NACHES-SELAH IRRIGATION DISTRICT
SELAH, WA

MAIN CANAL FLUME REPLACEMENT & OTHER CANAL IMPROVEMENTS – Bid Package

Construction Documents
Project Manual

SEPTEMBER 2014

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Naches-Selah Irrigation District
620 Guinan Loop Road
Selah, WA 98942-9641
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HDR Project No. 235609
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BIDDING REQUIREMENTS, CONTRACT FORMS, AND CONDITIONS OF THE CONTRACT
SECTION 00020
INVITATION TO BID

RECEIPT OF BIDS
Sealed bids for the Main Canal Flume Replacement & Other Canal Improvements Project will be received by the Naches-Selah Irrigation District (District) at the following address:

620 Guinan Loop Road
Selah, WA 98942-9641

until 2:00 P.M. PST on October 14, 2014, and shortly thereafter the bids will be opened publicly and read aloud.

GENERAL DESCRIPTION OF WORK
The completed Work shall provide the District with 10 and 8-foot diameter piping, concrete flumes, concrete-lined canals, and reinforced concrete inlet and outlet structures. The full Contract cost estimate ranges from $5 to $6 million.

The Project covers the approximately 5,000 feet of 9-10 feet wide wood and concrete flumes that are part of the Selah Valley Canal (Main Canal) between Mile 2 to Mile 9 of the canal. These flumes were installed between 1920 and 1960. The Project is focused on demolition of existing wood and concrete flumes, import and compaction of fill materials, canal shaping and concrete liner placement, concrete flume placement, installation of 8-foot and 10-foot diameter Fiberglass Reinforced Polymer Mortar Pipe and appurtenances, one County Road crossing, and O&M road construction.

The Project is located north of U.S. Route 12 near Naches, Yakima County, Washington. The Project skirts the north edge of the valley formed by the Naches River.

TYPE OF BID
The bid will be submitted on the form supplied as a part of Section 00301. Unit and lump sum prices will be provided in the appropriate locations on the form. The bid will be the total dollar value as stated on the bid form based on the quantities provided to the Contractor and the unit or lump sum prices provided by the Contractor.

DOCUMENT AVAILABILITY
Hard copies of the Bidding and Contract Documents may be obtained from the Naches-Selah Irrigation District at $25 per copy. Bidding and Contract Documents may be requested by calling the District at (509) 697-4177. Copies will be mailed or can be picked up at the District Office. No partial sets of Specifications or Drawings will be issued. Bidder must register with District Office to be considered an eligible bidder and to receive addenda.

Failure to obtain a complete set of Contract Documents will be the responsibility of the Contractor and will not be deemed as a valid reason for change orders, variations in contract price, or variance from the requirements of the entirety of the contract documents.

PREBID CONFERENCE
A mandatory prebid conference and site showing will be held at 10:00 A.M. PST on October 7, 2014.
Each Bid shall be accompanied by documents required in Section 00100 of the Specifications “Instructions to Bidders”, including bid security using the format provided in Section 00400 or equivalent. The successful BIDDER will be required to furnish Performance and Payment Bonds as described in Section 00700 - GENERAL CONDITIONS. The Contract Time is defined in Section 00700 - GENERAL CONDITIONS, and specified in Specification Section 00500 - AGREEMENT. Requirements concerning the qualifications of BIDDERS are described in Section Specification 00100 - INSTRUCTIONS TO BIDDERS. The Naches-Selah Irrigation District reserves the right to waive irregularities and to reject bids.

ISSUED BY:  
District Manager, Naches-Selah Irrigation District  
Date

END OF SECTION
SECTION 00100
INSTRUCTIONS TO BIDDERS

1. Defined Terms

Terms used in these Instructions to Bidders, which are defined in Section 00700 - General Conditions, have the meanings assigned to them in the General Conditions.

Certain additional terms used in these Instructions to Bidders have the meanings indicated below which are applicable to both the singular and plural thereof.

1.1. BIDDER: One who submits a Bid directly to OWNER as distinct from a sub-bidder, who submits a Bid to a BIDDER.

1.2. Successful BIDDER: The lowest, responsible and responsive BIDDER to whom OWNER (on the basis of OWNER's evaluation) makes an award.

2. Copies of Bidding Documents

2.1. Complete sets of the Bidding Documents may be obtained from the Naches-Selah Irrigation District (District) Offices at:

620 Guinan Loop Road
Selah, WA 98942-9641

Bidding and Contract Documents may be requested by calling the District at (509) 697-4177. Copies will be mailed or can be picked up at the District Office. No partial sets of Specifications or Drawings will be issued.

Failure to obtain a complete set of Contract Documents will be the responsibility of the Contractor and will not be deemed as a valid reason for change orders, variations in contract price, or variance from the requirements of the entirety of the contract documents.

2.2. Complete sets of Bidding Documents must be used in preparing Bids; neither OWNER nor ENGINEER assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

2.3. OWNER and ENGINEER in making copies of Bidding Documents available do so only for the purpose of obtaining Bids for the Work and do not confer a license or grant for any other use.

3. Qualifications of BIDDERS

3.1 As an attachment to the Bid, the BIDDER will submit the following information:

- Project Descriptions for three (3) previously completed projects that demonstrate BIDDER capabilities sufficient to accomplish the Work. Information about these projects should include approximate volumes of material moved, general means/methodology for accomplishing the work, project time frames, and other information the BIDDER believes will assist the OWNER in evaluating the BIDDER’S capabilities. Project information should include contact information for one Owner reference for each of the projects.
- A list of the equipment to be used on this Project and the availability of that equipment.
- A brief general statement describing the availability of BIDDERS labor/staff for this Project.
- Identify the project Superintendent and briefly describe their relevant experience.
• A brief description of the BIDDERS plan for accomplishing the Work (not more than one page).
• Contractors shall submit a preliminary plan including number of personnel of each classification, size and number of heavy equipment, anticipated work schedule, and anticipated quantity of material to be placed and/or installed per working day.
• Each Bid must contain evidence of BIDDER's qualification to do business in the state of Washington. BIDDER must currently be registered as a contractor in the state of Washington and not be on the debarred contractor’s list.

3.2 To demonstrate qualifications to perform the Work, each BIDDER must be prepared to submit within 5 days after Bid opening, upon OWNER's request, additional detailed written evidence, such as financial data, previous experience, present commitments, lists of BIDDER owned equipment to be used on the Project, clarification of the project plan, and other such data as may be called for in the Contract Documents.

4. Examination of Bidding and Contract Documents, Other Related Data, and the Project Site

4.1. It is the responsibility of each BIDDER before submitting a Bid to:

4.1.1. Thoroughly examine the Contract Documents and other related data identified in the Bidding Documents (including "technical data" referred to in Paragraph 4.2. below).

4.1.2. Become familiar with and satisfy BIDDER as to the general, local and site conditions that may affect cost, progress, performance or furnishing of the Work.

4.1.3. Attend the mandatory site visit (see paragraph 20 below).

4.1.4. Consider federal, state and local Laws and Regulations that may affect cost, progress, performance or furnishing of the Work.

4.1.5. Study and carefully correlate BIDDER's knowledge and observations with the Contract Documents and such other related data.

4.1.6. Promptly notify ENGINEER and/or OWNER of all conflicts, errors, ambiguities or discrepancies in or between the Contract Documents and such other related documents or as noted from the BIDDERS observation of field conditions.

When conflicts, errors, ambiguities or discrepancies are discovered in or between Contract Documents and/or other related documents, and when said conflicts, etc., have not been resolved through the interpretations by ENGINEER and/or OWNER as described in Paragraph 6., BIDDER shall include in the Bid the greater quantity or better quality of Work, or compliance with the more stringent requirement resulting in a greater cost. Such greater cost shall be included in the Bid.

4.2. Reference is made to the Supplementary Conditions, Section 00805, for identification of:

4.2.1. Reports of explorations and tests of subsurface conditions at the site which have been utilized by ENGINEER in preparation of the Contract Documents. BIDDER may rely upon the general accuracy of the "technical data" contained in such reports as the best information available to the OWNER but the Bidder should not assume that subsurface conditions are completely and fully described in the reports for the purposes of bidding or construction.
4.2.2. Drawings (if they exist) of physical conditions of existing surface and subsurface structures (except Underground Facilities) which are at or contiguous to the site that have been utilized by ENGINEER in preparation of the Contract Documents. BIDDER may rely upon the general accuracy of the "technical data" contained in such drawings but the Bidder should not assume that subsurface conditions are completely and fully described in the drawings for the purposes of bidding or construction.

4.2.3. Copies of such reports and drawings will be made available by OWNER to any BIDDER on request. Those reports and drawings are not part of the Contract Documents, but the "technical data" contained therein upon which BIDDER is entitled to rely on as provided in Paragraph 4.02 of the General Conditions, Section 00700, has been identified and established in Paragraph SC-4.02 of the Supplementary Conditions, Section 00805. BIDDER is responsible for any interpretation or conclusion drawn by the BIDDER from any "technical data" or any such data, interpretations, opinions or information.

4.3. Before submitt ing a Bid, each BIDDER will be responsible to obtain such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions at the site which may affect cost, progress, performance or furnishing of the Work. The BIDDER is responsible for obtaining supplementary information related to any aspect of the means, methods, techniques, sequences or procedures of construction to be employed by BIDDER and safety precautions and programs incident thereto or which BIDDER deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price and other terms and conditions of the Contract Documents.

4.4. On request, OWNER will provide each BIDDER access to the site to conduct such examinations, investigations, explorations, tests and studies as each BIDDER deems necessary for submission of a Bid. BIDDER must restore the site to its former conditions upon completion of explorations, investigations, tests and studies carried out by the BIDDER.

4.5. The submission of a Bid will constitute an incontrovertible representation by BIDDER that:

(i) BIDDER has complied with every requirement of the Instructions to Bidders,

(ii) that without exception the Bid is premised upon performing and furnishing the Work required by the Contract Documents and applying the specific means, methods, techniques, sequences or procedures of construction (if any) that may be shown or indicated or expressly required by the Contract Documents,

(iii) that BIDDER has given ENGINEER and OWNER written notice of all conflicts, errors, ambiguities and discrepancies in the Contract Documents and the written resolutions thereof by ENGINEER or OWNER are acceptable to BIDDER, and when said conflicts, etc., have not been resolved through the interpretations by ENGINEER or OWNER as described in Paragraph 6., BIDDER has included in the Bid the greater quantity or better quality of Work, or compliance with the more stringent requirement resulting in a greater cost, and

(iv) that the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

4.6 All of the quantities in the contract documents are estimates, and will likely vary in the field. The bid quantities will be the basis for bid award. It is recognized that the calculation of quantities using the drawings can produce different values than those in the bid form. Contractor will be paid on actual material excavated, moisture conditioned, moved, placed, and compacted per the plans as measured by field survey (either traditional survey or survey grade GPS as approved by the Engineer).
5. Availability of Lands for Work, Etc.

5.1. The lands upon which the Work is to be performed, rights-of-way and easements for access thereto and other lands designated for use by CONTRACTOR in performing the Work are identified in the Contract 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. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by OWNER unless otherwise provided in the Contract Documents.

6. Interpretations and Addenda

6.1. All questions about the meaning or intent of the Bidding Documents are to be directed to the OWNER in writing using either hardcopy or e-mail. Interpretations or clarifications considered necessary by the OWNER in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by the OWNER as having received the Bidding Documents. Questions received less than 5 days prior to the date for opening of Bids may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

Address questions to:

Naches-Selah Irrigation District
620 Guinan Loop Road
Selah, WA   98942-9641

Attn: Justin Harter
E-mail: justinh@n-sid.org
Fax: (509) 697-5255

6.2. Addenda may also be issued to modify the Bidding Documents as deemed advisable by OWNER or ENGINEER.

6.3 Addenda will be issued via e-mail only to Bidders who have obtained complete hard copies of the Contract Documents from the Owner and have provided their contact information to be included on the BIDDERS list.

6.4 The Bid will include written acknowledgement of receipt of all addenda.

7. Bid Security

7.1. Each Bid must be accompanied by Bid security made payable to OWNER in an amount of five (5) percent of BIDDER's maximum Bid price and in the form of a certified or bank check or a Bid Bond in its original form issued by a surety meeting the requirements of Paragraphs 5.01 and 5.02 of the General Conditions.

7.2. The Bid security of Successful BIDDER will be retained until such BIDDER has executed the Agreement, furnished the required Contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful BIDDER fails to execute and deliver the Agreement and furnish the required Contract security and certificates of insurance within 20 days after the Notice of Award, OWNER may annul the Notice of Award and the Bid security of that BIDDER will be forfeited. The Bid security of other BIDDERS whom OWNER believes to have a reasonable chance of receiving the award may be retained by OWNER until the earlier of the 7th day after the Effective Date of the Agreement or the 36th day (time period for award plus 1 day) after the Bid opening, whereupon Bid security furnished by such BIDDERS will be returned. Bid security with Bids which are not competitive will be returned within 7 days after the Bid opening.
8. Contract Times

The number of days within which, or the date(s) by which, the Work is to be: 1) substantially completed and 2) fully completed and ready for final payment, is set forth in the Agreement and/or incorporated therein by reference to the attached Bid Form in Section 00301.

9. Liquidated Damages

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

10. Substitute and "Or-Equal" Items

The Contract, if awarded, will be on the basis of materials and equipment described in the Project Drawings or specified in the Specifications without consideration of possible substitute or "or-equal" items. Whenever it is indicated in the Project Drawings or specified in the Specifications that a "substitute" or "or-equal" item of material or equipment may be furnished or used by CONTRACTOR if acceptable to ENGINEER, application for such acceptance will not be considered by OWNER and ENGINEER until after the Effective Date of the Agreement. The procedure for submission of any such application by CONTRACTOR and consideration by ENGINEER and/or OWNER is set forth in Paragraphs 6.05A, 6.05B and 6.05C of the General Conditions, Section 00700, and may be supplemented elsewhere in the Technical Specifications.

11. Subcontractors, Suppliers and Others

11.1. If the Supplementary Conditions (Section 00805) or elsewhere in the Contract Documents, require the identity of certain Subcontractors, Suppliers and other persons and organizations to be submitted to OWNER in advance of a specified date or prior to the Effective Date of the Agreement, the apparent Successful BIDDER, and any other BIDDER so requested, shall within 5 days after Bid opening submit to OWNER a list of all such Subcontractors, Suppliers and other persons and organizations proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, person or organization if requested by OWNER. OWNER or ENGINEER, who after due investigation has reasonable objection to any proposed Subcontractor, Supplier, other person or organization, may before the Notice of Award is given request apparent Successful BIDDER to submit an acceptable substitute.

If apparent Successful BIDDER declines to make any such substitution, OWNER may award the Contract to the next lowest BIDDER that proposes to use acceptable Subcontractors, Suppliers and other persons and organizations. The declining to make requested substitutions will not constitute grounds for sacrificing the Bid security of any BIDDER. Any Subcontractor, Supplier, other person or organization listed and to whom OWNER or ENGINEER does not make written objection prior to the giving of the Notice of Award will be deemed acceptable to OWNER and ENGINEER subject to revocation of such acceptance after the Effective Date of the Agreement as provided in Paragraph 6.06.B. of the General Conditions.

11.2. No CONTRACTOR shall be required to employ any Subcontractor, Supplier, other person or organization against whom CONTRACTOR has reasonable objection.

12. Bid Form

12.1. The Bid Form is included with the Bidding Documents in Section 00301; additional copies may be obtained from ENGINEER (or the Issuing Office).

12.2. All blanks on the Bid Form must be completed by printing in blue or black ink or by typewriter.
12.3. Bids by corporations must be executed in the corporate name by the president or a vice-president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal must be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation must be shown below the signature.

12.4. Bids by partnerships must be executed in the partnership name and signed by a partner, whose title must appear under the signature and the official address of the partnership must be shown below the signature.

12.5. All names must be typed or printed in black ink below the signature.

12.6. The Bid shall contain an acknowledgement of receipt of all Addenda (the numbers of which must be filled in on the Bid Form).

12.7. The address and telephone number for communications regarding the Bid must be shown.

12.8. Evidence of authority to conduct business as an out-of-state corporation in the state where the Work is to be performed shall be provided in accordance with Paragraph 3 above. State CONTRACTOR license number, must also be shown.

12.9. Descriptions of experience and capabilities in accordance with Paragraph 3 above.

13. Submission of Bids

13.1 Bids shall be submitted on the prescribed Bid Form, provided with the Bidding Documents, at the time and place indicated in the Advertisement or Invitation to Bid, addressed to Naches-Selah Irrigation District and shall be enclosed in an opaque sealed envelope, marked with the Project title, and the name and address of BIDDER, and accompanied by the Bid security and other required documents. If the Bid is sent through the mail or other delivery system, the sealed envelope shall be enclosed in a separate envelope with the notation "BID ENCLOSED" on the face of it. It is the responsibility of the BIDDER to ensure the Bids are received by the bid opening time. Express delivery system is not guaranteed by a specific time at the OWNER’s office.

13.2 Submitted Bids will include:
- Completed Bid Form (Section 00301 in its entirety)
- Signed Debarment Affidavit (Section 00390)
- Original Bid Bond (Section 00400 or other as allowed by these instructions)
- Signed Anti-Discrimination Certificate (Section 00460)
- Signed Non-Collusion Affidavit (Section 00470)
- Signed Copies of Addenda
- Experience and reference information per Paragraph 3 above.

14. Modification and Withdrawal of Bids

14.1. Bids may be modified or withdrawn by an appropriate document duly executed in the manner that a Bid must be executed and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.

14.2. If, within 24 HRS after Bids are opened, any BIDDER files a duly signed, written notice with OWNER and promptly thereafter demonstrates to the reasonable satisfaction of OWNER that there was a material and substantial mistake in the preparation of its Bid, that BIDDER may withdraw its Bid and the Bid security will be returned. Thereafter, that BIDDER will be disqualified from further bidding on the Work to be provided under the Contract Documents.
15. Opening of Bids

Bids will be opened and (unless obviously non-responsive) read aloud publicly at the place where Bids are to be submitted. An abstract of the amounts of the base Bids and major alternates (if any) will be made available to BIDDERS after the opening of Bids.

16. Bids to Remain Subject to Acceptance

All Bids will remain subject to acceptance for the time period specified for Notice of Award and execution and delivery of Agreement and required Contract security and certificate of insurance by Successful Bidder. OWNER may, at OWNER's sole discretion, release any Bid and return the Bid security prior to that date.

17. Award of Contract

17.1. OWNER reserves the right to reject any or all Bids, including without limitation the rights to reject any or all nonconforming, nonresponsive, unbalanced or conditional Bids and to reject the Bid of any BIDDER if OWNER believes that it would not be in the best interest of the Project to make an award to that BIDDER, whether because the Bid is not responsive or the BIDDER is unqualified or of doubtful financial ability or cannot satisfy the OWNER that the BIDDER has the resources in sufficient quantity and good condition to carry out the Work within the required time-frame or fails to meet any other pertinent standard or criteria established by OWNER. OWNER also reserves the right to waive all informalities not involving price, time or changes in the Work and to negotiate Contract terms with the Successful BIDDER. Discrepancies between the multiplication of units of Work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between words and figures will be resolved in favor of the words.

Any or all bids will be rejected if OWNER has reason to believe that collusion exists among the BIDDERS.

