Do not lay pipe when temperature is below 40 degrees F, or above 90 degrees F when exposed to direct sunlight.
 4. Shield ends to be joined from direct sunlight prior to and during the laying operation.
- I. Tolerances:
1. Deflection from Horizontal Line, Except PVC, CPVC, or HDPE: Maximum 2 inches.
 2. Deflection from Vertical Grade: Maximum 1/4-inch.

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3. Joint Deflection: Maximum of 75 percent of manufacturer's recommendation.
4. Horizontal position of pipe centerline on alignment around curves maximum variation of 1.75 feet from position shown.
5. Pipe Cover: Minimum 3 feet, unless otherwise shown.

3.05 PIPE CORROSION PROTECTION

- A. Ductile Iron Pipe: As specified in Section 09 90 00, Painting and Coating.
- B. Carbon Steel Pipe: As specified in Section 09 90 00, Painting and Coating.
- C. PVC and CPVC Pipe, Exposed: As specified in Section 09 90 00, Painting and Coating.
- D. Piping Accessories:
 1. Exposed:
 - a. Field paint black and galvanized steel, brass, copper, and bronze piping components as specified in Section 09 90 00, Painting and Coating, as applicable to base metal material.
 - b. Accessories include, but are not limited to, pipe hangers, supports, expansion joints, pipe guides, flexible couplings, vent and drain valves, and fasteners.

3.06 THRUST RESTRAINT

- A. All piping for this project is intended to be restrained joint.

3.07 BRANCH CONNECTIONS

- A. Do not install branch connections smaller than 1/2-inch nominal pipe size, including instrument connections, unless shown otherwise.
- B. When line of lower pressure connects to a line of higher pressure, requirements of Piping Data Sheet for higher pressure rating prevails up to and including first block valve in the line carrying the lower pressure, unless otherwise shown.
 1. Limitations: Threaded taps in pipe barrel are unacceptable.

3.08 VENTS AND DRAINS

- A. Vents and drains at high and low points in piping required for completed system may or may not be shown. Install vents on high points and drains on low points of pipelines at all low and high point locations.

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3.09 FIELD FINISHING

- A. Notify Engineer at least 3 days prior to start of surface preparation or coating application work.
- B. As specified in Section 09 90 00, Painting and Coating.

3.10 FIELD QUALITY CONTROL

- A. Pressure Leakage Testing: As specified in Section 40 80 01, Process Piping Leakage Testing.

3.11 CLEANING

- A. Following assembly and testing, and prior to final acceptance, flush pipelines, except as stated below, with water at 2.5 fps minimum flushing velocity until foreign matter is removed.
- B. Remove accumulated debris through drains 2 inches and larger or by removing spools and valves from piping.

3.12 SUPPLEMENTS

- A. The supplements listed below, following “End of Section,” are a part of this specification:
 - 1. Data Sheets.

Number	Title
40 27 00.10	Polyvinyl Chloride (PVC) Pipe and Fittings
40 27 00.20	High Density Polyethylene (HDPE) Pressure Pipe and Fittings

END OF SECTION

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SECTION 40 27 00.10 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS		
Item	Size	Description
General	All	Materials in contact with potable water shall conform to NSF 61 acceptance.
Pipe	All	Schedule 80 PVC: Type I, Grade I or Class 12454 conforming to ASTM D1784 and ASTM D1785. Pipe shall be manufactured with titanium dioxide for ultraviolet protection. Threaded Nipples: Schedule 80 PVC.
Fittings	All	Schedule to Match Pipe Above: ASTM D2466 and ASTM D2467 for socket weld type and Schedule 80 ASTM D2464 for threaded type. Fittings shall be manufactured with titanium dioxide for ultraviolet protection.
Joints	All	Solvent socket weld except where connection to threaded valves and equipment may require future disassembly.
Solvent Cement	All	Socket type joints shall be made employing solvent cement that meets or exceeds requirements of ASTM D2564 and primer that meets or exceeds requirements of ASTM F656, chemically resistant to the fluid service, and as recommended by pipe and fitting manufacturer. Solvent weld cement for PVC pipe joints in chemical service shall be free of silica filler and shall be certified by the manufacturer to be suitable for the intended service, IPS Weld-On 724 "or-equal". Submit Certification. Solvent cement and primer shall be listed by NSF 61 for contact with potable water.
Thread Lubricant	All	Teflon Tape.