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

17.3. OWNER may consider the qualifications and experience of Subcontractors, Suppliers, and other persons and organizations proposed for those portions of the Work as to which the identity of Subcontractors, Suppliers, and other persons and organizations must be submitted as provided in the Supplementary Conditions. OWNER also may consider the operating costs, maintenance requirements, performance data and guarantees of major items of materials and equipment proposed for incorporation in the Work when such data is required to be submitted prior to the Notice of Award.

17.4. OWNER may conduct such investigations as OWNER deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications and financial ability of BIDDERS, proposed Subcontractors, Suppliers and other persons and organizations to perform and furnish the Work in accordance with the Contract Documents to OWNER's satisfaction within the prescribed time.

17.5. If the Contract is to be awarded, it will be awarded to lowest BIDDER whose evaluation by OWNER indicates to OWNER that the award will be in the best interests of the Project.

17.6. If the Contract is to be awarded, OWNER will give Successful BIDDER a Notice of Award within 10 days after the day of the Bid opening. No other act of OWNER or others will constitute acceptance of a Bid.
18. **Contract Security**

Paragraph 5.01. of the General Conditions and the Supplementary Conditions set forth OWNER's requirements as to Performance and Payment Bonds. When the Successful BIDDER delivers the executed Agreement to OWNER, it must be accompanied by the required Performance and Payment Bonds.

19. **Signing of Agreement**

When OWNER gives a Notice of Award to the Successful BIDDER, it will be accompanied by the required number of unsigned counterparts of the Agreement. Within 20 days thereafter CONTRACTOR shall sign and deliver the required number of counterparts of the Agreement to OWNER with the required Bonds, Intent to Pay Prevailing Wages, and Certificates of Insurance. Within 10 days thereafter OWNER shall deliver one fully signed counterpart to CONTRACTOR.

20. **Prebid Conference**

A mandatory prebid conference will be held at 10:00 A.M. PST on October 7, 2014 at the Project Site (near Mile 3 of Selah Valley Canal – 12745 Old Naches HWY, Naches, WA). Representatives of OWNER and ENGINEER will be present to discuss the Project. OWNER will transmit to all prospective BIDDERS of record such Addenda as ENGINEER or OWNER considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective. Bids submitted by BIDDERS whose names do not appear on the sign in sheet from the mandatory site visit will not be considered for award.

END OF SECTION
It is the Contractor’s responsibility to assure that the appropriate prevailing wage rates and benefits are paid for the project.

State of Washington
DEPARTMENT OF LABOR AND INDUSTRIES

Washington State Prevailing Wage Rates for Public Works Contracts

The PREVAILING WAGES listed here include both the hourly wage rate and the hourly rate of fringe benefits. On public works projects, workers’ wage and benefit rates must add to not less than this total. A brief description of overtime calculation requirements is provided on the Benefit Code Key.

YAKIMA COUNTY
Effective 11-01-2014

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<tr>
<th>Trade</th>
<th>Job Classification</th>
<th>Wage</th>
<th>Holiday</th>
<th>Overtime</th>
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<td>$34.81</td>
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<td>Guage and Lock Tender</td>
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<td>Hazardous Waste Worker (level A)</td>
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<td>Laborers</td>
<td>Nozzleman (concrete Pump, Green Cutter When Using Combination Of High Pressure Air &amp; Water On Concrete &amp; Rock, Sandblast, Gunite, Shotcrete, Water Bla</td>
<td>$34.81</td>
<td>7A</td>
<td>3I</td>
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<td>Laborers</td>
<td>Pavement Breaker</td>
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<td>Laborers</td>
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<td>Laborers</td>
<td>Pipe Layer/tailor</td>
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<td>Pipe Pot Tender</td>
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<td>Pipe Reliner</td>
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<td>Pipe Wrapper</td>
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<td>Powderman</td>
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<td>Powderman's Helper</td>
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<td>Power Jacks</td>
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<td>Laborers</td>
<td>Raker - Asphalt</td>
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<td>7A</td>
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<td>Laborers</td>
<td>Re-timberman</td>
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<td>7A</td>
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<td>Remote Equipment Operator</td>
<td>$34.81</td>
<td>7A</td>
<td>3I</td>
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<tr>
<td>Laborers</td>
<td>Rigger/signal Person</td>
<td>$34.81</td>
<td>7A</td>
<td>3I</td>
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<td>Laborers</td>
<td>Rip Rap Person</td>
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<td>Rodder</td>
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<td>Scaffold Erector</td>
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<td>Scale Person</td>
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<td>7A</td>
<td>3I</td>
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<td>Laborers</td>
<td>Sloper (over 20&quot;)</td>
<td>$34.81</td>
<td>7A</td>
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<td>Laborers</td>
<td>Sloper Sprayer</td>
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<td>7A</td>
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<tr>
<td>Laborers</td>
<td>Spreader (concrete)</td>
<td>$34.81</td>
<td>7A</td>
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<td>Laborers</td>
<td>Stake Hopper</td>
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<td>Laborers</td>
<td>Stock Piler</td>
<td>$34.07</td>
<td>7A</td>
<td>3I</td>
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<td>Laborers</td>
<td>Tamper &amp; Similar Electric, Air &amp; Gas Operated Tools</td>
<td>$34.81</td>
<td>7A</td>
<td>3I</td>
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<td>Laborers</td>
<td>Tamper (multiple &amp; Self-propelled)</td>
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<td>7A</td>
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<td>Laborers</td>
<td>Timber Person - Sewer (lagger, Shorer &amp; Cribber)</td>
<td>$34.81</td>
<td>7A</td>
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<td>Laborers</td>
<td>Toolroom Person (at Jobsite)</td>
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<td>7A</td>
<td>3I</td>
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<td>Topper</td>
<td>$34.07</td>
<td>7A</td>
<td>3I</td>
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<td>Laborers</td>
<td>Track Laborer</td>
<td>$34.07</td>
<td>7A</td>
<td>3I</td>
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<td>Track Liner (power)</td>
<td>$34.81</td>
<td>7A</td>
<td>3I</td>
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<td>Laborers</td>
<td>Traffic Control Laborer</td>
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<td>7A</td>
<td>3I</td>
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<td>Traffic Control Supervisor</td>
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<td>7A</td>
<td>3I</td>
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<td>Truck Spotter</td>
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<td>7A</td>
<td>3I</td>
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<td>Tugger Operator</td>
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<td>7A</td>
<td>3I</td>
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<td>Laborers</td>
<td>Tunnel Work-Miner</td>
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<td>7A</td>
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<td>Laborers</td>
<td>Vibrator</td>
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<td>Vinyl Seamer</td>
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<td>Watchman</td>
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<td>7A</td>
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<td>Welder</td>
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<td>3I</td>
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<td>Laborers</td>
<td>Well Point Laborer</td>
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<td>3I</td>
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<td>Window Washer/cleaner</td>
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<td>7A</td>
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<td>Laborers - Underground Sewer &amp; Water</td>
<td>General Laborer &amp; Topman</td>
<td>$34.07</td>
<td>7A</td>
<td>3I</td>
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<td>Trade</td>
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<td>Wage</td>
<td>Holiday</td>
<td>Overtime</td>
<td>Notes</td>
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<td>Laborers - Underground Sewer &amp; Water</td>
<td>Pipe Layer</td>
<td>$34.81</td>
<td>7A</td>
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<tr>
<td>Landscape Construction</td>
<td>Irrigation Or Lawn Sprinkler Installers</td>
<td>$9.32</td>
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<td>Landscape Construction</td>
<td>Landscape Equipment Operators Or Truck Drivers</td>
<td>$15.45</td>
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<td>Landscape Construction</td>
<td>Landscaping Or Planting Laborers</td>
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<td>Lathers</td>
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<td>5D</td>
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<td>Marble Setters</td>
<td>Journey Level</td>
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<td>Metal Fabrication (In Shop)</td>
<td>Fitter</td>
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<td>Metal Fabrication (In Shop)</td>
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<td>Machine Operator</td>
<td>$11.32</td>
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<td>Painter</td>
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<td>Millwright</td>
<td>Journey Level</td>
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<td>Modular Buildings</td>
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<td>Painters</td>
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<td>Pile Driver</td>
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<td>5D</td>
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<td>Playground &amp; Park Equipment Installers</td>
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<td>Plumbers &amp; Pipefitters</td>
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<td>Power Equipment Operators</td>
<td>Asphalt Plant Operators</td>
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<td>Power Equipment Operators</td>
<td>Assistant Engineer</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators</td>
<td>Barrier Machine (zipper)</td>
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<td>3C</td>
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<td>Power Equipment Operators</td>
<td>Batch Plant Operator, Concrete</td>
<td>$54.75</td>
<td>7A</td>
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<td>8P</td>
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<td>Bobcat</td>
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<td>Brokk - Remote Demolition Equipment</td>
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<td>Brooms</td>
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<td>Cableways</td>
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<td>Concrete Pump: Truck Mount With Boom Attachment Over 42M</td>
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<td>7A</td>
<td>3C</td>
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<td>Concrete Finish Machine -laser Screed</td>
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<td>Concrete Pump - Mounted Or Trailer High Pressure Line Pump, Pump High Pressure.</td>
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<td>Concrete Pump: Truck Mount With Boom Attachment Up To 42m</td>
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<td>7A</td>
<td>3C</td>
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<td>Power Equipment Operators</td>
<td>Conveyors</td>
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<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Cranes: 20 Tons Through 44 Tons With Attachments</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators</td>
<td>Cranes: 100 Tons Through 199 Tons, Or 150' Of Boom Including Jib With Attachments</td>
<td>$55.79</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators</td>
<td>Cranes: 200 Tons To 300 Tons, Or 250' Of Boom (including Jib With Attachments)</td>
<td>$56.36</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators</td>
<td>Cranes: 45 Tons Through 99 Tons, Under 150' Of Boom (including Jib With Attachments)</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Cranes: 100 Tons Through 199 Tons</td>
<td>$56.36</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators</td>
<td>Cranes: Friction Over 200 Tons</td>
<td>$56.92</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Cranes: Over 300 Tons Or 300' Of Boom (including Jib With Attachments)</td>
<td>$56.92</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators</td>
<td>Cranes: Through 19 Tons With Attachments A-frame Over 10 Tons</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
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<td>Crusher</td>
<td>$54.75</td>
<td>7A</td>
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<td>Power Equipment Operators</td>
<td>Deck Engineer/deck Winches (power)</td>
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<td>7A</td>
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<td>8P</td>
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<td>Derricks, On Building Work</td>
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<td>Power Equipment Operators</td>
<td>Dozers D-9 &amp; Under</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Drill Oilers: Auger Type, Truck Or Crane Mount</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Drilling Machine</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Elevator And Man-lift: Permanent And Shaft Type</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Finishing Machine, Bidwell And Gamaco &amp; Similar Equipment</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Forklift: 3000 Lbs And Over With Attachments</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Forklifts: Under 3000 Lbs. With Attachments</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Grade Engineer: Using Blue Prints, Cut Sheets, Etc</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Gradechecker/stakeman</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Guardrail Punch</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Hard Tail End Dump Articulating Off- Road Equipment 45 Yards. &amp; Over</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Hard Tail End Dump Articulating Off-road Equipment Under 45 Yards</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Trade</td>
<td>Job Classification</td>
<td>Wage</td>
<td>Holiday</td>
<td>Overtime</td>
<td>Notes</td>
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</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Horizontal/directional Drill Locator</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Horizontal/directional Drill Operator</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Hydralifts/boom Trucks Over 10 Tons</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Hydralifts/boom Trucks, 10 Tons And Under</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Loader, Overhead 8 Yards. &amp; Over</td>
<td>$55.79</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Loader, Overhead, 6 Yards. But Not Including 8 Yards</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Loaders, Overhead Under 6 Yards</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Loaders, Plant Feed</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Loaders: Elevating Type Belt</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Locomotives, All</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Material Transfer Device</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators</td>
<td>Mechanics, All (leadmen - $0.50 Per Hour Over Mechanic)</td>
<td>$55.79</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Motor Patrol Grader - Non-finishing</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Motor Patrol Graders, Finishing</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Mucking Machine, Mole, Tunnel Drill, Boring, Road Header And/or Shield</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Oil Distributors, Blower Distribution &amp; Mulch Seeding Operator</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Outside Hoists (elevators And Manlifts), Air Tuggers,strato</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Overhead, Bridge Type Crane: 20 Tons Through 44 Tons</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Overhead, Bridge Type: 100 Tons And Over</td>
<td>$55.79</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Overhead, Bridge Type: 45 Tons Through 99 Tons</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Pavement Breaker</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Pile Driver (other Than Crane Mount)</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Plant Oiler - Asphalt, Crusher</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Posthole Digger, Mechanical</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Power Plant</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Pumps - Water</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Quad 9, Hd 41, D10 And Over</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Quick Tower - No Cab, Under 100 Feet In Height Based To Boom</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Trade</td>
<td>Job Classification</td>
<td>Wage</td>
<td>Holiday</td>
<td>Overtime</td>
<td>Notes</td>
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<tr>
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</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Remote Control Operator On Rubber Tired Earth Moving Equipment</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Rigger And Bellman</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Rollagon</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Roller, Other Than Plant Mix</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Roller, Plant Mix Or Multi-lift Materials</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Roto-mill, Roto-grinder</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Saws - Concrete</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Scaper, Self Propelled Under 45 Yards</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Scrapers - Concrete &amp; Carry All</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Scoopers, Self-propelled: 45 Yards And Over</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Service Engineers - Equipment</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Shotcrete/gunite Equipment</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Shovels, Excavator, Backhoe, Tractors Under 15 Metric Tons</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Shovels, Excavator, Backhoe: Over 30 Metric Tons To 50 Metric Tons</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Shovels, Excavator, Backhoes, Tractors: 15 To 30 Metric Tons</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Shovels, Excavator, Backhoes: Over 50 Metric Tons To 90 Metric Tons</td>
<td>$55.79</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Shovels, Excavator, Backhoes: Over 90 Metric Tons</td>
<td>$56.36</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Slipform Pavers</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Spreader, Topsider &amp; Screedman</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Subgrader Trimmer</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Tower Bucket Elevators</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Tower Crane Over 175' in Height, Base To Boom</td>
<td>$56.36</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Tower Crane Up To 175' In Height Base To Boom</td>
<td>$55.79</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Transporters, All Track Or Truck Type</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Trenching Machines</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Truck Crane Oiler/driver - 100 Tons And Over</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Truck Crane Oiler/driver Under 100 Tons</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Truck Mount Portable Conveyor</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Welder</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Wheel Tractors, Farmall Type</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Yo Yo Pay Dozer</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Trade</td>
<td>Job Classification</td>
<td>Wage</td>
<td>Holiday</td>
<td>Overtime</td>
<td>Notes</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Asphalt Plant Operators</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Underground Sewer &amp; Water</td>
<td>Assistant Engineer</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Barrier Machine (zipper)</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Underground Sewer &amp; Water</td>
<td>Batch Plant Operator, Concrete</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Bobcat</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Underground Sewer &amp; Water</td>
<td>Brokk - Remote Demolition Equipment</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Brooms</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Underground Sewer &amp; Water</td>
<td>Bump Cutter</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators</td>
<td>Cableways</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Underground Sewer &amp; Water</td>
<td>Chipper</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators</td>
<td>Compressor</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Underground Sewer &amp; Water</td>
<td>Concrete Pump: Truck Mount</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>With Boom Attachment Over 42  M</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Concrete Finish Machine - laser</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Underground Sewer &amp; Water</td>
<td>Screed</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Concrete Pump - Mounted Or</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Underground Sewer &amp; Water</td>
<td>Trailer High Pressure Line Pump,</td>
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<tr>
<td>Pump High Pressure.</td>
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<td></td>
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<tr>
<td>Power Equipment Operators</td>
<td>Concrete Pump: Truck Mount</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Underground Sewer &amp; Water</td>
<td>Truck Mount With Boom Attachment Up To 42m</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Conveyors</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Underground Sewer &amp; Water</td>
<td>Cranes: 20 Tons Through 44 Tons</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>With Attachments</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Power Equipment Operators</td>
<td>Cranes: 100 Tons Through 199 Tons,</td>
<td>$55.79</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Underground Sewer &amp; Water</td>
<td>Or 150' Of Boom (Including Jib With Attachments)</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Cranes: 200 Tons To 300 Tons,</td>
<td>$56.36</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Underground Sewer &amp; Water</td>
<td>Or 250' Of Boom (including Jib With Attachments)</td>
<td></td>
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<tr>
<td>Power Equipment Operators</td>
<td>Cranes: 45 Tons Through 99 Tons,</td>
<td>$55.24</td>
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<td>Underground Sewer &amp; Water</td>
<td>Under 150' Of Boom (including Jib With Attachments)</td>
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<td>Power Equipment Operators</td>
<td>Cranes: A-frame - 10 Tons And</td>
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<td>7A</td>
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<tr>
<td>Underground Sewer &amp; Water</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Cranes: Friction 100 Tons Through</td>
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<td>Underground Sewer &amp; Water</td>
<td>199 Tons</td>
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<td>Power Equipment Operators</td>
<td>Cranes: Friction Over 200 Tons</td>
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<tr>
<td>Underground Sewer &amp; Water</td>
<td>Cranes: Over 300 Tons Or 300' Of Boom (including Jib With Attachments)</td>
<td>$56.92</td>
<td>7A</td>
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<td>Cranes: Through 19 Tons With Attachments A-frame Over 10 Tons</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
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<td>Underground Sewer &amp; Water</td>
<td>Crusher</td>
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<td>Deck Engineer/deck Winches (power)</td>
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<td>Derricks, On Building Work</td>
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<td>7A</td>
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<td>Underground Sewer &amp; Water</td>
<td>Dozers D-9 &amp; Under</td>
<td>$54.33</td>
<td>7A</td>
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<td>Underground Sewer &amp; Water</td>
<td>Drill Oilers: Auger Type, Truck Or Crane Mount</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
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<td>Underground Sewer &amp; Water</td>
<td>Drilling Machine</td>
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<td>7A</td>
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<td>Underground Sewer &amp; Water</td>
<td>Elevator And Man-lift: Permanent And Shaft Type</td>
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<td>7A</td>
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<tr>
<td>Underground Sewer &amp; Water</td>
<td>Finishing Machine, Bidwell And Gamaco &amp; Similar Equipment</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
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<tr>
<td>Underground Sewer &amp; Water</td>
<td>Forklift: 3000 Lbs And Over With Attachments</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
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<tr>
<td>Power Equipment Operators-</td>
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<tr>
<td>Underground Sewer &amp; Water</td>
<td>Forklifts: Under 3000 Lbs. With Attachments</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
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<tr>
<td>Underground Sewer &amp; Water</td>
<td>Grade Engineer: Using Blue Prints, Cut Sheets, Etc</td>
<td>$54.75</td>
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<td>Power Equipment Operators-</td>
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<td>Underground Sewer &amp; Water</td>
<td>Gradechecker/stakeman</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Underground Sewer &amp; Water</td>
<td>Guardrail Punch</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Underground Sewer &amp; Water</td>
<td>Hard Tail End Dump Articulating Off- Road Equipment 45 Yards. &amp; Over</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators-</td>
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</tr>
<tr>
<td>Underground Sewer &amp; Water</td>
<td>Hard Tail End Dump Articulating Off-road Equipment Under 45 Yards</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators-</td>
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<tr>
<td>Underground Sewer &amp; Water</td>
<td>Horizontal/directional Drill Locator</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators-</td>
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<tr>
<td>Underground Sewer &amp; Water</td>
<td>Horizontal/directional Drill Operator</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators-</td>
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<tr>
<td>Underground Sewer &amp; Water</td>
<td>Hydralifts/boom Trucks Over 10 Tons</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators-</td>
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<tr>
<td>Underground Sewer &amp; Water</td>
<td>Hydralifts/boom Trucks, 10 Tons And Under</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators-</td>
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<tr>
<td>Underground Sewer &amp; Water</td>
<td>Loader, Overhead 8 Yards. &amp; Over</td>
<td>$55.79</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators-</td>
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<tr>
<td>Underground Sewer &amp; Water</td>
<td>Loader, Overhead, 6 Yards. But Not Including 8 Yards</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators-</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Underground Sewer &amp; Water</td>
<td>Loaders, Overhead Under 6 Yards</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Trade</td>
<td>Job Classification</td>
<td>Wage</td>
<td>Holiday</td>
<td>Overtime</td>
<td>Notes</td>
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<tr>
<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Loaders, Plant Feed</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Loaders: Elevating Type Belt</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Locomotives, All</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Material Transfer Device</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Mechanics, All (leadmen - $0.50 Per Hour Over Mechanic)</td>
<td>$55.79</td>
<td>7A</td>
<td>3C</td>
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<tr>
<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Motor Patrol Grader - Non-finishing</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Motor Patrol Graders, Finishing</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Mucking Machine, Mole, Tunnel Drill, Boring, Road Header And/or Shield</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Oil Distributors, Blower Distribution &amp; Mulch Seeding Operator</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Outside Hoists (elevators And Manlifts), Air Tuggers,strato</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Overhead, Bridge Type Crane: 20 Tons Through 44 Tons</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Overhead, Bridge Type: 100 Tons And Over</td>
<td>$55.79</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Overhead, Bridge Type: 45 Tons Through 99 Tons</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Pavement Breaker</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
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<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Pile Driver (other Than Crane Mount)</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Plant Oiler - Asphalt, Crusher</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Posthole Digger, Mechanical</td>
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<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Power Plant</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Pumps - Water</td>
<td>$51.77</td>
<td>7A</td>
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<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Quad 9, Hd 41, D10 And Over</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Quick Tower - No Cab, Under 100 Feet In Height Based To Boom</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Rigger And Bellman</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Rollagon</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
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<td>Wage</td>
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<td>Overtime</td>
<td>Notes</td>
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<td>Power Equipment Operators</td>
<td>Underground Sewer &amp; Water</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Roller, Other Than Plant Mix</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators</td>
<td>Roller, Plant Mix Or Multi-lift Materials</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators</td>
<td>Roto-mill, Roto-grinder</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators</td>
<td>Saws - Concrete</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators</td>
<td>Scraper, Self Propelled Under 45 Yards</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators</td>
<td>Scraps - Concrete &amp; Carry All</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators</td>
<td>Scrapers, Self-propelled: 45 Yards And Over</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators</td>
<td>Service Engineers - Equipment</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Shotcrete/gunite Equipment</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators</td>
<td>Shovel, Excavator, Backhoe, Tractors Under 15 Metric Tons</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Power Equipment Operators</td>
<td>Shovel, Excavator, Backhoe: Over 30 Metric Tons To 50 Metric Tons</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Shovel, Excavator, Backhoes: 15 To 30 Metric Tons</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Shovel, Excavator, Backhoes: Over 50 Metric Tons To 90 Metric Tons</td>
<td>$55.79</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Shovel, Excavator, Backhoes: Over 90 Metric Tons</td>
<td>$56.36</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Slipform Pavers</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Spreader, Topsider &amp; Screedman</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Subgrader Trimmer</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Tower Bucket Elevators</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Tower Crane Over 175'in Height, Base To Boom</td>
<td>$56.36</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators</td>
<td>Tower Crane Up To 175' In Height Base To Boom</td>
<td>$55.79</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Transporters, All Track Or Truck Type</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Trenching Machines</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
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</tr>
<tr>
<td>Power Equipment Operators</td>
<td>Truck Crane Oiler/driver - 100 Tons And Over</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
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<td>Power Equipment Operators</td>
<td>Truck Crane Oiler/driver Under 100 Tons</td>
<td>$54.33</td>
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<td>Power Equipment Operators</td>
<td>Truck Mount Portable Conveyor</td>
<td>$54.75</td>
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<td>Trade</td>
<td>Job Classification</td>
<td>Wage</td>
<td>Holiday</td>
<td>Overtime</td>
<td>Notes</td>
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<tr>
<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Welder</td>
<td>$55.24</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Wheel Tractors, Farmall Type</td>
<td>$51.77</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Equipment Operators-Underground Sewer &amp; Water</td>
<td>Yo Yo Pay Dozer</td>
<td>$54.75</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<tr>
<td>Power Line Clearance Tree Trimmers</td>
<td>Journey Level In Charge</td>
<td>$44.86</td>
<td>5A</td>
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</tr>
<tr>
<td>Power Line Clearance Tree Trimmers</td>
<td>Spray Person</td>
<td>$42.58</td>
<td>5A</td>
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<tr>
<td>Power Line Clearance Tree Trimmers</td>
<td>Tree Equipment Operator</td>
<td>$44.86</td>
<td>5A</td>
<td>4A</td>
<td></td>
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<td>Power Line Clearance Tree Trimmers</td>
<td>Tree Trimmer</td>
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<td>5A</td>
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<td>Power Line Clearance Tree Trimmers</td>
<td>Tree Trimmer Groundperson</td>
<td>$30.20</td>
<td>5A</td>
<td>4A</td>
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<td>Refrigeration &amp; Air Conditioning Mechanics</td>
<td>Journey Level</td>
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<td></td>
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<tr>
<td>Residential Brick Mason</td>
<td>Journey Level</td>
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<td></td>
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<tr>
<td>Residential Carpenters</td>
<td>Journey Level</td>
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<td></td>
<td>1</td>
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<td>Residential Cement Masons</td>
<td>Journey Level</td>
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<td>Residential Drywall Applicators</td>
<td>Journey Level</td>
<td>$18.00</td>
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<td>Residential Drywall Tapers</td>
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<td>Residential Electricians</td>
<td>Journey Level</td>
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<td>Residential Glaziers</td>
<td>Journey Level</td>
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<td>Residential Insulation Applicators</td>
<td>Journey Level</td>
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<td>Residential Laborers</td>
<td>Journey Level</td>
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<td></td>
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<td>Residential Marble Setters</td>
<td>Journey Level</td>
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<td></td>
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<tr>
<td>Residential Painters</td>
<td>Journey Level</td>
<td>$16.32</td>
<td></td>
<td>1</td>
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<tr>
<td>Residential Plumbers &amp; Pipefitters</td>
<td>Journey Level</td>
<td>$20.55</td>
<td></td>
<td>1</td>
<td></td>
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<tr>
<td>Residential Refrigeration &amp; Air Conditioning Mechanics</td>
<td>Journey Level</td>
<td>$28.11</td>
<td></td>
<td>1</td>
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<tr>
<td>Residential Sheet Metal Workers</td>
<td>Journey Level (Field or Shop)</td>
<td>$38.97</td>
<td>5A</td>
<td>1X</td>
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<tr>
<td>Residential Soft Floor Layers</td>
<td>Journey Level</td>
<td>$17.55</td>
<td></td>
<td>1</td>
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</tr>
<tr>
<td>Residential Sprinkler Fitters (Fire Protection)</td>
<td>Journey Level</td>
<td>$9.32</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Residential Stone Masons</td>
<td>Journey Level</td>
<td>$16.00</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Residential Terrazzo Workers</td>
<td>Journey Level</td>
<td>$9.32</td>
<td></td>
<td>1</td>
<td></td>
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<tr>
<td>Residential Terrazzo/Tile Finishers</td>
<td>Journey Level</td>
<td>$17.00</td>
<td></td>
<td>1</td>
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<tr>
<td>Residential Tile Setters</td>
<td>Journey Level</td>
<td>$16.78</td>
<td></td>
<td>1</td>
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<td>Roofers</td>
<td>Journey Level</td>
<td>$12.00</td>
<td></td>
<td>1</td>
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<tr>
<td>Sheet Metal Workers</td>
<td>Journey Level (Field or Shop)</td>
<td>$53.31</td>
<td>5A</td>
<td>1X</td>
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<td>Trade</td>
<td>Job Classification</td>
<td>Wage</td>
<td>Holiday</td>
<td>Overtime</td>
<td>Notes</td>
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<tr>
<td>Sign Makers &amp; Installers (Electrical)</td>
<td>Journey Level</td>
<td>$14.65</td>
<td></td>
<td>1</td>
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<tr>
<td>Sign Makers &amp; Installers (Non-Electrical)</td>
<td>Journey Level</td>
<td>$14.65</td>
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<td>Soft Floor Layers</td>
<td>Journey Level</td>
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<td>5A</td>
<td>1N</td>
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<td>Solar Controls For Windows</td>
<td>Journey Level</td>
<td>$9.32</td>
<td></td>
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<td>Sprinkler Fitters (Fire Protection)</td>
<td>Journey Level</td>
<td>$26.36</td>
<td></td>
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<td>Stage Rigging Mechanics (Non Structural)</td>
<td>Journey Level</td>
<td>$13.23</td>
<td></td>
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<td>Stone Masons</td>
<td>Journey Level</td>
<td>$43.35</td>
<td>5A</td>
<td>1M</td>
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<tr>
<td>Street And Parking Lot Sweeper Workers</td>
<td>Journey Level</td>
<td>$9.32</td>
<td></td>
<td>1</td>
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<tr>
<td>Surveyors</td>
<td>Assistant Construction Site Surveyor</td>
<td>$54.33</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Surveyors</td>
<td>Chainman</td>
<td>$53.81</td>
<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Surveyors</td>
<td>Construction Site Surveyor</td>
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<td>7A</td>
<td>3C</td>
<td>8P</td>
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<td>Telecommunication Technicians</td>
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<td></td>
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<tr>
<td>Telephone Line Construction - Outside</td>
<td>Cable Splicer</td>
<td>$36.96</td>
<td>5A</td>
<td>2B</td>
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<td>Telephone Line Construction - Outside</td>
<td>Hole Digger/Ground Person</td>
<td>$20.49</td>
<td>5A</td>
<td>2B</td>
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<td>Telephone Line Construction - Outside</td>
<td>Installer (Repairer)</td>
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<td>5A</td>
<td>2B</td>
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<td>Telephone Line Construction - Outside</td>
<td>Special Aparatus Installer I</td>
<td>$36.96</td>
<td>5A</td>
<td>2B</td>
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<td>Telephone Line Construction - Outside</td>
<td>Special Aparatus Installer II</td>
<td>$36.19</td>
<td>5A</td>
<td>2B</td>
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<tr>
<td>Telephone Line Construction - Outside</td>
<td>Telephone Equipment Operator (Heavy)</td>
<td>$36.96</td>
<td>5A</td>
<td>2B</td>
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<tr>
<td>Telephone Line Construction - Outside</td>
<td>Telephone Equipment Operator (Light)</td>
<td>$34.34</td>
<td>5A</td>
<td>2B</td>
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<tr>
<td>Telephone Line Construction - Outside</td>
<td>Telephone Lineperson</td>
<td>$34.34</td>
<td>5A</td>
<td>2B</td>
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<tr>
<td>Telephone Line Construction - Outside</td>
<td>Television Groundperson</td>
<td>$19.45</td>
<td>5A</td>
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<td>Telephone Line Construction - Outside</td>
<td>Television Lineperson/Installer</td>
<td>$25.89</td>
<td>5A</td>
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<td>Telephone Line Construction - Outside</td>
<td>Television System Technician</td>
<td>$30.97</td>
<td>5A</td>
<td>2B</td>
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<td>Telephone Line Construction - Outside</td>
<td>Television Technician</td>
<td>$27.77</td>
<td>5A</td>
<td>2B</td>
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<td>Telephone Line Construction - Outside</td>
<td>Tree Trimmer</td>
<td>$34.34</td>
<td>5A</td>
<td>2B</td>
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<tr>
<td>Terrazzo Workers</td>
<td>Journey Level</td>
<td>$33.85</td>
<td>5A</td>
<td>1M</td>
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<td>Tile Setters</td>
<td>Journey Level</td>
<td>$33.85</td>
<td>5A</td>
<td>1M</td>
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<tr>
<td>Tile, Marble &amp; Terrazzo Finishers</td>
<td>Journey Level</td>
<td>$29.85</td>
<td>5A</td>
<td>1M</td>
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<td>Traffic Control Stripers</td>
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<td>7A</td>
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<td>Trade</td>
<td>Job Classification</td>
<td>Wage</td>
<td>Holiday</td>
<td>Overtime</td>
<td>Notes</td>
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<td>Truck Drivers</td>
<td>Asphalt Mix</td>
<td>$14.19</td>
<td></td>
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<td>Truck Drivers</td>
<td>Dump Truck &amp; Trailer(c.wa-760)</td>
<td>$38.40</td>
<td>6I</td>
<td>2G</td>
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<td>Truck Drivers</td>
<td>Dump Truck(c.wa-760)</td>
<td>$38.40</td>
<td>6I</td>
<td>2G</td>
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<tr>
<td>Truck Drivers</td>
<td>Other Trucks(c.wa-760)</td>
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<td>6I</td>
<td>2G</td>
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<td>Truck Drivers</td>
<td>Transit Mixer</td>
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<td>Well Drillers &amp; Irrigation</td>
<td>Irrigation Pump Installer</td>
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<td>Pump Installers</td>
<td>Oiler</td>
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<tr>
<td>Well Drillers &amp; Irrigation</td>
<td>Well Driller</td>
<td>$18.00</td>
<td></td>
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<td>Pump Installers</td>
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State of Washington
DEPARTMENT OF LABOR AND INDUSTRIES

Washington State Prevailing Wage Rates for Public Works Contracts – Benefit Code Key

Overtime Codes Effective 8-31-2014 Thru 3-3-2015

Overtime Calculations are based on the hourly rate actually paid to the worker. On public works projects, the hourly rate must be not less than the prevailing rate of wage minus the hourly rate of the cost of fringe benefits actually provided for the worker.

1. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.

B. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

C. The first two (2) hours after eight (8) regular hours Monday through Friday and the first ten (10) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other overtime hours worked and all hours worked on Sundays and Holidays worked shall be paid at double the hourly rate of wage.
D. The first two (2) hours before or after a five - eight (8) hour workweek day or a four - ten (10) hour workweek day and the first eight (8) hours worked the next day after either workweek shall be paid at one and one-half times the hourly rate of wage. All additional hours worked and all worked on Sundays and holidays shall be paid at double the hourly rate of wage.

E. The first two (2) hours after eight (8) regular hours Monday through Friday and the first eight (8) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other hours worked Monday through Saturday, and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

F. The first two (2) hours after eight (8) regular hours Monday through Friday and the first ten (10) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other overtime hours worked, except Labor day, shall be paid at double the hourly rate of wage. All hours worked on Labor day shall be paid at three times the hourly rate of wage.

G. The first ten (10) hours worked on Saturdays and the first ten (10) hours worked on a fifth calendar weekday in a four - ten hour schedule, shall be paid at one and one-half times the hourly rate of wage. All hours worked in excess of ten (10) hours per day Monday through Saturday and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

H. All hours worked on Saturdays (except makeup days if work is lost due to inclement weather conditions or equipment breakdown) shall be paid at one and one-half times the hourly rate of wage. All hours worked Monday through Saturday over twelve (12) hours and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

I. All hours worked on Sundays and Holidays shall be paid at double the hourly rate of wage.

J. The first two (2) hours after eight (8) regular hours Monday through Friday and the first ten (10) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked over ten (10) hours Monday through Saturday, Sundays and holidays shall be paid at double the hourly rate of wage.

K. All hours worked on Saturdays and Sundays shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid at double the hourly rate of wage.

M. All hours worked on Saturdays (except makeup days if work is lost due to inclement weather conditions) shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.
N. All hours worked on Saturdays (except makeup days) shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

O. The first ten (10) worked on Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays, holidays and after twelve (12) hours, Monday through Friday, and after ten (10) hours on Saturday shall be paid at double the hourly rate of wage.

P. All hours worked on Saturdays (except makeup days if circumstances warrant) and Sundays shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid at double the hourly rate of wage.

Q. The first two (2) hours after eight (8) regular hours Monday through Friday and up to ten (10) hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked in excess of ten (10) hours per day Monday through Saturday and all hours worked on Sundays and holidays (except Christmas Day) shall be paid at double the hourly rate of wage. All hours worked on Christmas Day shall be paid at two and one-half times the hourly rate of wage.

R. All hours worked on Sundays and holidays shall be paid at two times the hourly rate of wage.

S. The first two (2) hours after eight (8) regular hours Monday through Friday and the first eight (8) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays and all other overtime hours worked, except Labor Day, shall be paid at double the hourly rate of wage. All hours worked on labor day shall be paid at three times the hourly rate of wage.

U. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays (except Labor Day) shall be paid at two times the hourly rate of wage. All hours worked on Labor Day shall be paid at three times the hourly rate of wage.

V. All hours worked on Sundays and holidays (except Thanksgiving Day and Christmas Day) shall be paid at one and one-half times the hourly rate of wage. All hours worked on Thanksgiving Day and Christmas Day shall be paid at double the hourly rate of wage.

W. All hours worked on Saturdays, Sundays and holidays (except for make-up days) shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid at double the hourly rate of wage.
X. The first four (4) hours after eight (8) regular hours Monday through Friday and the first twelve (12) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked over twelve (12) hours Monday through Saturday, Sundays and holidays shall be paid at double the hourly rate of wage. When holiday falls on Saturday or Sunday, the day before Saturday, Friday, and the day after Sunday, Monday, shall be considered the holiday and all work performed shall be paid at double the hourly rate of wage.

Y. All hours worked outside the hours of 5:00 am and 5:00 pm (or such other hours as may be agreed upon by any employer and the employee) and all hours worked in excess of eight (8) hours per day (10 hours per day for a 4 X 10 workweek) and on Saturdays and holidays (except Labor Day) shall be paid at one and one-half times the hourly rate of wage. (Except for employees who are absent from work without prior approval on a scheduled workday during the workweek shall be paid at the straight-time rate until they have worked 8 hours in a day (10 in a 4 X 10 workweek) or 40 hours during that workweek.) All hours worked Monday through Saturday over twelve (12) hours and all hours worked on Sundays and Labor Day shall be paid at double the hourly rate of wage.

Z. All hours worked on Saturdays and Sundays shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid the straight time rate of wage in addition to holiday pay.

2. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.

B. All hours worked on holidays shall be paid at one and one-half times the hourly rate of wage.

C. All hours worked on Sundays shall be paid at one and one-half times the hourly rate of wage. All hours worked on holidays shall be paid at two times the hourly rate of wage.

F. The first eight (8) hours worked on holidays shall be paid at the straight hourly rate of wage in addition to the holiday pay. All hours worked in excess of eight (8) hours on holidays shall be paid at double the hourly rate of wage.

G. All hours worked on Sunday shall be paid at two times the hourly rate of wage. All hours worked on paid holidays shall be paid at two and one-half times the hourly rate of wage including holiday pay.

H. All hours worked on Sunday shall be paid at two times the hourly rate of wage. All hours worked on holidays shall be paid at one and one-half times the hourly rate of wage.
O. All hours worked on Sundays and holidays shall be paid at one and one-half times the hourly rate of wage.