END OF SECTION

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SECTION 40 27 00.20 HIGH DENSITY POLYETHYLENE (HDPE) PRESSURE PIPE AND FITTINGS		
Item	Size	Description
Pipe	All	HDPE: Shall meet or exceed requirements of ASTM D3350 for PE 4710 material with cell classification of 445474C, or better. Pressure rating shall be based on hydrostatic design stress of 1,600 psi at 73 degrees F and 800 psi at 180 degrees F. The material shall contain a stabilizer system for high oxidative environments with a CC3 rating per ASTM D3350. Pressure Rating: 64 psig and nominal SDR of 32.5.
Fittings	All	HDPE as specified under Pipe above. All pressure fittings shall be injection molded below 8 inches. For sizes above 8 inches, use thermal butt fusion. Fittings shall have same or higher-pressure rating as pipe.
Joints	All	Butt Fusion: Temperatures, times, and pressures of fusion shall be according to the manufacturer. Pipe joining equipment shall be provided by the pipe and fitting manufacturer.
Flanges	All	Stub end and polyethylene coated steel backing ring with ASME B16.5 Class 150 bolt pattern. Backing ring bore shall be chamfered or radiused to provide clearance to the flange adapter radius. Follow manufacturer's torque and tightening procedures.
MJ Adapters	All	MJ Adapter with stainless steel stiffener. Gaskets and bolting as provided by manufacturer.
Bolting	All	ASTM A193/A193M Type 316 stainless steel Grade B8M heavy hex head or stud bolts and ASTM A194/A194M Grade 8M heavy hex head nuts. Stud bolts are not allowed when bolting to tapped flanges. Torque bolts per gasket and flange manufacturer recommendations.
Gaskets	All	Shall be low torque, full face to ASME B16.5 Class 150 dimensions and shall have two concentric, convex, molded rings between center hole and bolt hole circle in flange. Rated to minimum 180 degrees F.

END OF SECTION

SECTION 40 27 02
PROCESS VALVES AND OPERATORS

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Gas Association (AGA): 3, Orifice Metering of Natural Gas and Other Related Hydrocarbon Fluids.
 2. American National Standards Institute (ANSI): Z21.15, Manually Operated Gas Valves for Appliances, Appliance Connector Valves and Hose End Valves.
 3. American Society of Mechanical Engineers (ASME):
 - a. B16.1, Gray Iron Pipe Flanges and Flanged Fittings: Class 25, Class 125, and Class 250.
 - b. B16.44, Manually Operated Metallic Gas Valves for Use in Above Ground Piping Systems up to 5 pounds per square inch.
 4. American Society of Sanitary Engineers (ASSE): 1011, Performance Requirements for Hose Connection Vacuum Breakers.
 5. American Water Works Association (AWWA):
 - a. C111/A21.11, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - b. C500, Metal-Seated Gate Valves for Water Supply Service.
 - c. C504, Rubber-Seated Butterfly Valves, 3 Inches (75 mm) Through 72 Inches (1,800 mm).
 - d. C508, Swing-Check Valves for Waterworks Service, 2-Inch Through 24-Inch (50-mm Through 600-mm) NPS.
 - e. C509, Resilient-Seated Gate Valves for Water Supply Service.
 - f. C510, Double Check Valve Backflow Prevention Assembly.
 - g. C511, Reduced-Pressure Principle Backflow Prevention Assembly.
 - h. C512, Air-Release, Air/Vacuum, and Combination Air Valves for Waterworks Service.
 - i. C515, Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service.
 - j. C541, Hydraulic and Pneumatic Cylinder and Vane-Type Actuators for Valves and Slide Gates.
 - k. C542, Electric Motor Actuators for Valves and Slide Gates.
 - l. C550, Protective Interior Coatings for Valves and Hydrants.
 - m. C606, Grooved and Shouldered Joints.
 - n. C800, Underground Service Line Valves and Fittings.