R. All hours worked on Sundays and Holidays and all hours worked over sixty (60) in one week shall be paid at Double the hourly rate of wage.

U. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. All hours worked over twelve (12) hours in a day, or on Sundays and Holidays shall be paid at double the hourly rate of wage.

W. The first two (2) hours after eight (8) regular hours Monday through Friday and the first eight (8) hours on Saturday shall be paid at one and one-half times the hourly rate of wage. All other hours worked Monday through Saturday, and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage. On a four-day, ten-hour weekly schedule, either Monday thru Thursday or Tuesday thru Friday schedule, all hours worked after ten shall be paid at double the hourly rate of wage. The first eight (8) hours worked on the fifth day shall be paid at one and one-half times the hourly rate of wage. All other hours worked on the fifth, sixth, and seventh days and on holidays shall be paid at double the hourly rate of wage.

Y. All hours worked on Saturdays (except for make-up days) shall be paid at one and one-half times the hourly rate of wage. All hours worked Monday through Saturday over twelve (12) hours and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

3. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.

A. Work performed in excess of eight (8) hours of straight time per day, or ten (10) hours of straight time per day when four ten (10) hour shifts are established, or forty (40) hours of straight time per week, Monday through Friday, or outside the normal shift, and all work on Saturdays shall be paid at time and one-half the straight time rate. Hours worked over twelve hours (12) in a single shift and all work performed after 6:00 pm Saturday to 6:00 am Monday and Holidays shall be paid at double the straight time rate of pay. Any Shift starting between the hours of 6:00 pm and midnight shall receive an additional one dollar ($1.00) per hour for all hours worked that shift. The Employer shall have the sole discretion to assign overtime work to employees. Primary consideration for overtime work shall be given to employees regularly assigned to the work to be performed on overtime situations. After an employee has worked eight (8) hours at an applicable overtime rate, all additional hours shall be at the applicable overtime rate until such time as the employee has had a break of eight (8) hours or more.
C. Work performed in excess of eight (8) hours of straight time per day, or ten (10) hours of straight time per day when four ten (10) hour shifts are established, or forty (40) hours of straight time per week, Monday through Friday, or outside the normal shift, and all work on Saturdays shall be paid at one and one-half times the hourly rate of wage. All work performed after 6:00 pm Saturday to 5:00 am Monday and Holidays shall be paid at double the hourly rate of wage. After an employee has worked eight (8) hours at an applicable overtime rate, all additional hours shall be at the applicable overtime rate until such time as the employee has had a break of eight (8) hours or more.

D. All hours worked between the hours of 6:00 pm and 6:00 am, Monday through Saturday, shall be paid at a premium rate of 15% over the hourly rate of wage. All other hours worked after 6:00 am on Saturdays, shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

E. All hours worked Sundays and holidays shall be paid at double the hourly rate of wage. Each week, once 40 hours of straight time work is achieved, then any hours worked over 10 hours per day Monday through Saturday shall be paid at double the hourly wage rate.

F. All hours worked on Saturday shall be paid at one and one-half times the hourly rate of wage. All hours worked on Sunday shall be paid at two times the hourly rate of wage. All hours worked on paid holidays shall be paid at two and one-half times the hourly rate of wage including holiday pay.

H. All work performed on Sundays between March 16th and October 14th and all Holidays shall be compensated for at two (2) times the regular rate of pay. Work performed on Sundays between October 15th and March 15th shall be compensated at one and one half (1-1/2) times the regular rate of pay.

I. All hours worked on Saturdays shall be paid at one and one-half times the hourly rate of wage. In the event the job is down due to weather conditions during a five day work week (Monday through Friday,) or a four day-ten hour work week (Tuesday through Friday,) then Saturday may be worked as a voluntary make-up day at the straight time rate. However, Saturday shall not be utilized as a make-up day when a holiday falls on Friday. All hours worked Monday through Saturday over twelve (12) hours and all hours worked on Sundays and holidays shall be paid at double the hourly rate of wage.

4. ALL HOURS WORKED IN EXCESS OF EIGHT (8) HOURS PER DAY OR FORTY (40) HOURS PER WEEK SHALL BE PAID AT ONE AND ONE-HALF TIMES THE HOURLY RATE OF WAGE.
A. All hours worked in excess of eight (8) hours per day or forty (40) hours per week shall be paid at double the hourly rate of wage. All hours worked on Saturdays, Sundays, and holidays shall be paid at double the hourly rate of wage.

B. All hours worked over twelve (12) hours per day and all hours worked on holidays shall be paid at double the hourly rate of wage.

5. HOLIDAY CODES


6. HOLIDAY CODES


Z. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, and Christmas Day (7). If a holiday falls on Saturday, the preceding Friday shall be considered as the holiday. If a holiday falls on Sunday, the following Monday shall be considered as the holiday.

7. HOLIDAY CODES

A. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, and Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. If any of the listed holidays falls on a Saturday, the preceding Friday shall be a regular work day.

B. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, and Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

C. Holidays: New Year's Day, Martin Luther King Jr. Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, and Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

D. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran’s Day, Thanksgiving Day, the Friday after Thanksgiving Day, and Christmas Day (8). Unpaid Holidays: President’s Day. Any paid holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any paid holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
E. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, and Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

F. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, the last working day before Christmas Day and Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.


H. Holidays: New Year's Day, Martin Luther King Jr. Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, the last working day before Christmas Day and Christmas Day (9). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

I. Holidays: New Year's Day, President’s Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, the day before Christmas Day and Christmas Day (9). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

J. Holidays: New Year's Day, Independence Day, Memorial Day, Labor Day, Thanksgiving Day and Christmas Day (6). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

K. Holidays: New Year's Day, Memorial Day, Independence Day, Thanksgiving Day, the Friday and Saturday after Thanksgiving Day, and Christmas Day (8). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

L. Holidays: New Year's Day, Memorial Day, Labor Day, Independence Day, Thanksgiving Day, the last working day before Christmas Day, and Christmas Day (7). Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.
M. Paid Holidays: New Year's Day, the day after or before New Year’s Day, President’s Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, and the day after or before Christmas Day. Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

N. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, and Christmas Day. Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. When Christmas falls on a Saturday, the preceding Friday shall be observed as a holiday.

P. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, and Christmas Day. Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday.

Q. Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the last working day before Christmas Day and Christmas Day. Any holiday which falls on a Sunday shall be observed as a holiday on the following Monday. If any of the listed holidays falls on a Saturday, the preceding Friday shall be a regular work day.

R. Paid Holidays: Paid Holidays: New Year's Day, the day after or before New Year’s Day, President’s Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, Christmas Day, and the day after or before Christmas Day. If any of the listed holidays fall on Saturday, the preceding Friday shall be observed as the holiday. If any of the listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly.

S. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday After Thanksgiving Day, Christmas Day, The Day After Christmas, And A Floating Holiday. If any of the listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly.

T. Paid Holidays: New Year's Day, The Day After Or Before New Year’s Day, President’s Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, The Friday After Thanksgiving Day, Christmas Day, and The Day After Or Before Christmas Day. If any of the listed holidays falls on a Sunday, the day observed by the Nation shall be considered a holiday and compensated accordingly. Any holiday which falls on a Saturday shall be observed as a holiday on the preceding Friday.

8. NOTE CODES
A. In addition to the hourly wage and fringe benefits, the following depth premiums apply to depths of fifty feet or more: over 50' to 100' - $2.00 per foot for each foot over 50 feet, over 100' to 150' - $3.00 per foot for each foot over 100 feet, over 150' to 200' - $4.00 per foot for each foot over 150 feet, over 220' - $5.00 per foot for each foot over 220 feet.

C. In addition to the hourly wage and fringe benefits, the following depth premiums apply to depths of fifty feet or more: over 50' to 100' - $1.00 per foot for each foot over 50 feet, over 100' to 150' - $1.50 per foot for each foot over 100 feet, over 150' to 200' - $2.00 per foot for each foot over 150 feet, over 200' - divers may name their own price.

D. Workers working with supplied air on hazmat projects receive an additional $1.00 per hour.

L. Workers on hazmat projects receive additional hourly premiums as follows - Level A: $0.75, Level B: $0.50, and Level C: $0.25.

M. Workers on hazmat projects receive additional hourly premiums as follows - Levels A & B: $1.00, Levels C & D: $0.50.

N. Workers on hazmat projects receive additional hourly premiums as follows - Level A: $1.00, Level B: $0.75, Level C: $0.50, and Level D: $0.25.

P. Workers on hazmat projects receive additional hourly premiums as follows - Class A Suit: $2.00, Class B Suit: $1.50, Class C Suit: $1.00, and Class D Suit: $0.50.

Q. The highest pressure registered on the gauge for an accumulated time of more than fifteen (15) minutes during the shift shall be used in determining the scale paid.

R. Effective August 31, 2012 – A Traffic Control Supervisor shall be present on the project whenever flagging or spotting or other traffic control labor is being utilized. A Traffic Control Laborer performs the setup, maintenance and removal of all temporary traffic control devices and construction signs necessary to control vehicular, bicycle, and pedestrian traffic during construction operations. Flaggers and Spotters shall be posted where shown on approved Traffic Control Plans or where directed by the Engineer. All flaggers and spotters shall possess a current flagging card issued by the State of Washington, Oregon, Montana, or Idaho. These classifications are only effective on or after August 31, 2012.
S. Effective August 31, 2012 – A Traffic Control Supervisor shall be present on the project whenever flagging or spotting or other traffic control labor is being utilized. Flaggers and Spotters shall be posted where shown on approved Traffic Control Plans or where directed by the Engineer. All flaggers and spotters shall possess a current flagging card issued by the State of Washington, Oregon, Montana, or Idaho. This classification is only effective on or after August 31, 2012.

T. Effective August 31, 2012 – A Traffic Control Laborer performs the setup, maintenance and removal of all temporary traffic control devices and construction signs necessary to control vehicular, bicycle, and pedestrian traffic during construction operations. Flaggers and Spotters shall be posted where shown on approved Traffic Control Plans or where directed by the Engineer. All flaggers and spotters shall possess a current flagging card issued by the State of Washington, Oregon, Montana, or Idaho. This classification is only effective on or after August 31, 2012.

END OF SECTION
SECTION 00301
BID FORM

PROJECT IDENTIFICATION: Naches-Selah Irrigation District Main Canal Flume Replacement & Other Canal Improvements Project

CONTRACT IDENTIFICATION: Naches-Selah Irrigation District Main Canal Flume & Other Canal Improvements Project

THIS BID IS SUBMITTED TO: Naches-Selah Irrigation District, herein after referred to as OWNER.

1. Enter Into Agreement

The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an agreement with OWNER in the form included in the Bidding Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Bid Price and within the Bid Times indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

2. BIDDER Acknowledgements

BIDDER accepts all of the terms and conditions of the Advertisement or INVITATION TO BID and INSTRUCTIONS TO BIDDERS, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for the period specified for Notice of Award after the day of Bid opening or for such longer period of time that BIDDER may agree to in writing upon request of Owner. BIDDER will sign and deliver the required number of counterparts of the AGREEMENT with the Bonds and other documents required by the Bidding Requirements within 20 days after the date of OWNER's Notice of Award.

3. BIDDER's Representations

In submitting this Bid, BIDDER represents that:

a. BIDDER has examined and carefully studied the Bidding Documents, other related data identified in the Bidding Documents, and the following Addenda receipt of all which is hereby acknowledged: (List Addenda by Number)

   ADDENDA NO

b. 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, performance and furnishing of the Work.

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

d. BIDDER has carefully studied all: 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) which have been identified in the SUPPLEMENTARY CONDITIONS as provided in Paragraph 4.02A of the General Conditions.
e. BIDDER accepts the determination set forth in Paragraph SC-4.02 of the Supplementary Conditions of the extent of the "technical data" contained in such reports and drawings upon which BIDDER is entitled to rely as provided in Paragraph 4.02 of the General Conditions.

f. BIDDER acknowledges that such reports and drawings are not Contract Documents and may not be complete for BIDDER's purposes.

g. BIDDER acknowledges that OWNER and ENGINEER do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the site.

h. BIDDER has obtained and carefully studied (or assumes responsibility for having done so) all reasonable additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise which may affect cost progress, performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences and procedures of construction to be employed by BIDDER and safety precautions and programs incident thereto.

BIDDER does not consider that any additional examinations, investigations, explorations, tests, studies or data are necessary for the determination of this Bid for performance and furnishing of the Work in accordance with the times, price and other terms and conditions of the Contract Documents.

i. BIDDER is aware of the general nature of Work to be performed by OWNER and others at the site that relates to Work for which this Bid is submitted as indicated in the Contract Documents.

j. BIDDER has correlated the information known to BIDDER, information commonly known to CONTRACTORS doing business in the locality of the Site, information and observations obtained from visits to the site, reports and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies and data with the Contract Documents.

k. BIDDER has given ENGINEER and OWNER written notice of all conflicts, errors, ambiguities or discrepancies in the Contract Documents and the written resolution thereof by ENGINEER and/or OWNER is acceptable to BIDDER, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.

l. Where conflicts, errors, ambiguities or discrepancies have been discovered in or between Contract Documents and/or other related documents, and where said conflicts, etc., have not been resolved through the interpretations or clarifications by ENGINEER or OWNER as described in the INSTRUCTIONS TO BIDDERS, because of insufficient time or otherwise, BIDDER has included in the Bid the greater quantity or better quality of Work, or compliance with the more stringent requirement resulting in a greater cost.

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

4. BIDDER's Certification

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

b. BIDDER has not directly or indirectly induced or solicited any other BIDDER to submit a false or sham Bid.
c. BIDDER has not solicited or induced any individual or entity to refrain from bidding.

d. BIDDER has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph:

(1) "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process.

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

(3) "collusive practice" means a scheme or arrangement between two or more BIDDERS, with or without the knowledge of OWNER, a purpose of which is to establish Bid prices at artificial, non-competitive levels.

(4) "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.
5. **Bid Prices**

BIDDER will complete the Work in accordance with the Contract Documents for the following prices(s):

<table>
<thead>
<tr>
<th>Bid Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Unit Cost($)</th>
<th>Total Cost ($)</th>
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<tr>
<td>1</td>
<td>Mobilization/Demobilization</td>
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<td>Site Preparation &amp; Cleanup</td>
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<td>Temporary Construction Roads</td>
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**Total Bid Amount (excluding sales tax)**
Unit Cost, Total Cost, and Total Bid Amount excludes all applicable sales and use taxes. The costs for all Work shown or specified in Contract Documents is included in the Bid Price. Work not specifically covered by bid items shall be considered incidental to the Work. No separate payment will be made for incidental work and all associated costs will be included in the bid amounts for the items listed in the bid schedule. Payment for the work shall be made in accordance with the requirements of the Agreement and elsewhere in the Contract Documents.

6. Sales and Use Tax

State of Washington Sales and Use Tax shall be excluded from the unit and total cost in all bid items, but be included with the monthly invoices. The District will reimburse the Bidder for Sales and Use Tax based on the applicable tax rate for each individual Bid Item. The project is located in Yakima County. Taxes shall be current rates for Yakima County.

7. Time of Completion

BIDDER agrees that the Work will be substantially completed and ready for final payment in accordance with Paragraph 14.07B. of the General Conditions on or before the dates or within the number of calendar days indicated in the AGREEMENT.

BIDDER accepts the provisions of the AGREEMENT as to liquidated damages in the event of failure to complete the Work within the times specified in the AGREEMENT.

8. Attached To This Bid

The following documents are attached to and made a condition of this Bid:

   a. Required Bid Security in the form of certified check, bank money order, or original Bid Bond (on attached Form).

9. Address for Communications

Communications concerning this Bid shall be addressed to:

   Justin Harter
   Naches-Selah Irrigation District
   620 Guinan Loop Road
   Selah, WA 98942-9641
   Ph. 509-697-4177

10. Defined Terms

Terms used in this Bid which are defined in the General Conditions or INSTRUCTIONS TO BIDDERS will have the meanings indicated in the General Conditions or INSTRUCTIONS TO BIDDERS.

11. Prevailing Wages

This Project requires that the contractor and all subcontractors pay Washington State Prevailing Wage Rates (Section 00102) and workers shall receive no less than the prevailing rate of wage. Successful Bidder acknowledges that an Intent to Pay Prevailing Wages, Certified Payrolls, and Affidavit of Wages Paid must be provided to Owner.
12. Bid Submittal

This Bid is submitted by:

If BIDDER is:

An Individual

Name (typed or printed): __________________________________________

By: ____________________________________________________________
   (Individual's signature)

Doing business as: ________________________________________________

A Partnership

Partnership Name: ________________________________________________

By: ____________________________________________________________
   (Signature of general partner -- attach evidence of authority to sign)

Name (typed or printed): __________________________________________

A Corporation

Corporation name: ________________________________________________

State of Incorporation: ____________________________________________

Type of Corporation: _____________________________________________
   (General Business, Professional, Service, Limited Liability)

By: ____________________________________________________________
   (Signature -- attach evidence of authority to sign)

Name (typed or printed): __________________________________________

Title: ___________________________________________________________

   (Corporate Seal)

Attest: ___________________________________________________________

Date of Qualification to do business in _____________________________ is __/__/____.
   (State where Project is located)
A Joint Venture

Name of Joint Venture: ____________________________________________

First Joint Venturer Name: ________________________________________

By: ____________________________
    (Signature of first joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): __________________________________________

Title: __________________________________________________________

Second Joint Venturer Name: ______________________________________

By: ____________________________
    (Signature of first joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): __________________________________________

Title: __________________________________________________________

(Each joint venture must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

Bidder's Business Address: _________________________________________

_________________________________________________________________

Phone No.: _______________________________________________________

Fax No.: _________________________________________________________

E-mail: __________________________________________________________

Submitted on: ______________________, 20___

State Contractor License No.: _________________________________

END OF SECTION
SECTION 00390
CERTIFICATION REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS

Certification Regarding Debarment, Suspension, and Other Responsibility Matters

The prospective participant certifies to the best of its knowledge and belief that it and the principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any State or Federal department or agency;

(b) Have not within a three year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction: violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for otherwise criminally or civilly charged by a government entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (1) (b) of this certification; and

(d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated or cause or default.

I understand that a false statement on this certification may be ground for rejection of this proposal or termination of the award.

________________________________________________________
Typed Name & Title of Authorized Representative

________________________________________________________
Signature of Authorized Representative Date

☐ I am unable to certify to the above statements. My explanation is attached.
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SECTION 00400
BID BOND

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

BIDDER (Name and Address):

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

OWNER (Name and Address):  Naches-Selah Irrigation District
620 Guinan Loop Road
Selah, WA 98942-9641

BID
Bid Due Date: 2:00 P.M. PST on October 14, 2014
Project: Naches-Selah Irrigation District Main Canal Flume Replacement & Other Canal Improvements

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

( Words )     ( Figures )

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

BIDDER

__________________________ (Seal)      SURETY
Bidder’s Name and Corporate Seal

By:___________________________
Signature and Title

Attest:_____________________
Signature and Title

Note: Above addresses are to be used for giving required notices.
1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Surety’s liability.

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

3. This obligation shall be null and void if:

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

   3.2. All Bids are rejected by Owner, or

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

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

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

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

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

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

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

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

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

END OF SECTION
SECTION 00460
ANTI-DISCRIMINATION CERTIFICATE

Naches-Selah Irrigation District
Main Canal Flume Replacement & Other Canal Improvements Project

STATE OF WASHINGTON
COUNTY OF YAKIMA

The BIDDER hereby covenants, stipulates, and agrees that no person shall be discriminated against in the bidding of the services and/or materials hereinunder and that the BIDDER shall not refuse to hire any person therefore because of such person’s race, creed, color, or national origin, unless based on a bonafide occupational qualification. Also, the BIDDER will in no manner discriminate against any person because of such person’s race, creed, color, or national origin. Any such discrimination shall be deemed a violation of this Bid and shall render this Bid subject to forfeiture.

Contractor’s Signature:______________________________

I certify that I know or have satisfactory evidence that ________________ signed this instrument, on oath stated that (he/she) was authorized to execute the instrument and acknowledged it as the ________________ (title) of ________________ to be the free and voluntary act of such party of the uses and purposes mentioned in the instrument.

Dated: ________________, 2014

(Seal or Stamp) Notary Public for __________________________
Residing at: __________________________
My Commission Expires: __________________________

END OF SECTION
STATE OF WASHINGTON
COUNTY OF YAKIMA

I, the undersigned, an authorized representative of __________________________, being first duly sworn on oath hereby certify that the Bid submitted is a genuine and not a sham or collusive Bid, or made in the interest or on behalf of any person not therein named; and I further state that the said firm, association or corporation (hereinafter referred to as “Firm”) has not directly or indirectly inducted or solicited any Bidder on the above work or supplies to put in a sham Bid, or any other person or corporation to refrain from bidding; and that said Firm, has not in any manner sought by collusion to secure to the Firm, an advantage over other bidder or bidders.

Exceptions noted:

Signed: ________________________________

Title: ________________________________

Subscribed and sworn to before me this _______ day of ________________, 2014.

(Seal or Stamp) Notary Public for ________________________________
Residing at: ________________________________
My Commission Expires: ________________________________

END OF SECTION
SECTION 00500
AGREEMENT

THIS AGREEMENT is by and between Naches-Selah Irrigation District, hereinafter called OWNER, and
hereinafter called CONTRACTOR. OWNER and CONTRACTOR, in consideration of the mutual
covenants hereinafter set forth, agree as follows:

Article 1. WORK

CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents for the
Project identified herein.

Article 2. PROJECT

The Project for which the Work under the Contract Documents may be the whole or only a part is generally
described as follows:

Naches-Selah Irrigation District
Main Canal Flume Replacement & Other Canal Improvements Project

Article 3. ENGINEER

The Project has been designed by HDR Engineering Inc., who is hereinafter called ENGINEER and who is
to act as OWNER's representative, assume all duties and responsibilities, and have the rights and authority
assigned to ENGINEER in the Contract Documents in connection with completion of the Work in
accordance with the Contract Documents.

Article 4. CONTRACT TIMES

4.1. Time of the Essence.

A. All time limits for Substantial Completion, and completion and readiness for final
   payment as stated in the Contract Documents are of the essence of the Contract.

4.2. Substantial Completion is required on or before March 20, 2015, and fully completed on or before
March 27, 2015.

A. After the Contractor has, in the opinion of the Engineer, satisfactorily completed all
   corrections identified during the final inspection and has delivered, in accordance with
   the Contract Documents, all required documents, Contractor may make Application for
   Final Payment in accordance with Paragraph 14.07A of the General Conditions.

B. If the Work has been completed and documentation has been provided to the satisfaction
   of the Engineer, the Engineer will, within ten days after receipt of Application for Final
   Payment, indicate in writing Engineer’s recommendation of payment and present the
   Application for Payment to Owner for payment in accordance with Paragraph 14.7B of
   the General Conditions.

C. Thirty days after the presentation to Owner of the Application for Final Payment and
   accompanying documentation, the amount recommended by Engineer, less any sum
   Owner is entitled set off against Engineer’s recommendation, including but not limited to
   liquidated damages, will become due and will be paid by Owner to Contractor in
   accordance with Paragraph 14.7C of the General Conditions.
4.3. Liquidated Damages.

A. OWNER and CONTRACTOR recognize that time is of the essence of this AGREEMENT and that OWNER will suffer financial loss if the Work is not completed within the times specified in Paragraph 4.2. above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty), CONTRACTOR shall pay OWNER Two Thousand dollars ($2,000.00) for each day that expires after the time specified in Paragraph 4.2. for Substantial Completion until the Work is substantially complete. After Substantial Completion, if CONTRACTOR shall neglect, refuse or fail to complete the remaining Work within the time specified in Paragraph 4.2. for completion and readiness for final payment or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER Five Thousand dollars ($5,000.00) for each day that expires after the time specified in Paragraph 4.2. for completion and readiness for final payment. The Owner reserves the right to pursue compensation for actual liabilities incurred by the Owner in excess of liquidated damages, if CONTRACTOR shall neglect, refuse or fail to complete the remaining Work within the time specified in Paragraph 4.2. for completion and readiness for final payment or any proper extension thereof granted by OWNER.

Article 5. CONTRACT PRICE

5.1. OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to Paragraphs 5.1.A. below:

A. For all Work described in the Contract Documents a total amount of $_________________, based on the combination of unit prices and lump sum amounts in the bid.

5.2 As provided in Paragraph 11.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classification are to be made by ENGINEER as provided in Paragraph 9.08 of the General Conditions. Unit prices have been computed as provided in Paragraph 11.03B. of the General Conditions.

Article 6. PAYMENT PROCEDURES


A. CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions. Payments are made by OWNER twice a month. Approved invoice form ENGINEER shall be submitted to OWNER at least seven days prior to payment date. CONTRACTOR will be given a payment schedule.

6.2. Progress Payments; Retainage.

A. OWNER shall make monthly progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment as recommended by ENGINEER, during construction as provided in Paragraphs 6.A.1 and 6.A.2 below. All such payments will be measured by the schedule of values established in Paragraph 2.07A. of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements.
1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below, but, in each case, less the aggregate of payments previously made and less such amounts as in accordance with Paragraph 14.02 of the General Conditions.

   a. 95 percent of Work completed (with the balance being retainage). If Work has been 50 percent completed as determined by ENGINEER, and if the character and progress of the Work have been satisfactory to OWNER and ENGINEER.

   b. 95 percent (with the balance being retainage) of materials and equipment not incorporated in the Work (but delivered, suitably stored and accompanied by documentation satisfactory to OWNER as provided in Paragraph 14.02 of the General Conditions).

2. Upon Substantial Completion, in an amount sufficient to increase total payments to CONTRACTOR to 95 percent of the Contract Price (with the balance being retainage), less such amounts as ENGINEER shall determine, or OWNER may withhold, in accordance with Paragraph 14.02 of the General Conditions.

6.3. Final Payment.

   A. Upon final completion and acceptance of the Work in accordance with Paragraph 14.07 of the General Conditions, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER as provided in said Paragraph 14.07

Article 7. CONTRACTOR'S REPRESENTATIONS

7.1. In order to induce OWNER to enter into this Agreement, CONTRACTOR makes the following representations:

   A. CONTRACTOR has examined and carefully studied the Contract Documents (including the Addenda listed in Article 9.) and the other related data identified in the Bidding Documents.

   B. CONTRACTOR has visited the site and become familiar with and is satisfied as to the general, local and site conditions that may affect cost, progress, performance or furnishing of the Work.

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

   D. CONTRACTOR has carefully studied all: 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) which have been identified in the Supplementary Conditions as provided in Paragraph 4.02A. of the General Conditions.

      1. CONTRACTOR accepts the determination set forth in the General and Supplementary Conditions of the extent of the "technical data" contained in such reports and Drawings upon which CONTRACTOR is entitled to rely as provided in Paragraph 4.02 of the General Conditions.

      2. CONTRACTOR acknowledges that such reports and Drawings are not Contract Documents and may not be complete for CONTRACTOR's purposes.
3. CONTRACTOR acknowledges that OWNER and ENGINEER do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Contract Documents with respect to Underground Facilities at or contiguous to the Site.

E. CONTRACTOR has obtained and carefully studied (or assumes risk for not doing so) all reasonable additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto.

F. CONTRACTOR does not consider that any additional examinations, investigations, explorations, studies or data are necessary for the performance and furnishing of the Work at the Contract Price, within the Contract Times and in accordance with the other terms and conditions of the Contract Documents.

G. CONTRACTOR is aware of the general nature of work to be performed by OWNER and others at the site that relates to the Work as indicated in the Contract Documents.

H. CONTRACTOR has correlated the information known to CONTRACTOR, information commonly known to contractors doing business in the locality of the Site, information and observations obtained from visits to the site, reports and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies and data with the Contract Documents.

I. CONTRACTOR has given ENGINEER and OWNER written notice of all conflicts, errors, ambiguities or discrepancies in the Contract Documents and the written resolution thereof by ENGINEER or OWNER through issued addendum or addenda is acceptable to CONTRACTOR, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work. When said conflicts, etc., have not been resolved through interpretation or clarification by OWNER or ENGINEER, because of insufficient time or otherwise, CONTRACTOR has included in the Bid the greater quantity or better quality of Work, or compliance with the more stringent requirement resulting in a greater cost; and said greater cost is included in the Contract Price.

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

Article 8. CONTRACT DOCUMENTS

8.1. Contents.

A. The Contract Documents which comprise the entire agreement between OWNER and CONTRACTOR concerning the Work consist of the following:

1. Invitation to Bid

2. Instructions to Bidders

3. Addenda numbers _____ through ______
4. Bid Proposal
5. Non-Collusion and Debarment Affidavits
6. This Agreement (pages 1 to 8, inclusive).
7. Exhibits to this Agreement (pages _____ to _____, inclusive).
8. Performance, Payment, and other Bonds, identified as exhibits _____ and consisting of _____ pages.
9. Documentation submitted by CONTRACTOR prior to Notice of Award (pages _____ to _____ inclusive).
10. Notice of Award.
11. General Conditions (pages 1 to 66, inclusive).
12. Supplementary Conditions (pages 1 to 8, inclusive).
13. Specifications as listed in Table of Contents of the Project Manual.
14. Drawings consisting of a cover sheet and sheets numbered 1 through 40, inclusive with each sheet bearing the following general title:

Naches-Selah Irrigation District Main Canal Flume Replacement & Other Canal Improvements

15. The following which may be delivered or issued after the Effective Date of the AGREEMENT and are not attached thereto:

a. Notice to Proceed.
b. Field Orders.
c. Work Change Directives.
d. Change Orders.

B. There are no Contract Documents other than those listed above in this Article 9. The Contract Documents may only be amended, modified or supplemented as provided in Paragraph 3.04. of the General Conditions.

Article 9. MISCELLANEOUS

9.1 Terms.

A. Terms used in this Agreement which are defined in Article 1 of the General Conditions will have the meanings indicated in the General Conditions.

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

9.3. Successors and Assigns.

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

9.4. Severability.

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

9.5 CONTRACTOR’S Certifications.

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

1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process or in the Contract execution.

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of OWNER, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive OWNER of the benefits of free and open competition.

3. "collusive practice" means a scheme or arrangement between two or more BIDDERS, with or without the knowledge of OWNER, a purpose of which is to establish Bid prices at artificial, non-competitive levels.

4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.
IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed this Agreement in triplicate. One counterpart each has been delivered to OWNER, CONTRACTOR, and ENGINEER. All portions of the Contract Documents have been signed, initialed or identified by OWNER and CONTRACTOR or identified by ENGINEER on their behalf.

This AGREEMENT will be effective on _________________________, 20_____ (which is the Effective Date of the AGREEMENT).

OWNER Naches-Selah Irrigation District
________________________________________
By: _____________________________________

[CORPORATE SEAL]

Attest ___________________________________

Address for giving notices:
________________________________________
________________________________________

Agent for service of process:
________________________________________

License No. ______________________________

NOTE: If OWNER is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of Agreement.

CONTRACTOR
________________________________________
By: _____________________________________

[CORPORATE SEAL]

Attest ___________________________________

Address for giving notices:
________________________________________
________________________________________

Agent for service of process:
________________________________________

NOTE: If CONTRACTOR is a corporation, attach evidence of authority to sign.

END OF SECTION
SECTION 00610
PERFORMANCE BOND

See attachment.

END OF SECTION
CONTRACTOR (name and address):

SURETY (name and address of principal place of business):

OWNER (name and address):

CONSTRUCTION CONTRACT
   Effective Date of the Agreement:
   Amount:
   Description (name and location):

BOND
   Bond Number:
   Date (not earlier than the Effective Date of the Agreement of the Construction Contract):
   Amount:
   Modifications to this Bond Form: □ None □ See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

______________________________ (seal)
Contractor’s Name and Corporate Seal

By: ______________________________
Signature

Print Name
Title

Attest: __________________________
Signature
Title

SURETY

______________________________ (seal)
Surety’s Name and Corporate Seal

By: ______________________________
Signature (attach power of attorney)

Print Name
Title

Attest: __________________________
Signature
Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.
1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

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

   3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

   3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

   3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

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

   5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

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

   5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

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

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

   5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

   7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

   7.2 additional legal, design professional, and delay costs resulting from the Contractor’s Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

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

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety’s liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.
10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

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

14. Definitions

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

14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

16. Modifications to this Bond are as follows:
SECTION 00615
PAYMENT BOND

See attachment.

END OF SECTION
PAYMENT BOND

CONTRACTOR (name and address):

SURETY (name and address of principal place of business):

OWNER (name and address):

CONSTRUCTION CONTRACT
  Effective Date of the Agreement:
  Amount:
  Description (name and location):

BOND
  Bond Number:
  Date (not earlier than the Effective Date of the Agreement of the Construction Contract):
  Amount:
  Modifications to this Bond Form: □ None □ See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

________________________________________ (seal)
Contractor’s Name and Corporate Seal

By: ______________________________________
  Signature

__________________________
Print Name

__________________________
Title

Attest: ____________________________________
  Signature

__________________________
Title

SURETY

________________________________________ (seal)
Surety’s Name and Corporate Seal

By: ______________________________________
  Signature (attach power of attorney)

__________________________
Print Name

__________________________
Title

Attest: ____________________________________
  Signature

__________________________
Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.
1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

3. If there is no Owner Default under the Construction Contract, the Surety’s obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner’s property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.

4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety’s expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.

5. The Surety’s obligations to a Claimant under this Bond shall arise after the following:

   5.1 Claimants who do not have a direct contract with the Contractor,

   5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and

   5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).

   5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).

6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant’s obligation to furnish a written notice of non-payment under Paragraph 5.1.1.

7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety’s expense take the following actions:

   7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

   7.2 Pay or arrange for payment of any undisputed amounts.

   7.3 The Surety’s failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney’s fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

8. The Surety’s total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney’s fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

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

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

11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

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

15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. Definitions

16.1 Claim: A written statement by the Claimant including at a minimum:

1. The name of the Claimant;
2. The name of the person for whom the labor was done, or materials or equipment furnished;
3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
4. A brief description of the labor, materials, or equipment furnished;
5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
7. The total amount of previous payments received by the Claimant; and

8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2 Claimant: An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic’s lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of “labor, materials, or equipment” that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor’s subcontractors, and all other items for which a mechanic’s lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

18. Modifications to this Bond are as follows:
SECTION 00700
GENERAL CONDITIONS

See attached.
NOTE: This EJCDC Document has been modified as indicated herein by HDR, Inc. A *strikeout* indicates that language has been deleted from the EJCDC General Conditions. An *underline* indicates that language has been added to the EJCDC General Conditions.

STANDARD GENERAL CONDITIONS
OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by

---

AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASSOCIATED GENERAL CONTRACTORS OF AMERICA

AMERICAN SOCIETY OF CIVIL ENGINEERS

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
A Practice Division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed by

CONSTRUCTION SPECIFICATIONS INSTITUTE

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.
# STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 Defined Terms

A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. Wherever used in these General Conditions or in other Contract Documents, the terms listed below have the meanings indicated which are applicable to both the singular and plural thereof. Said terms are generally capitalized or written in italics, but not always. When used in a context consistent with the definition of a listed-defined term, the term shall have a meaning as defined below whether capitalized or italicized or otherwise. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

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

2. Agreement—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.

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

4. Asbestos—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

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

6. Bidder—The individual or entity who submits a Bid directly to Owner.


8. Bidding Requirements—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.

9. Change Order—A document, which may be recommended by Engineer, which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

10. Claim—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
11. **Contract**—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. **Contract Documents**—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.

13. **Contract Price**—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).

14. **Contract Times**—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer’s written recommendation of final payment.

15. **Contractor**—The individual or entity with whom Owner has entered into the Agreement.

16. **Cost of the Work**—See Paragraph 11.01 for definition.

17. **Drawings**—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.

18. **Effective Date of the Agreement**—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

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

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

21. **General Requirements**—Sections of Division 1 of the Specifications.

22. **Hazardous Environmental Condition**—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.

23. **Hazardous Waste**—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

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

25. **Liens**—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
26. **Milestone**—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. **Notice of Award**—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.

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

29. **Owner**—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.

30. **PCBs**—Polychlorinated biphenyls.

31. **Petroleum**—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.

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

33. **Project**—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.

34. **Project Manual**—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

35. **Radioactive Material**—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

36. **Resident Project Representative**—The authorized representative of Engineer who may be assigned to the Site or any part thereof.

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

38. **Schedule of Submittals**—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.

39. **Schedule of Values**—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.
40. **Shop Drawings**—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

41. **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.

42. **Specifications**—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.

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

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

45. **Successful Bidder**—The Bidder submitting a responsive Bid to whom Owner makes an award.

46. **Supplementary Conditions**—That part of the Contract Documents which amends or supplements these General Conditions.

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

48. **Underground Facilities**—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

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

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

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

1.02 Terminology

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. Intent of Certain Terms or Adjectives:

1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. Day:

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

D. Defective:

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

   a. does not conform to the Contract Documents; or

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

   c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. Furnish, Install, Perform, Provide

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1. The word "Furnish" or the word "Install" or the word "Perform" or the word "Provide" or the word "Supply," or any combination or similar directive or usage thereof, shall mean furnishing and incorporating in the Work including all necessary labor, materials, equipment, and everything necessary to perform the Work indicated, unless specifically limited in the context used.

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

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

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

4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.

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

ARTICLE 2 – PRELIMINARY MATTERS

2.01 Delivery of Bonds and Evidence of Insurance

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

B. Evidence of Insurance: Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 Copies of Documents

A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 Commencement of Contract Times; Notice to Proceed

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

2.04 Starting the Work

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

2.05 Before Starting Construction

A. Preliminary Schedules: Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:

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

2. a preliminary Schedule of Submittals; and

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

2.06 Preconstruction Conference; Designation of Authorized Representatives

A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Subcontractors, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

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

2.07 Initial Acceptance of Schedules

A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor’s full responsibility therefor.

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

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

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 Intent

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

B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

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

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

3.02 Reference Standards

A. Standards, Specifications, Codes, Laws, and Regulations
1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

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

3.03 Reporting and Resolving Discrepancies

A. Reporting Discrepancies:

1. Contractor’s Review of Contract Documents Before Starting Work: Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and against all applicable field measurements and conditions. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.

2. Contractor’s Review of Contract Documents During Performance of Work: If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.

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

B. Resolving Discrepancies:

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

   a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 Amending and Supplementing Contract Documents

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work, not involving a change in Contract Price or Contract time, may be authorized, by one or more of the following ways:

1. A Field Order;

2. Engineer’s approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer’s written interpretation or clarification.

3.05 Reuse of Documents

A. Contractor and any Subcontractor or Supplier shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or

2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.