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6. ASTM International (ASTM):
 - a. A276, Standard Specification for Stainless Steel Bars and Shapes.
 - b. A351/A351M, Standard Specification for Castings, Austenitic, for Pressure-Containing Parts.
 - c. A380, Standard Practice for Cleaning, Descaling, and Passivation of Stainless Steel Parts, Equipment, and Systems.
 - d. A564/A564M, Standard Specification for Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes.
 - e. B61, Standard Specification for Steam or Valve Bronze Castings.
 - f. B62, Standard Specification for Composition Bronze or Ounce Metal Castings.
 - g. B98/B98M, Standard Specification for Copper-Silicon Alloy Rod, Bar, and Shapes.
 - h. B127, Standard Specification for Nickel-Copper Alloy (UNS N04400) Plate, Sheet, and Strip.
 - i. B139/B139, Standard Specification for Phosphor Bronze Rod, Bar and Shapes.
 - j. B164, Standard Specification for Nickel-Copper Alloy Rod, Bar, and Wire.
 - k. B194, Standard Specification for Copper-Beryllium Alloy Plate, Sheet, Strip, and Rolled Bar.
 - l. B584, Standard Specification for Copper Alloy Sand Castings for General Applications.
 - m. D429, Standard Test Methods for Rubber Property-Adhesion to Rigid Substrates.
 - n. D1784, Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
7. Canadian Standards Association, Inc. (CSA): 9.1, Manually Operated Gas Valves for Appliances, Appliance Connector Valves and Hose End Valves.
8. Chlorine Institute (CI): Pamphlet 6, Piping Systems for Dry Chlorine.
9. FM Global (FM).
10. Food and Drug Administration (FDA).
11. International Association of Plumbing and Mechanical Officials (IAPMO).
12. Manufacturers Standardization Society (MSS):
 - a. SP 80, Bronze Gate, Globe, Angle, and Check Valves.
 - b. SP 81, Stainless Steel, Bonnetless, Flanged Knife Gate Valves.
 - c. SP 85, Gray Iron Globe and Angle Valves, Flanged and Threaded Ends.
 - d. SP 88, Diaphragm Valves.
 - e. SP 110, Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

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13. National Electrical Manufacturers Association (NEMA): 250, Enclosures for Electrical Equipment (1,000 Volts Maximum).
14. NSF International (NSF):
 - a. NSF/ANSI 61, Drinking Water System Components - Health Effects.
 - b. NSF/ANSI 372, Drinking Water System Components - Lead Content.
15. UL.
16. USC Foundation for Cross-Connection Control and Hydraulic Research.

1.02 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. Product data sheets for each make and model. Indicate valve Type Number, applicable Tag Number, and facility name/number or service where used.
 - b. Complete catalog information, descriptive literature, specifications, and identification of materials of construction.
 - c. Anchorage and bracing drawings and cut sheets, as required by Section 01 88 15, Anchorage and Bracing.

B. Informational Submittals:

1. Anchorage and bracing calculations as required by Section 01 88 15, Anchorage and Bracing.
2. Component and attachment testing seismic certificate of compliance as required by Section 01 45 33, Special Inspection, Observation, and Testing.
3. Tests and inspection data.
4. Operation and Maintenance Data as specified in Section 01 78 23, Operation and Maintenance Data.
5. Manufacturer's Certificate of Proper Installation, in accordance with Section 01 43 33, Manufacturers' Field Services.

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PART 2 PRODUCTS

2.01 GENERAL

- A. Valves to include operator, actuator, handwheel, chain wheel, extension stem, floor stand, operating nut, chain, wrench, and accessories to allow a complete operation from the intended operating level.
- B. Valve to be suitable for intended service. Renewable parts not to be of a lower quality than specified.
- C. Valve same size as adjoining pipe, unless otherwise called out on the Drawings or in Supplements.
- D. Valve ends to suit adjacent piping.
- E. Resilient seated valves shall have no leakage (drip-tight) in either direction at valve rated design pressure. All other valves shall have no leakage (drip-tight) in either direction at valve rated design pressure, unless otherwise allowed for in this section or in stated valve standard.
- F. Size operators and actuators to operate valve for full range of pressures and velocities.
- G. Valve to open by turning counterclockwise, unless otherwise specified.
- H. Factory mount operator, actuator, and accessories.

2.02 MATERIALS

- A. Bronze and brass valve components and accessories that have surfaces in contact with water to be alloys containing less than 16 percent zinc and 2 percent aluminum.
 - 1. Approved alloys are of the following ASTM designations: B61, B62, B98/B98M (Alloy UNS No. C65100, C65500, or C66100), B139/B139M (Alloy UNS No. C51000), B584 (Alloy UNS No. C90300 or C94700), B164, B194, and B127.
 - 2. Stainless steel Alloy 18-8 may be substituted for bronze.
- B. Valve materials in contact with or intended for drinking water service to meet the following requirements:
 - 1. Materials to comply with requirements of the Safe Drinking Water Act and other applicable federal, state, and local requirements.

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2. Coatings materials to be formulated from materials deemed acceptable to NSF/ANSI 61.

2.03 FACTORY FINISHING

A. General:

1. Interior coatings for valves and hydrants shall be in accordance with AWWA C550, unless otherwise specified.
2. Exterior coating for valves and hydrants shall be in accordance with Section 09 90 00, Painting and Coating.
3. Material in contact with potable water shall conform to NSF/ANSI 61.
4. Exposed safety isolation valves and lockout valves with handles, handwheels, or chain wheels shall be “safety yellow.”

B. Where epoxy lining and coating are specified, factory finishing shall be as follows:

1. In accordance with AWWA C550.
2. Either two-part liquid material or heat-activated (fusion) material except only heat-activated material if specified as “fusion” or “fusion bonded” epoxy.
3. Minimum 7-mil dry film thickness except where limited by valve operating tolerances.

2.04 VALVES

A. Ball Valves:

1. Type V330 PVC Ball Valve 2 Inches and Smaller:
 - a. Rated 150 pounds per square inch at 73 degrees F, with ASTM D1784, Type I, Grade 1 polyvinyl chloride body, ball, and stem, end entry, double union design, solvent-weld socket ends, elastomer seat, Viton or Teflon O-ring stem seals, to block flow in both directions.
 - b. Manufacturers and Products:
 - 1) Nibco; Chemtrol Tru-Bloc.
 - 2) ASAHI/America; Type 21.
 - 3) Spears; True Union.

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2.05 OPERATORS AND ACTUATORS

A. Manual Operators:

1. General:
 - a. For AWWA valves, operator force not to exceed requirements of applicable valve standard. Provide gear reduction operator when force exceeds requirements.
 - b. For non-AWWA valves, operator force not to exceed applicable industry standard or 80 pounds, whichever is less, under operating condition, including initial breakaway. Provide gear reduction operator when force exceeds requirements.
 - c. Operator self-locking type or equipped with self-locking device.
 - d. Position indicator on quarter-turn valves.
 - e. Worm and gear operators one-piece design, worm-gears of gear bronze material. Worm of hardened alloy steel with thread ground and polished. Traveling nut type operator's threaded steel reach rod with internally threaded bronze or ductile iron nut.
2. Exposed Operator:
 - a. Galvanized and painted handwheel.
 - b. Cranks on gear type operator.
 - c. Chain wheel operator with tieback, extension stem, floor stand, and other accessories to permit operation from normal operation level.
 - d. Valve handles to take a padlock, and wheels a chain and padlock.

PART 3 EXECUTION

3.01 INSTALLATION

A. Flange Ends:

1. Flanged valve bolt holes shall straddle vertical centerline of pipe.
2. Clean flanged faces, insert gasket and bolts, and tighten nuts progressively and uniformly.