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

3.06 Electronic Data

A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user’s sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data’s creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving
party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.

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

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 Availability of Lands

A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner’s furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

   1. Where easement lines are shown on the Contract Drawings, they shall be considered as shown in their final location unless stipulated otherwise in the Supplementary Conditions.

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

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

4.02 Subsurface and Physical Conditions

A. Reports and Drawings: The Supplementary Conditions identify:

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

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

B. Limited Reliance by Contractor on Technical Data Authorized: Contractor may rely upon the accuracy of the “technical data” contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such “technical data” is identified in the Supplementary Conditions. Except for such reliance on such “technical data,” Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
1. the completeness of such reports and drawings for Contractor’s purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

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

3. any Contractor interpretation of or conclusion drawn from any “technical data” or any such other data, interpretations, opinions, or information.

4.03 Differing Subsurface or Physical Conditions

A. Notice: If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

1. is of such a nature as to establish that any “technical data” on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or

2. is of such a nature as to require a change in the Contract Documents; or

3. differs materially from that shown or indicated in the Contract Documents; or

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

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. Engineer’s Review: After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner’s obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer’s findings and conclusions.

C. Possible Price and Times Adjustments:

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor’s cost of, or time required for, performance of the Work; subject, however, to the following:

   a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and

   b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
   a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
   b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor’s making such final commitment; or
   c. Contractor failed to give the written notice as required by Paragraph 4.03.A.

3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 Underground Facilities

A. Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
   1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
   2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
      a. reviewing and checking all such information and data;
      b. locating all Underground Facilities shown or indicated in the Contract Documents;
      c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
      d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. Not Shown or Indicated:

   1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract
Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 Reference Points

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

4.06 Hazardous Environmental Condition at Site

A. Reports and Drawings: The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.

B. Limited Reliance by Contractor on Technical Data Authorized: Contractor may rely upon the accuracy of the “technical data” contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such “technical data” is identified in the Supplementary Conditions. Except for such reliance on such “technical data,” Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

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

3. any Contractor interpretation of or conclusion drawn from any “technical data” or any such other data, interpretations, opinions or information.

C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.

E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.

F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner’s own forces or others in accordance with Article 7.

G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition,
provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual’s or entity’s own negligence.

H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual’s or entity’s own negligence.

I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 Performance, Payment, and Other Bonds

A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor’s obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.

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

C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.
5.02 Licensed Sureties and Insurers

A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 Certificates of Insurance

A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.

B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

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

D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.

E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor’s liability under the indemnities granted to Owner in the Contract Documents.

5.04 Contractor’s Insurance

A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor’s performance of the Work and Contractor’s other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:

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

2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor’s employees;

3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor’s employees;
4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:
   a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
   b. by any other person for any other reason;

5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

B. The policies of insurance required by this Paragraph 5.04 shall:

1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

3. include contractual liability insurance covering Contractor’s indemnity obligations under Paragraphs 6.11 and 6.20;

4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);

5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and

6. include completed operations coverage:
   a. Such insurance shall remain in effect for two years after final payment.
   b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence
satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

7. With respect to all insurance required by this Paragraph 5.04, Contractor agrees to waive all rights of subrogation against Owner, Engineer, and each additional insured identified in the Supplementary Conditions.

8. The Contractor's general liability insurance shall include a per project or per location endorsement, which shall be identified in the certificate of insurance provided to the Owner.

5.05 Owner’s Liability Insurance

A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner’s option, may purchase and maintain at Owner’s expense Owner’s own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 Property Insurance

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;

2. be written on a Builder’s Risk “all-risk” policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, explosion, underground exposure, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.

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

4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;

5. allow for partial utilization of the Work by Owner;

6. include testing and startup; and
7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.

B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.

C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.

D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser’s own expense.

E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Contractor shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Contractor shall in writing advise Contractor whether or not such other insurance has been procured by Contractor.

5.07 Waiver of Rights

A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners,
employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.

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

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

2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.

C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 Receipt and Application of Insurance Proceeds - NOT USED

A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and Contractor and made payable to Owner and Contractor as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.

B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner’s Contractor’s exercise of this power. If such objection be made, Owner Contractor as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner Contractor as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner Contractor as fiduciary shall give bond for the proper performance of such duties.

5.09 Acceptance of Bonds and Insurance; Option to Replace

A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in
accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party’s interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 Partial Utilization, Acknowledgment of Property Insurer

A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

1. All insurance required by the Contract Documents, or by laws or regulations shall remain in full force and effect on all phases of the Work, whether or not the Work is occupied or utilized by Owner, until all Work included in the agreement has been completed and final payment has been made.

2. Nothing contained in the insurance requirements shall be construed as limiting the extent of Contractor's responsibility for payment of damages resulting from Contractor’s, subcontractor’s or supplier’s operations under the Contract. Contractor agrees that Contractor alone shall be completely responsible for procuring and maintaining full insurance coverage as provided herein or as may be otherwise required by the Contract Documents. Any approval by Owner or Engineer shall not operate to the contrary.

ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES

6.01 Supervision and Superintendence

A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.

B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. The superintendent will be Contractor’s representative at
the Site and shall have authority to act on behalf of Contractor. All communications given to or received from the superintendent shall be binding on Contractor.

6.02 Labor; Working Hours

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

B. In the absence of any Federal, state or local laws, regulations or covenants, the Contractor may conduct its performance of the Work at the Contractor's sole discretion, except that the cost of any overtime pay or other expense incurred by the Owner for Resident Project Representative, Owner's Representative and construction observation services, occasioned by the conduct of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day, shall be reimbursed to the Owner by the Contractor.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 Services, Materials, and Equipment

A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

1. Where the Work requires equipment be furnished, due to the lack of standardization of equipment as produced by the various manufacturers, it may become necessary to make minor modifications in the structures, buildings, piping, mechanical work, electrical work, accessories, controls, or other work, to accommodate the particular equipment offered. Contractor's bid price for any equipment offered shall include the cost of making any necessary changes subject to the approval of Engineer.

B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.
D. All items of standard equipment shall be the latest model at the time of bid, unless otherwise specified.

6.04 Progress Schedule

A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.

1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 Substitutes and “Or-Equals”

A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or “or-equal” item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.

1. “Or-Equal” Items: If in Engineer’s sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an “or-equal” item, in which case review and approval of the proposed item may, in Engineer’s sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:

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

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

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

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

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

   1) there will be no increase in cost to the Owner or increase in Contract Times; and
2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. Substitute Items:

a. If in Engineer’s sole discretion an item of material or equipment proposed by Contractor does not qualify as an “or-equal” item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.

b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.

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

1) shall certify that the proposed substitute item will:

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

   b) be similar in substance to that specified, and

   c) be suited to the same use as that specified;

2) will state:

   a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor’s achievement of Substantial Completion on time,

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

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

3) will identify:

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

   b) available engineering, sales, maintenance, repair, and replacement services; and
4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.

B. Substitute Construction Methods or Procedures: If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer’s sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.

C. Engineer’s Evaluation: Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No “or equal” or substitute will be ordered, installed or utilized until Engineer’s review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an “or equal.” Engineer will advise Contractor in writing of any negative determination.

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

E. Engineer’s Cost Reimbursement: Engineer will record Engineer’s costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.

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

G. See Specification Section 01640.

6.06 Concerning Subcontractors, Suppliers, and Others

A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner’s acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or
objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor’s own acts and omissions. Nothing in the Contract Documents:

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

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

D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.

E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.

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

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.
6.07 Patent Fees and Royalties

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

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

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

6.08 Permits

A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 Laws and Regulations

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

B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all...
court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor’s responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor’s obligations under Paragraph 3.03.

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 Taxes

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

6.11 Use of Site and Other Areas

A. Limitation on Use of Site and Other Areas:

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.

2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.

3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor’s performance of the Work.

B. Removal of Debris During Performance of the Work: During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
C. **Cleaning:** Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

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

6.12 **Record Documents**

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

6.13 **Safety and Protection**

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

1. all persons on the Site or who may be affected by the Work;
2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

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

C. Contractor shall comply with the applicable requirements of Owner’s safety programs, if any. The Supplementary Conditions identify any Owner’s safety programs that are applicable to the Work.
D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor’s safety program with which Owner’s and Engineer’s employees and representatives must comply while at the Site.

E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

F. Contractor’s duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion) and during the Correction Period to the extent the Contractor or Contractor's Subcontractors are present on the Site to fulfill Correction Period obligations.

6.14 Safety Representative

A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 Hazard Communication Programs

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

6.16 Emergencies

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

6.17 Shop Drawings and Samples

A. Contractor shall submit required Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.
1. **Shop Drawings:**

   a. Submit number of copies specified in the General Requirements.

   b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

   c. **Shop Drawings submitted as herein provided by Contractor and reviewed by Engineer for conformance with the design concept shall be executed in conformity with the Contract Documents unless otherwise required by Owner.**

   d. **When Shop Drawings are submitted for the purpose of showing the installation in greater detail, their review shall not excuse Contractor from requirements shown on the drawings and Specifications.**

   e. **For-Information-Only submittals upon which the Engineer is not expected to conduct review or take responsive action may be so identified in the Contract Documents.**

2. **Samples:**

   a. Submit number of required Samples specified in the Specifications.

   b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.

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

C. **Submittal Procedures:**

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

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

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

   c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
d. determined and verified all information relative to Contractor’s responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

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

3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation, otherwise Contractor will not be relieved of the responsibility of executing the Work in accordance with the Contract Documents, even though such Shop Drawings or Samples have been otherwise reviewed.

a. If a Shop Drawing or Sample, as submitted, indicates a variation from the Contract Requirements as set forth in the Contract Documents and Engineer finds same to be in the interest of Owner and to be so minor as not to involve a change in the Contract Price or time for performance, Engineer may approve the Shop Drawings or Samples; provided however, such departure is slight in nature and does not affect the design concept of the Work.

4. Contractor shall submit all Shop Drawings and Samples sufficiently in advance of construction requirements to allow ample time for checking, correcting, resubmitting and rechecking and to avoid any delay in progress of the Work.

5. See Specification Section 01340.

6. Shop Drawings and Sample submittals not conforming to requirements of this Paragraph 6.17C. and Specification Section 01340 will be returned to Contractor without action for resubmittal and the resulting delay shall be entirely the responsibility of Contractor.

D. Engineer’s Review:

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

2. Engineer’s review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Engineer’s review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer’s review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

4. Engineer’s check and review of Shop Drawings and Samples, Standard Specifications and descriptive literature submitted by Contractor will be only for general conformance with design concept, except as otherwise provided, and shall not be construed as:

   a. permitting any departure from the Contract Requirements;
   b. relieving Contractor of the responsibility for any error in details, dimensions or otherwise that may exist in such submittals;
   c. constituting a blanket approval of dimensions, quantities, or details of the material or equipment shown; or
   d. approving departures from additional details or instructions previously furnished by Engineer. Such check or review shall not relieve Contractor of the full responsibility of meeting all of the requirements of the Contract Documents.

E. Resubmittal Procedures:

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

6.18 Continuing the Work

A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 Contractor’s General Warranty and Guarantee

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

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

   1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
2. normal wear and tear under normal usage.

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

1. observations by Engineer;
2. recommendation by Engineer or payment by Owner of any progress or final payment;
3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
4. use or occupancy of the Work or any part thereof by Owner;
5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;
6. any inspection, test, or approval by others; or
7. any correction of defective Work by Owner.

6.20 Indemnification

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

B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers’ compensation acts, disability benefit acts, or other employee benefit acts.
C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer’s officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:

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

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

6.21 Delegation of Professional Design Services

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

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

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

D. Pursuant to this Paragraph 6.21, Engineer’s review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer’s review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.
ARTICLE 7 – OTHER WORK AT THE SITE

7.01 Related Work at Site

A. Owner may perform other work related to the Project at the Site with Owner’s employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:

1. written notice thereof will be given to Contractor prior to starting any such other work; and

2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.

B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner’s employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others’ work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

C. If the proper execution or results of any part of Contractor’s Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor’s Work. Contractor’s failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor’s Work except for latent defects and deficiencies in such other work.

7.02 Coordination

A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:

1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;

2. the specific matters to be covered by such authority and responsibility will be itemized; and

3. the extent of such authority and responsibilities will be provided.
B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.

B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor’s wrongful actions or inactions.

C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor’s wrongful action or inactions.

**ARTICLE 8 – OWNER’S RESPONSIBILITIES**

8.01 *Communications to Contractor*

A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. Owner’s duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner’s identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at or contiguous to the Site that have been utilized by Engineer in preparing the Contract Documents.

8.06 *Insurance*

A. Owner’s responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.
8.07 **Change Orders**

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 **Inspections, Tests, and Approvals**

A. Owner’s responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 **Limitations on Owner’s Responsibilities**

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

8.10 **Undisclosed Hazardous Environmental Condition**

A. Owner’s responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 **Evidence of Financial Arrangements**

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner’s obligations under the Contract Documents.

8.12 **Compliance with Safety Program**

A. While at the Site, Owner’s employees and representatives shall comply with the specific applicable requirements of Contractor’s safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

**ARTICLE 9 – ENGINEER’S STATUS DURING CONSTRUCTION**

9.01 **Owner’s Representative**

A. Engineer will be Owner’s representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner’s representative during construction are set forth in the Contract Documents.

9.02 **Visits to Site**

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor’s executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make
exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer’s efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer’s visits and observations are subject to all the limitations on Engineer’s authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer’s visits or observations of Contractor’s Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor’s means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03  Project Representative

A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions Paragraph 9.03B, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer’s consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

B. Engineer’s Resident Project Representative shall not authorize any deviation from the Contract Documents or substitutions of materials or equipment.

9.04  Authorized Variations in Work

A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05  Rejecting Defective Work

A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.
B. The acceptance at any time of materials or equipment by or on behalf of Owner shall not be a bar to future rejection if they are subsequently found to be defective, inferior in quality, or not equal to the material or equipment specified, or are not as represented to Engineer or Owner.

9.06 Shop Drawings, Change Orders and Payments

A. In connection with Engineer’s authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.

B. In connection with Engineer’s authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.

C. In connection with Engineer’s authority as to Change Orders, see Articles 10, 11, and 12.

D. In connection with Engineer’s authority as to Applications for Payment, see Article 14.

9.07 Determinations for Unit Price Work

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer’s preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer’s written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 Decisions on Requirements of Contract Documents and Acceptability of Work

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.

B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer’s decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.

C. Engineer’s written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.

D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.
9.09  Limitations on Engineer’s Authority and Responsibilities

A. Neither Engineer’s authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor’s means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor’s failure to perform the Work in accordance with the Contract Documents.

C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

D. Engineer’s review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.

E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

9.10  Compliance with Safety Program

A. While at the Site, Engineer’s employees and representatives shall comply with the specific applicable requirements of Contractor’s safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01  Authorized Changes in the Work

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

1.  Change Proposal Request:

   a.  When Owner requests Contractor to present a proposal to accomplish a change in the Work, the request will be made in the form of a Change Proposal Request (CPR)
b. When the Contractor desires to propose changes to the Work, it may initiate a CPR in the same form as provided in Paragraph 10.01A.1.a. and submit the CPR to the Engineer for the Engineer's review and recommendation.

B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 Unauthorized Changes in the Work

A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

10.03 Execution of Change Orders

A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:

1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner’s correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;

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

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.
10.04 Notification to Surety

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

10.05 Claims

A. Engineer’s Decision Required: All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.

B. Notice: Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant’s written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant’s last submittal (unless Engineer allows additional time).

C. Engineer’s Action: Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:

1. deny the Claim in whole or in part;

2. approve the Claim; or

3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer’s sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.

D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

E. Engineer’s written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor
invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.

F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 Cost of the Work

A. Costs Included: The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers’ compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers’ field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor’s Cost of the Work and fee shall be determined in the same manner as Contractor’s Cost of the Work and fee as provided in this Paragraph 11.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.

5. Supplemental costs including the following:

   a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor’s employees incurred in discharge of duties connected with the Work.

   b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.

   c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

   d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.

   e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

   f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor’s fee.

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

   h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.

   i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. Costs Excluded: The term Cost of the Work shall not include any of the following items:
1. Payroll costs and other compensation of Contractor’s officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor’s principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor’s fee.

2. Expenses of Contractor’s principal and branch offices other than Contractor’s office at the Site.

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

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.

C. Contractor’s Fee: When all the Work is performed on the basis of cost-plus, Contractor’s fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor’s fee shall be determined as set forth in Paragraph 12.01.C.

D. Documentation: Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 Allowances

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

B. Cash Allowances:

1. Contractor agrees that:

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

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

C. **Contingency Allowance:**

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

### 11.03 Unit Price Work

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

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor’s overhead and profit for each separately identified item. **Work described in the Contract Documents, or reasonably inferred as required for a functionally complete installation, but not identified in the listing of unit price items shall be considered incidental to unit price work listed and the cost of incidental work included as a part of the unit price.**

D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

2. there is no corresponding adjustment with respect to any other item of Work; and

3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

### ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

#### 12.01 Change of Contract Price

A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to
the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:

1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2), and shall include the cost of any secondary impacts that are foreseeable at the time of pricing the cost of extra Work; or

3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor’s fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. Contractor’s Fee: The Contractor’s fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or

2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

   a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor’s fee shall be 15 percent;

   b. for costs incurred under Paragraph 11.01.A.3, the Contractor’s fee shall be five percent;

   c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

   d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;

   e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor’s fee by an amount equal to five percent of such net decrease; and

   f. when both additions and credits are involved in any one change, the adjustment in Contractor’s fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.
12.02  *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

C. No extension of the Contract Time will be allowed for additional Work or for claimed delay unless the additional Work contemplated or claimed delay is shown to be on the critical path of the Project's schedule of construction or Contractor can show by Critical Path Method analysis how the additional Work or claimed delay adversely affects the critical path.

12.03  *Delays*

A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor’s entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor’s ability to complete the Work within the Contract Times.

C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor’s ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor’s sole and exclusive remedy for the delays described in this Paragraph 12.03.C.

D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 Notice of Defects

A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 Access to Work

A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor’s safety procedures and programs so that they may comply therewith as applicable.

13.03 Tests and Inspections

A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;

2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and

3. as otherwise specifically provided in the Contract Documents.

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

D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner’s and Engineer’s acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor’s purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.
E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.

F. Uncovering Work as provided in Paragraph 13.03.E shall be at Contractor’s expense unless Contractor has given Engineer timely notice of Contractor’s intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 Uncovering Work

A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer’s observation and replaced at Contractor’s expense.

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

C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); or Owner shall be entitled to accept defective Work in accordance with Paragraph 13.08 in which case Contractor shall still be responsible for all costs associated with exposing, observing, and testing the defective Work, and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.

D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 Owner May Stop the Work

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 Correction or Removal of Defective Work

A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it
from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner’s special warranty and guarantee, if any, on said Work.