B. Screwed Ends:

1. Clean threads by wire brushing or swabbing.
2. Apply joint compound.

C. PVC and CPVC Valves: Install using solvents approved for valve service conditions.

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D. Valve Installation and Orientation:

1. General:
 - a. Install valves so handles operate from fully open to fully closed without encountering obstructions.
 - b. Install valves in location for easy access for routine operation and maintenance.
 - c. Install valves per manufacturer's recommendations.
2. Gate, Globe, and Ball Valves:
 - a. Install operating stem vertical when valve is installed in horizontal runs of pipe having centerline elevations 4 feet 6 inches or less above finished floor, unless otherwise shown.
 - b. Install operating stem horizontal in horizontal runs of pipe having centerline elevations greater than 4 feet 6 inches above finish floor, unless otherwise shown.
3. Eccentric Plug Valves:
 - a. Unless otherwise restricted or shown on the Drawings, install valve as follows:
 - 1) Liquids with suspended solids service with horizontal flow: Install valve with stem in horizontal position with plug up when valve is open. Install valve with seat end upstream (flow to produce unseating pressure).
 - 2) Liquids with suspended solids service with vertical flow: Install valve with seat in highest portion of valve (seat up).
 - 3) Clean Liquids and Gas Service: Install valve with seat end downstream of higher pressure when valve is closed (higher pressure forces plug into seat).
4. Butterfly Valves:
 - a. Unless otherwise restricted or shown on the Drawings, install valve a minimum of 8 diameters downstream of a horizontal elbow or branch tee with shaft in horizontal position.
 - b. For vertical elbow or branch tee immediately upstream of valve, install valve with shaft in vertical position.
 - c. For horizontal elbow or branch tee immediately upstream of valve, install valve with shaft in horizontal position.
 - d. When installed immediately downstream of swing check, install valve with shaft perpendicular to swing check shaft.
 - e. For free inlet or discharge into basins and tanks, install valve with shaft in vertical position.
5. Check Valves:
 - a. Install valve in accordance with manufacturer's instructions and provide required distance from immediate upstream fitting.
 - b. Install valve in vertical flow (up) piping only for gas services.
 - c. Install swing check valve with shaft in horizontal position.

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- d. Install double disc swing check valve to be perpendicular to flow pattern when discs are open.
- 6. Solenoid Valves: Install in accordance with manufacturer's instructions.
 - E. Install line size ball valve and union upstream of each solenoid valve, in-line flow switch, or other in-line electrical device, excluding magnetic flowmeters, for isolation during maintenance.
 - F. Install safety isolation valves on compressed air.
 - G. Locate valve to provide accessibility for control and maintenance. Install access doors in finished walls and plaster ceilings for valve access.
 - H. Extension Stem for Operator: Where depth of valve operating nut is 3 feet or greater below finish grade, furnish operating extension stem with 2-inch operating nut to bring operating nut to a point within 6 inches of finish grade.
 - I. Torque Tube: Where operator for quarter-turn valve is located on floor stand, furnish extension stem torque tube of a type properly sized for maximum torque capacity of valve.
 - J. Floor Box and Stem: Steel extension stem length shall locate operating nut in floor box.
 - K. Chain Wheel and Guide: Install chain wheel and guide assemblies or chain lever assemblies on manually operated valves over 6 feet 9 inches above finish floor. Install chain to within 3 feet of finish floor. Where chains hang in normally traveled areas, use appropriate "L" type tie-back anchors. Install chains to within operator horizontal reach of 2 feet 6 inches maximum, measured from normal operator standing location or station.

3.02 TESTS AND INSPECTION

- A. Valve may be either tested while testing pipelines, or as a separate step.
- B. Test that valves open and close smoothly under operating pressure conditions. Test that two-way valves open and close smoothly under operating pressure conditions from both directions.
- C. Inspect air and vacuum valves as pipe is being filled to verify venting and seating is fully functional.
- D. Count and record number of turns to open and close valve; account for discrepancies with manufacturer's data.

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- E. Set, verify, and record set pressures for relief and regulating valves.
- F. Automatic valves to be tested in conjunction with control system testing. Set opening and closing speeds, limit switches, as required or recommended by Engineer.
- G. Test hydrostatic relief valve seating; record leakage. Adjust and retest to maximum leakage of 0.1 gpm per foot of seat periphery.