13.07 Correction Period

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor’s use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner’s written instructions:

1. repair such defective land or areas; or

2. correct such defective Work; or

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner’s written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
E. Contractor’s obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 Acceptance of Defective Work

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer’s recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner’s evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer’s recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 Owner May Correct Defective Work

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor’s services related thereto, take possession of Contractor’s tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner’s representatives, agents and employees, Owner’s other contractors, and Engineer and Engineer’s consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include
but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor’s defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner’s rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 Schedule of Values

A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 Progress Payments

A. Applications for Payments:

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner’s interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor’s legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. Review of Applications:

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer’s reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer’s recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer’s observations of the executed Work as an experienced and qualified design professional, and on Engineer’s review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer’s knowledge, information and belief:

a. the Work has progressed to the point indicated;

b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and

c. the conditions precedent to Contractor’s being entitled to such payment appear to have been fulfilled in so far as it is Engineer’s responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or

b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer’s review of Contractor’s Work for the purposes of recommending payments nor Engineer’s recommendation of any payment, including final payment, will impose responsibility on Engineer:

a. to supervise, direct, or control the Work, or

b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

c. for Contractor’s failure to comply with Laws and Regulations applicable to Contractor’s performance of the Work, or

d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or

e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer’s opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise
or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer’s opinion to protect Owner from loss because:

a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;

b. the Contract Price has been reduced by Change Orders;

c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or

d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due:

1. Ten days after presentation of the Application for Payment to Owner with Engineer’s recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. Reduction in Payment:

1. Owner may refuse to make payment of the full amount recommended by Engineer because:

   a. claims have been made against Owner on account of Contractor’s performance or furnishing of the Work;

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

   c. there are other items entitling Owner to a set-off against the amount recommended; or

   d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.

3. Upon a subsequent determination that Owner’s refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.
14.03 **Contractor’s Warranty of Title**

A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 **Substantial Completion**

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

B. Promptly after Contractor’s notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

1. If portions of the Work have been determined not to be at a point of Substantial Completion and require re-inspection or retesting by Engineer, the cost of such re-inspection or retesting, including the cost of time, travel and living expenses, shall be paid by Contractor to Owner who will reimburse Engineer. Owner may offset said monies by deducting that amount from payments due to Contractor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner’s objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer’s issuing the definitive certificate of Substantial Completion, Engineer’s aforesaid recommendation will be binding on Owner and Contractor until final payment.
E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 Partial Utilization

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor’s performance of the remainder of the Work, subject to the following conditions:

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.

2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 Final Inspection

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.
14.07 Final Payment

A. Application for Payment:

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

   a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;

   b. consent of the surety, if any, to final payment;

   c. a list of all Claims against Owner that Contractor believes are unsettled; and

   d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. Engineer’s Review of Application and Acceptance:

1. If, on the basis of Engineer’s observation of the Work during construction and final inspection, and Engineer’s review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor’s other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer’s recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. Payment Becomes Due:
1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer’s recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 Final Completion Delayed

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor’s final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 Waiver of Claims

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor’s continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner and/or Engineer other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner and/or Engineer in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 Owner May Suspend Work

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall be granted the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 Owner May Terminate for Cause

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor’s persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

2. Contractor’s disregard of Laws or Regulations of any public body having jurisdiction;

3. Contractor’s repeated disregard of the authority of Engineer; or


B. If one or more of the events identified in Paragraph 15.02A. occur, Owner will provide written notice to Contractor and Surety to arrange a conference with Contractor and Surety to address Contractor's failure to perform the Work. Conference shall be held not later than 15 days, after receipt of notice.

1. If the Owner, the Contractor, and the Surety do not agree to allow the Contractor to proceed to perform the Construction Contract, the Owner may, to the extent permitted by Laws and Regulations, declare a Contractor Default and formally terminate the Contractor's right to complete the Contract. Contractor Default shall not be declared earlier than 20 days after the Contractor and Surety have received notice of conference to address Contractor's failure to perform the Work.

2. If Contractor's services are terminated, Surety shall be obligated to take over and perform the Work. If Surety does not commence performance thereof within 15 consecutive calendar days after date of an additional written notice demanding Surety's performance of its obligations, then Owner, without process or action at law, may take over any portion of the Work and complete it as described below.

a. If Owner completes the Work, Owner may exclude Contractor and Surety from the site and take possession of the Work and of all tools, appliances, construction equipment and machinery at the site and use the same to the full extent they could be used by Contractor and Surety (without liability to Contractor and Surety for trespass or conversion), incorporate in the Work all materials and equipment stored at the site or for which Owner has paid Contractor or Surety but which are stored elsewhere, and finish the Work as Owner may deem expedient.

3. Whether Owner or Surety completes the Work, Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses and damages sustained by Owner arising out of or resulting from completing the Work, such excess will be paid to Contractor. If such claims, costs, losses and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and when so approved by Engineer incorporated in a Change Order, provided that when exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

4. Neither Owner, Engineer, nor any of their respective consultants, agents, officers, directors or employees shall be in any way liable or accountable to Contractor or Surety for the
method by which the completion of the said Work, or any portion thereof, may be accomplished or for the price paid therefor.

5. Owner, notwithstanding the method used in completing the Contract, shall not forfeit the right to recover damages from Contractor or Surety for Contractor's failure to timely complete the entire Contract. Contractor shall not be entitled to any claim for damages on account of the method used by Owner in completing the Contract.

6. Maintenance of the Work shall continue to be Contractor's and Surety's responsibilities as provided for in the bond requirements of the Contract Documents or any special guarantees provided for under the Contract Documents or any other obligations otherwise prescribed by law.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and

3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.

E. Where Contractor’s services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 Owner May Terminate For Convenience

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 Contractor May Stop Work or Terminate

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor’s stopping the Work as permitted by this Paragraph.
ARTICLE 16 – DISPUTE RESOLUTION

16.01 Methods and Procedures

A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the Claim is not resolved by mediation, Engineer’s action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or

2. agrees with the other party to submit the Claim to another dispute resolution process; or

3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 Giving Notice

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 Computation of Times

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.
17.03 Cumulative Remedies

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 Survival of Obligations

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 Controlling Law

A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 Headings

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.
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SECTION 00805
SUPPLEMENTARY CONDITIONS
TO
EJCDC GENERAL CONDITIONS, C-700 (2007 EDITION)

Supplementary Conditions

These Supplementary Conditions modify and supplement Section 00700 - General Conditions, and other provisions of the Contract Documents as indicated below. All provisions of the General Conditions that are modified or supplemented remain in full force and effect as so modified or supplemented. All provisions of the General Conditions which are not so modified or supplemented remain in full force and effect.

Defined Terms

The terms used in these Supplementary Conditions which are defined in the General Conditions have the meaning assigned to them in the General Conditions.

Modifications and Supplements

The following are instructions that modify or supplement specific paragraphs in the General Conditions and other Contract Documents.

SC-1.01A.3

Add to the end of the paragraph: “This does not include the release of retainage.”

SC-1.01A.44

Modify the definition of Substantial Completion to read: “…in the opinion of Engineer and Owner, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be safely utilized for the purposes for which it is intended. ….”

SC-2.01B

Replace paragraph to read: “Evidence of Insurance: Before any Work at the Site is started, Contractor shall deliver to Owner, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which Contractor or any additional insured may reasonably request) which Contractor is required to purchase and maintain in accordance with Article 5.”

SC-2.02A

Modify number of copies to read: “…up to six printed or hard copies…”

SC-2.03A

Replace this paragraph in its entirety with the following:

“Contract times will be as defined in the Instructions to Bidders and the Agreement.”

SC-2.04A.

Replace this paragraph in its entirety with the following:
“Contractor shall start to perform the Work on the date when the Contract Times commence to run or when Notice to Proceed has been issued. No Work shall be done at the Site prior to the date on which the Contract Times commence to run or the Notice to Proceed has been issued.”

**SC-2.05A**

Modify to read as: “…Contractor shall submit to Engineer and Owner…”

**SC-2.06B**

Add an underline emphasis to “in writing”

**SC-2.07A**

Add after each occurrence of “Engineer” in section and all sub-sections: “and Owner”

**SC-3.03A.1**

Add after each occurrence of “Engineer” in section: “and/or Owner”

**SC-3.03A.2**

Add after each occurrence of “Engineer” in section: “and Owner”

**SC-3.04B.3**

Modify to read as “Engineer’s or Owner’s…”

**SC-4.02A.**

The following are reports of explorations and tests of subsurface conditions at the project site:

Geotechnical Data Report, Main Canal Flumes & Other Improvements, Naches-Selah Irrigation District, Yakima County, Washington

The following are supplemental exhibits are available related to temporary traffic control:

Temporary Traffic Control for Demolition of Trestle
Temporary Traffic Control for Detour

The following is a supplemental exhibit available related to site access:

Mile 8.5 Access

**SC-4.02.**

Add the following new subparagraph immediately following GC-4.02B.:

"C. The "technical data" contained in such report upon which the Contractor may rely are: the test pit locations and logs of the test pits, the levels of subsurface water (if any), laboratory test methods and results, and similar factual data.

1. Test pit information represents subsurface characteristics to the extent indicated, only for the point location of the test pit and, with regard to the level of subsurface water (if any), only at the time the test pit was made."
2. Contractor shall make its own interpretations of the subsurface characteristics to be encountered between test pits and its own interpretations of the fluctuation of the level of subsurface water (if any) at and between test pits.

D. The "technical data" contained in drawings of physical conditions in or relating to existing surface and subsurface structures (except Underground Facilities) which are at or contiguous to the Site upon which the Contractor may relay include all of the information in such drawings.

**SC-4.05A.1.**

Add a new paragraph 4.05A.1. to read as follows:

"Contractor shall, at his own expense, employ a registered engineer or licensed land surveyor to give to Contractor lines and elevations for Contractor's use in constructing the Work. The registered engineer or licensed land surveyor shall furnish to Engineer, through Contractor, a signed plat certifying to the location and elevations of the Work indicating ties and closure to baseline and datum bench mark. Contractor’s surveyor shall also provide before and after construction surveys to determine quantities moved."

**SC-5.01A.**

Modify to read as: “Contractor shall furnish original performance and payment bonds…”

**SC-5.02A.**

Add at end of paragraph: “The insurance company shall have an A+ rating or better.”

**SC-5.03B.**

Replace paragraph in its entirety with:

“Owner shall deliver to Contractor, upon request, an evidence of insurance certificate (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.”

**SC-5.04A.**

The limits of liability for the insurance required by Paragraph GC-5.04 shall provide the following coverages for not less than the following amounts or greater where required by laws and regulations:

**5.04A.1. and 5.04A.2.** Workers' Compensation, etc., under Paragraphs GC-5.04A.1. and GC-5.04A.2.

2. Applicable Federal (e.g., Longshoreman's): Statutory.
3. Employer's Liability: Statutory

**5.04A.3., 5.04A.4., and 5.04A.5.** Contractor's Liability Insurance under Paragraphs GC-5.04A.3., GC-5.04A.4. and GC-5.04A.5., which shall also include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody and control of Contractor:

1. Commercial Liability (combined single limit bodily injury and property damage): $2,000,000
2. Umbrella Excess Liability (each occurrence and annual aggregate): $4,000,000
**5.04A.6.** Automobile Liability.

(1) Combined Single Limit (Bodily Injury and Property Damage):

$2,000,000 Each Accident

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**SC-5.04B.1.**

The entities listed below are "additional insureds as their interest may appear" including their respective officers, directors, agents and employees.

- **OWNER:** Naches-Selah Irrigation District
- **ENGINEER:** HDR Engineering, Inc.
- **ENGINEER's Consultants:** Huibregtse, Louman Associates, Inc.
  - Shannon & Wilson, Inc.
  - Bear Testing, Inc.

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**SC-5.06B**

Modify to read as: “Owner may purchase…”

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**SC-5.07B**

Delete GC-5.07A replace paragraph to read as follows:

“Contractor intends that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Contractor waives all rights against Owner and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.”

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**SC-5.07B**

Delete GC-5.07B and it subparagraph in their entirety.

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**SC-5.07C**

Delete GC-5.07C in its entirety.

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**SC-6.02B**

Replace the paragraph in it’s entirety with the following:
“Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner’s written consent (which will not be unreasonably withheld) given after prior written notice to Engineer. For the purposes of this Contract, regular working hours is defined as sun up to sun down. Work outside of regular working hours requested in writing by the Contractor will be considered by Owner if allowed by local landowners, consultants, testing companies, and regulatory agencies.”

**SC-6.02C**

Add a new paragraph after GC-6.02B, which is to read as follows:

Prevailing wages must be paid in accordance with the current wage schedule in effect in Yakima County. An Intent to Pay Prevailing Wages, Weekly Certified Payrolls and Affidavit of Wages Paid must be submitted to Owner by Contractor and subcontractors.

**SC-6.05G**

Delete GC-6.05G in its entirety.

**SC-6.10**

Add new subparagraphs after GC-6.10A, which are to read as follows:

“B. The project is located in Yakima County. Taxes shall be paid for the appropriate amount of work performed in the county. Taxes shall be current rates for Yakima County.

C. All other federal, state and local taxes, excluding sales and use taxes, as required by federal, state, or local laws shall be included in the unit prices, lump sum price, or other prices stated in the Bid Schedule.”

**SC-6.19C.1**

Modify to read as: “observations by Engineer or Owner;”

**SC-12.02.**

Add new subparagraphs 12.02D, which is to read as follows:

“D. Inclement weather is not reason for variance from carrying out the Work as specified in the Contract Documents. The Contractor shall notify the District each time he ceases work for inclement weather so that an accurate record of events can be maintained.

The Contractor is advised that normal weather can result in adverse conditions at the site of this project. Wet conditions and flowing water are possible across the project site, resulting from normal precipitation and runoff. Other adverse site conditions are possible.

The District, to the extent it can reasonably do so will operate the facilities under its control in a manner which avoids creating adverse conditions for the Contractor at the site. The Contractor may need to install protective coverings, install and operate heaters and take other protective or preventive measures to mitigate adverse site conditions. The cost of such actions is to be considered incidental to and included in unit bid prices.

It is expected that the Contractor’s decision to suspend operations for inclement weather conditions will be offset by an increased level of effort in order to meet the completion date.
It is critical that the canal be available to deliver water to meet irrigation demands by April 1, 2015.”

SC-12.03A.

Strike the words “abnormal weather conditions” from the paragraph.

SC-12.03C.

Strike the words “abnormal weather conditions” from the paragraph.

SC-13.03B.

Add new subparagraphs 13.03B4, which is to read as follows:

“4. Payment for Soil Testing:
   a. The Owner will carry out Quality Assurance testing sufficient to ensure that the Project Work is being done in compliance with the requirements of the Contract Documents. The Engineer will provide the Contractor with the approximate frequency of Quality Assurance testing that the Owner and Engineer intend to carry out. Adjustments to the frequency of testing will be, in part, based on field conditions and performance at the discretion of the Engineer.
   b. The Contractor will be responsible for Quality Control Testing at the discretion of the Contractor.
   c. Soils Quality Assurance testing:
      i. The Owner will pay for "Passing" soils and "Passing" concrete tests on the Project.
      ii. Costs of corrective action, costs of "Failing" soils tests are the sole responsibility of the Contractor.
      iii. The Contractor may elect to perform interim Quality Control soil tests to ensure that the Quality Assurance testing done by the Owner will result in a “Passing” test. The Contractor will pay for all Quality Control tests.
      iv. Lab testing of soils to develop the baseline parameters to support field testing such as sieve analysis, hydrometer tests, density tests, moisture content tests, and other similar lab tests will be carried out and paid for by the Owner.
   d. Other testing: Required testing, testing procedures, reports, certificates, and costs associated with all phases of securing required satisfactory test information which may be required by individual Specification Sections or Drawings that are not specifically assigned as Owner responsibilities will be assumed to be the full responsibility of the Contractor.
   e. The Contractor and the Owner will coordinate to select a firm to provide testing services for both Quality Assurance and Quality Control testing to avoid conflicts caused by differences between testing services.

SC-14.02A.

Modify Paragraph 14.02A.1. by adding the following:

"a. Provide a copy of the Shop Drawing Transmittal Letter indicating approval of material or equipment for which payment as stored material is requested."

SC-14.02A.3

Replace paragraph GC-14.02A.3 in its entirety with: “The amount of retainage with respect to progress payments will be five (5) percent unless Owner has reason to believe a lien will be filed exceeding that amount.”

SC-14.02C.1
Replace paragraph GC-14.02C.1 in its entirety with: “Owner pays through the Yakima County Treasurer and bills are paid twice a month on the fifteenth of the month, or next business day and the last business day of the month. Any invoice for payment needs to be submitted to Owner at least seven (7) working days prior to these dates for payment. If not received in these deadlines, payment will be made in the next processing period.”

**SC-14.07C.2**

Add a new paragraph after GC-14.07C.1 that reads as the following:

“Retainage will be held until releases have been received from WA Dept of Labor & Industries, WA Employment Security Department and WA Dept. of Revenue. If there are other liens filed with Owner against Contractor, disputed amount will be held and remaining retainage will be released to Contractor in as timely a manner as possible.”

**END OF SECTION**
SECTION 01010  
SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

A. General work included in this section:
   1. Furnish all labor, materials, and equipment required in accordance with provisions of the Contract Documents.
   2. Completely coordinate the Work.
   3. Although such work may not be specifically indicated, furnish and install all miscellaneous items incidental to or necessary for completion of Work.

1.2 WORK COVERED BY CONTRACT

A. The completed Work shall provide the Owner with approximately 162 linear feet of 10-foot diameter and 2,996 linear feet of 8-foot diameter FRPM pipe divided into 4 segments. At the beginning and end of each pipe segment will be a reinforced inlet, outlet, or box structure. Along the pipe segments there are air vents, pipe drains, services, and access manholes. Trenching and backfill will follow manufacturer’s specifications and may require the import of select fill. Test pits investigations revealed that some on-site materials will meet the backfill gradation requirements.

B. A significant amount of demolition and disposal of wood and concrete structures are included in this Work. The wood is treated with Creosote. All wood and concrete demolished must be hauled off site to a State approved disposal site for the material.

C. The piping will cross a Yakima County Road (Naches Wenas Road). The piping will be backfilled with Controlled Density Fill (CDF) from County right of way (row) line to row line. Traffic control will need to be provided for demolition as wells as rerouting on a temporary road during pipe installation. An initial traffic control plan has been conditionally approved by Yakima County, but the Contractor will need to further coordinate with the County to secure final approval. Due to the season in which the project will be completed, an initial cold patch will need to be installed, and maintained until later replaced by a hot patch to complete the road reconstruction per County specification and permit conditions.

D. Included in the work is approximately 3,600 linear feet of concrete lined, welded wire fabric reinforced canal. The subgrade is to be shaped and angular material removed, a geomembrane installed, and concrete poured and finished. Some sections of concrete flume, and multiple reinforced concrete transition structures are included.

E. Contractor shall protect existing structures and canals not being removed. If facilities to remain are damaged, Contractor is responsible for repair.

F. Several temporary roads will be required for construction purposes. Work will provide Owner with approximately 8,000 linear feet of gravel road for O&M purposes

G. Contractor to provide labor and materials for services as shown on drawings and specifications. Owner will provide labor and materials for final connection to existing landowner irrigation services.

H. Materials will need to be purchased by the Contractor, delivered to the Project Site, and properly installed, including but not limited to, FRPM pipe, select fill, concrete, steel, geomembrane, road base material, hot and cold asphalt, etc.
1.3 **WORK NOT COVERED BY CONTRACT**

A. The Contractor will stub out the 4 inch and 6 inch services per the Drawings, and Owner will be responsible for furnishing and installing final connection to landowner facilities.