3.03 MANUFACTURER'S SERVICES

- A. See Section 01 43 33, Manufacturers' Field Services.

END OF SECTION

SECTION 40 80 01
PROCESS PIPING LEAKAGE TESTING

PART 1 GENERAL

1.01 SUBMITTALS

A. Informational Submittals:

1. Testing Plan:
 - a. Submit prior to testing and include at least the information that follows.
 - 1) Testing dates.
 - 2) Piping systems and section(s) to be tested.
 - 3) Test type.
 - 4) Method of isolation.
 - 5) Calculation of maximum allowable leakage for piping section(s) to be tested.
2. Certifications of Calibration: Testing equipment.
3. Certified Test Report.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PREPARATION

A. Notify Engineer in writing 5 days in advance of testing. Perform testing in presence of Engineer.

B. Pressure Piping:

1. Install temporary thrust blocking or other restraint as necessary to protect adjacent piping or equipment and make taps in piping prior to testing.
2. Prior to test, remove or suitably isolate appurtenant instruments or devices that could be damaged by pressure testing.
3. New Piping Connected to Existing Piping:
 - a. Isolate new piping with grooved-end pipe caps, spectacle blinds, blind flanges, or as acceptable to Engineer.
 - b. Test joint between new piping and existing piping by methods that do not place entire existing system under test load, as approved by Engineer.
4. Test Pressure: As specified herein.

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- C. Test section may be filled with water and allowed to stand under low pressure prior to testing.

3.02 HYDROSTATIC TEST FOR PRESSURE PIPING

- A. Fluid: Clean water of such quality to prevent corrosion of materials in piping system.
- B. Exposed Piping:
 - 1. Perform testing on installed piping prior to application of insulation.
 - 2. Maximum Filling Velocity: 0.25-foot per second, applied over full area of pipe.
 - 3. Vent piping during filling. Open vents at high points of piping system or loosen flanges, using at least four bolts, or use equipment vents to purge air pockets.
 - 4. Maintain hydrostatic test pressure continuously for 30 minutes, minimum, and for such additional time as necessary to conduct examinations for leakage.
 - 5. Examine joints and connections for leakage.
 - 6. Correct visible leakage and retest as specified.
 - 7. Empty pipe of water prior to final cleaning or disinfection.

3.03 PNEUMATIC TEST FOR PRESSURE PIPING

- A. Do not perform on:
 - 1. PVC or CPVC pipe.
 - 2. Buried and other non-exposed piping.
 - 3. Piping that is designed to carry a liquid.
- B. Fluid: Oil-free, dry air.
- C. Procedure:
 - 1. Apply preliminary pneumatic test pressure of 25 pounds per square inch gauge maximum to piping system prior to final leak testing, to locate visible leaks. Apply soap bubble mixture to joints and connections; examine for leakage.
 - 2. Correct visible leaks and repeat preliminary test until visible leaks are corrected.
 - 3. Gradually increase pressure in system to half of specified test pressure. Thereafter, increase pressure in steps of approximately one-tenth of specified test pressure until required test pressure is reached.

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4. Maintain pneumatic test pressure continuously for minimum of 10 minutes and for such additional time as necessary to conduct soap bubble examination for leakage.
 5. Correct visible leakage and retest as specified.
- D. Allowable Leakage: Piping system, exclusive of possible localized instances at pump or valve packing, shall show no visual evidence of leakage.
- E. After testing and final cleaning, purge with nitrogen those lines that will carry flammable gases to assure no explosive mixtures will be present in system during filling process.

3.04 FIELD QUALITY CONTROL

- A. Test Report Documentation:
1. Test date.
 2. Description and identification of piping tested.
 3. Test fluid.
 4. Test pressure.
 5. Remarks, including:
 - a. Leaks (type, location).
 - b. Repair/replacement performed to remedy excessive leakage.
 6. Signed by Contractor and Engineer to represent that test has been satisfactorily completed.

END OF SECTION

PART 4

DRAWINGS
(BOUND SEPARATELY)