1.4 **CONTRACTOR’S USE OF PREMISES**

A. Coordinate use of premises under direction of Owner and Engineer.

B. Contractor:
   1. Assumes full responsibility for the protection and safekeeping of products and materials Contractor has stored on the site including all equipment, storage trailers, job shacks, and other items.
   2. Shall move any equipment, stored products, or materials, under Contractor’s responsibility, which interfere with operations of Owner.
   3. Shall obtain and pay for the use of any additional storage or work areas if needed for Contractor operations.
   4. Shall confine all materials storage, equipment storage, and employee and subcontractor parking to within the project property boundaries shown on the Contract Drawings.
   5. Shall restore any areas used for materials storage, equipment storage, or employee and subcontractor parking to their original condition or better, unless indicated otherwise.

1.5 **WORK SEQUENCE**

A. The Contractor shall develop excavation plans and schedules in accordance with the requirements of Section 01320 Construction Progress Schedule.

1.6 **OWNER OCCUPANCY**

A. The Owner will not be occupying the project site during the execution of the Work except as needed to maintain or repair adjacent irrigation facilities.

B. Contractor shall coordinate with Owner in all construction operations to minimize conflicts and to facilitate Owner usage of adjacent irrigation facilities.

1.7 **SUBSTANTIAL COMPLETION**

A. For the purposes of establishing when the overall Project is substantially complete and suitable for its intended purpose, the component element shall be completed as follows:
   1. All piping and appurtenances shall be installed and backfilled.
   2. All concrete structures will be completed, backfilled, and any steel appurtenances attached.
   3. All concrete canals, flumes, and transitions will be completed and backfilled.
   4. All demolished wood, concrete, and steel to be removed from project site.
   5. The O&M roads shall be complete.

B. Additional work elements that shall be completed for final completion of total project include:
   1. Clean up.
   2. Final grading, if needed.
   4. Hot patch asphalt for county road crossing.

1.8 **LINES AND GRADES**

A. Construct all Work to the lines, grades and elevations indicated on the Drawings.
   1. Remove and reconstruct improperly located work.

B. Provide all additional survey, layout, and measurement work required.
   1. Locate and protect control points prior to starting site work, and preserve all permanent reference points during construction.
   2. Make no changes or relocations without prior written notice to Engineer.
   3. Report to Engineer when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
4. Establish lines and levels, locate and lay out by instrumentation and similar appropriate means.
5. Stakes for grading, fill, and topsoil placement.
6. Utility slopes and invert elevation.
7. From time to time, verify layouts by the same methods.
8. Maintain a complete, accurate log of all control and survey work as it progresses.
9. Upon request of Engineer, submit documentation to verify accuracy of field engineering work.

1.9 REGULATORY REQUIREMENTS
A. Comply with all Federal, State, and local laws, regulations, codes, and ordinance applicable to the Work.
B. References in the Contract Documents to local codes shall mean Yakima County, Washington.
C. Other standards and codes that apply to the Work are designated in the Specifications.

1.10 ACCESS BY GOVERNMENT OFFICIALS
A. Authorized representatives of governmental agencies shall at all times have access to the Work where it is in preparation or progress.

1.11 EASEMENTS AND RIGHTS-OF-WAY
A. Confine construction operations to within the project boundaries shown on the Project Drawings.

1.12 FENCES
A. Maintain all fences affected by the Work until completion of the Work. Erect temporary fencing as approved to maintain security and safety.
B. Keep gates closed and locked when the work is not in progress.

1.13 PROTECTION OF PUBLIC AND PRIVATE PROPERTY
A. Contractor to protect existing utilities in the Project area including, but not limited to, utility poles, guy wires, fences, phone wire, fiber optic cable, private wells, and buried/overhead power lines.
B. Contractor shall be responsible for all damage to streets, roads, highways, shoulders, ditches, embankments, culverts, bridges, and other public or private property, regardless of location or character, that may be caused by transporting equipment, materials, or workers to or from the Work or any part or site thereof, whether by Contractor or Contractor’s subcontractors or suppliers.
C. Make satisfactory and acceptable arrangements with the Owner of, or the agency or authority having jurisdiction over, any damaged property concerning its repair, replacement, or payment of costs incurred in connection with the damage.
D. In areas where the Contractor’s operations are adjacent to or near a utility and such operations may cause damage which might result in considerable expense, loss, and inconvenience, the operation shall be suspended until all arrangements necessary for the protection thereof have been made by the Contractor.
E. Notify all utilities that may be affected by the construction operation at least 48 hours in advance. Before exposing any utility, the utility having jurisdiction shall grant permission and may oversee the operation. Should service of any utility be interrupted due to the Contractor’s operation, the proper authority shall be notified immediately. Contractor shall cooperate with the said authority in restoring the service as promptly as possible and shall bear any costs incurred.
F. Contractor shall coordinate as much as possible with adjacent landowners on their private access roads.
1.14 MAINTENANCE OF TRAFFIC

A. Conduct Work to interfere as little as possible with public travel on adjacent public roads, whether vehicular or pedestrian.

B. Do not close any public street or portion thereof without first notifying and receiving approval from Yakima County, including applying for and receiving approved permit specific to closing or other approved traffic control plan. Conduct operations to minimize interference with emergency vehicle access.

END OF SECTION
SECTION 01011  
OWNER FURNISHED EQUIPMENT  

PART 1 - GENERAL  

1.1 SUMMARY  
A. General work included in this section:  
   1. Coordinating delivery, unloading, storage, and installation of Owner Pre-purchased  
      equipment or materials under separate equipment procurement contracts.  
   2. Coordination and scheduling of manufacturer’s field services for the equipment.  
B. Related Sections include but are not necessarily limited to:  
   1. Division 0 – Bidding Requirements, Contract Forms, and Conditions of the Contract.  
   2. Division 1 – General Requirements  

1.2 DELIVERY, STORAGE, AND HANDLING  
A. The Contractor shall be responsible for picking up parts and equipment from the Owner’s shop,  
located in Selah, Washington, and delivering to the job site.  

1.3 STORAGE  
A. Contractor shall store all parts and equipment to avoid damage, theft, vandalism. Parts and  
equipment shall be stored up off the ground on pallets, etc.  

PART 2 - PRODUCTS  

2.1 GENERAL  
A. There are no Owner-Furnished products in this Contract.  

PART 3 - EXECUTION  

3.1 INSTALLATION  
A. Contractor shall install equipment in a manner that prevents damage.  

3.2 FIELD QUALITY CONTROL  
A. Contractor shall inspect all goods associated with the equipment prior to installation to verify it  
is complete and undamaged.  

END OF SECTION
SECTION 01025
MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Measurement and payment.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 1 - General Requirements.
   3. Section 02110 - Site Clearing.
   4. Section 02200 - Earthwork.

1.2 SUBMITTALS

A. Informational Submittals:
   1. See Specification Section 01340 for requirements for the mechanics and administration of
      the submittal process.
   2. Schedule of Values: Submit on Contractor’s standard form and modify as required by the
      Engineer.
   3. Schedule of Estimated Progress Payments:
      a. Submit with initially acceptable Schedule of Values.
      b. Submit adjustments thereto with Application for Payment.
   4. Application for Payment.
   5. Final Application for Payment.

1.3 SCHEDULE OF VALUES

A. Upon request of Engineer, provide support documentation to support the accuracy and
   payment of lump sum bid items.

B. An unbalanced or front-end loaded schedule will not be acceptable.

C. Summation of the complete Schedule of Values will represent all the Work and shall equal the
   Contract Price.

1.4 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.
   1. Adjust to reflect subsequent adjustments in progress schedule and Contract
   2. Price as reflected by modifications to the Contract Documents.

1.5 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 suitable to Engineer.

C. Preparation:
   1. Round values to nearest dollar.
2. List each Change Order executed prior to date of submission as separate line item. Totals to equal those shown on the Transmittal Summary Form for each schedule as applicable.

3. 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, and such supporting data as may be requested by Engineer.

D. Contractor shall, upon satisfactory performance and completion of major tasks during progress of the Work, be entitled to receive a percentage of the Contract price, less an amount equal to five percent (5%) thereof as a retainage which shall be payable in accordance with the work actually completed in the field.

E. The Naches-Selah Irrigation District (District) will require, as a prerequisite to any payment, that Contractor submit evidence that all costs incurred for the Work completed have been paid. The District may withhold payment of any amount due on a payment request for Contractor’s unsatisfactory performance of the Contract provided such withholding shall not exceed one hundred fifty percent (150%) of the disputed amount.

F. For each payment request submitted, the Contractor shall prepare an invoice showing amounts due for the percentage of the Work completed which is covered by such invoice, itemized and in such form as District may require, less five percent (5%) and less any previous payments in respect of such Work and/or such material. District will pay Contractor the amounts payable after authorization by the District’s Board of Directors, subject to District’s audit of the invoice. The Board of Directors makes such authorization at its regular monthly Board meetings. Regular Board meetings are held the 10th of the month or closest business day to the 10th beginning at 9:00 a.m. Invoices must be received by 4:30 p.m. on the 4th of each month to be reviewed and authorized at the upcoming Board meeting. Upon final completion and acceptance of all Work, a separate invoice for retention shall be submitted by Contractor payable in accordance with the provisions below. Invoices should be mailed, in triplicate, to Engineer at the address provided in the Contract Documents, with a minimum of 3 working days to review and process.

1.6 PAYMENT

A. General:
   1. Progress payments will be made monthly.
   2. The date for Contractor’s submission of monthly Application for Payment shall be established at the Preconstruction Conference (see paragraph 1.5.F above).

B. Payment for all the Work shown or specified in Contract Documents is included in the Contract Price.

C. Payment for Lump Sum Work covers all Work specified or shown within the limits or Specification sections as follows: Limits of Work are as shown on the Project Drawings. Partial payment for Lump Sum Work may be made for work in progress based on the percentage of the work completed as documented by the Contractor and accepted by the Engineer.

D. Pursuant to RCW 60.28.011 an amount equal to five percent (5%) of each payment made to the Contractor will be retained by the District for a period of sixty (60) days after final acceptance of the Work by the District as a trust fund for the protection and payment of: (a) the claims of any person arising under the Contract and (b) the State of Washington with respect to taxes imposed pursuant to Title 82 RCW which may be due from the Contractor. After completion of all Contract Work, the Contractor may request the District to release and pay in full the full amounts retained during the performance of the Contract, and sixty (60) days thereafter the District shall release and pay in full the amounts retained subject to the payment or release of any lien releases or claims filed and the provisions of Chapters 39.12 and 60.28 RCW.
E. Bids shall not include Washington State Retail Sales and Use Taxes on the Bid Form within each bid item. The District will reimburse the Bidder for Sales and Use Tax which shall be included with monthly invoices. Any and all other Federal, State or local taxes or charges of governmental agencies shall be the responsibility of the Contractor.

F. Payment for all Work shown or specified in Contract Documents is included in the Contract Price. Work not specifically covered by bid items shall be considered incidental to the Work. No separate payment will be made for incidental work and all associated costs will be included in the bid amounts for the items listed in the bid schedule. Payment will be based on a percentage complete basis for each line item, or units completed, of the accepted Schedule of Values.

Payment shall be for all labor, equipment, and materials required to construct the Work in accordance with the contract documents, furnished and installed. Surveying services necessary for the calculation of payment quantities shall be incidental to the bid item. Engineer will spot check survey data for quality control purposes. Further description of the Bid Items identified in the Bid Schedule are as follows:

1. Mobilization/Demobilization: Includes bonds, insurance, permits, site work trailers and miscellaneous construction facilities, temporary utilities, preconstruction conference and submittals, other startup costs for construction, removal of facilities, site cleanup, completion of O&M Manuals, warranty documentation delivery, removal of equipment, and other demobilization activities. Mobilization shall not exceed 5 percent of the amount shown for Total Bid Amount in the Bid Schedule. Demobilization shall be 15 percent of the amount shown for this Bid Item (Bid Item No. 1) in the Bid Schedule. The payment for mobilization will be made when the mobilization items described herein, have been completed and the Engineer is satisfied that the Contractor is diligently pursuing commencement of the Work. Payment for demobilization will be made at the time of the final payment upon final acceptance of the Work by the Owner. The payment for demobilization will be made when all Work is complete, including but not limited to removal of work trailers, warranty, and O&M Manuals provided, unused material removal, all equipment removed, road work complete, etc. There will be no measurement for payment associated with this Work.

2. Site Preparation: Includes stripping, clearing and grubbing, utility coordination, protection of existing features to remain and development of access across the Project Site. Includes all labor and materials required to perform this work as identified in Section 02110, Site Clearing. Measurement and payment will be made in accordance with paragraph 1.6.F above.

3. Temporary Construction Roads: Includes all labor, equipment and other activity associated with cut, fill, grading, and improvements of haul roads within the Project Limits, including access roads to neighboring and borrow properties for earth import and excess disposal. Special consideration should be given to the temporary construction road that will be necessary to access the Mile 8.5 flume area. The cost shall include any road maintenance to establish and keep the roads in both safe and useable condition throughout the project. Temporary construction roads will not be paid under O&M Roads unless directed by Owner to grade and install crushed surface base course for permanent use. Measurement and payment will be made in accordance with paragraph 1.6.F above.

4. SWPPP & Erosion Control: Includes preparation, submittal, revisions, resubmittals and advertising as necessary to get and approved SWPPP through the Department of Ecology. Also includes the implementation of all erosion control and reporting as described in the SWPPP. Near completion of the project, the Contractor shall Hydrosoweed, per Section 02270, as part of this bid item. Measurement and payment will be made in accordance with paragraph 1.6.F above.
5. Dust Control: Includes all labor, equipment and other activity associated with dust-prevention activities throughout the duration of the Project. Particular attention will be required for the ingress/egress route from public roads, construction roads, and borrow areas. Conduct operations of trucking to cause a minimum of dust. Give haul roads used on the Project Site a dust-preventive treatment or periodically water to prevent dust. Strictly adhere to applicable environmental regulations for dust prevention. An air-pollution control plan shall be submitted to the Engineer and local regulatory agency for review. A permit shall be applied for by Contractor at the appropriate regulatory agency and approved permit shall be posted onsite prior to any work conducted at the Project Site. Measurement and payment will be made in accordance with paragraph 1.6.F above.

6. Demolition & Disposal: Includes all labor, equipment and other activity associated with demolition and disposal of existing concrete and wood structures designated as being replaced in the Project Drawings. Remove and of wood flumes, trestles, supports, and footings as designated on the Drawings. Note that all wood to be demolished and disposed of is treated with creosote as a wood preservative. Steel beams on the County Road Crossing will become the property of the Contractor and can be salvaged as desired. Demolition of the County Road Crossing will be performed in conjunction with a traffic control plan as required in the plans or approved equal. Demolish and properly dispose of concrete flumes, trestles, inlet structures, outlet structures, transition structures, canal panels, supports, and footings as indicated for removal and disposal on the Drawings. All wood, concrete, and asphalt demolished must be hauled off site to a State approved disposal site for the material. Strictly adhere to applicable environmental regulations regarding handling and disposal of materials. Measurement and payment will be made in accordance with paragraph 1.6.F above.

7. Traffic Control & Temporary Detour Road: Includes any required design, installation, and maintenance related to traffic control and the temporary detour road. Preliminary approval of temporary traffic control plans have been secured and are available for use by the Contractor. The Contractor will need to contact Yakima County and secure the permit for the actual Work. The detour road is detailed in the Project Drawings. Demolition will require a temporary road closure (less than 4 hours). Pipeline installation will require a detour unless the pipeline can be installed and the road re-established in less than 24 hours. Measurement and payment will be made in accordance with paragraph 1.6.F above.

8. County Road Crossing: Includes all labor, equipment, materials, and placement of items in accordance with the requirements of the Yakima County Road Department for the County Road Crossing. Includes all saw cutting and asphalt disposal, CDF pipe backfill, base and top course, temporary patching with cold asphalt mix, maintenance and repair of temporary patch, permanent patching with hot asphalt mix, clearing snow or other accumulation on the roadway, and satisfying all other requirements of County permit. Trenching and pipe installation are included in another bid item. Measurement and payment will be made in accordance with paragraph 1.6.F above.

10. 10 Foot Diameter FRPM Pipe: Includes approximately 162 linear feet of 10-foot diameter Fiberglass Reinforced Polymer Mortar Pipe plus fittings (including horizontal bends, tees, etc.) and appurtenances not specifically called out in another bid item. Linear footage for payment is measured along the centerline of the pipe and elbows. Includes all labor, materials, equipment, location & identification supplies, and other activity associated with securing, transporting, excavating, bedding, placing, backfilling, and compacting. Note that only some of the on site material is suitable for pipe zone backfill (see Sections 02200 and 02221); the test pit information should be reviewed for additional information. Special attention will be given to compaction in the haunches of the pipe, which is critical to proper installation and long term service of the pipe. Excess earth material may be spread within the right of way or used in other portions of this Project as needed. Minimum cover at completion of backfill is 2.5 feet, maximum cover allowable is 10 feet. Cut and fill related to pipeline installation is considered incidental to the bid item. Measurement and payment will be made in accordance with paragraph 1.6.F above.

11. 8 Foot Diameter FRPM Pipe: Includes approximately 3,610 linear feet of 8-foot diameter Fiberglass Reinforced Polymer Mortar Pipe plus fittings (including horizontal bends, tees, etc.) and appurtenances not specifically called out in another bid item. Linear footage for payment is measured along the centerline of the pipe and elbows. Includes all labor, materials, equipment, location & identification supplies, and other activity associated with securing, transporting, excavating, bedding, placing, backfilling, and compacting. Note that only some of the on site material is suitable for pipe zone backfill (see Sections 02200 and 02221); the test pit information should be reviewed for additional information. Special attention will be given to compaction in the haunches of the pipe, which is critical to proper installation and long term service of the pipe. Excess earth material may be spread within the right of way or used in other portions of this Project as needed. Minimum cover at completion of backfill is 2.5 feet, maximum cover allowable is 10 feet. Cut and fill related to pipeline installation is considered incidental to the bid item. Measurement and payment will be made in accordance with paragraph 1.6.F above.

12. Inlet or Outlet Structure – 10-foot Pipe: Includes the structure for either inlet or outlet of the 10-foot diameter FRPM pipe as shown on the Drawings. Includes all concrete, steel, and other products required by the design drawings for construction of the structure. Also includes all labor and equipment necessary to complete the Work in accordance with the contract documents. Includes all excavation, backfill, and compaction related to the structure. Measurement and payment will be made in accordance with paragraph 1.6.F above.

13. Inlet or Outlet Structure – 8-foot Pipe: Includes the structure for either inlet or outlet of the 8-foot diameter FRPM pipe as shown on the Drawings. Includes all concrete, steel, and other products required by the design drawings for construction of the structure. Also includes all labor and equipment necessary to complete the Work in accordance with the contract documents. Includes all excavation, backfill, and compaction related to the structure. Measurement and payment will be made in accordance with paragraph 1.6.F above.

14. Pre-Inlet Structure: Includes the structure located just prior to the three inlet structures as shown on the Drawings. Includes all concrete, steel, and other products required to construct the structure. Also includes all labor and equipment necessary to complete the Work in accordance with the contract documents. Includes all excavation, backfill, and
compaction related to the structure. Measurement and payment will be made in accordance with paragraph 1.6.F above.

15. Deep Flume Section: Includes the deepened flume structure located just prior to two of the Pre-Inlet Structures as shown on the Drawings. Includes all concrete, steel, and other products to form the structure. Also includes all labor and equipment necessary to complete the Work in accordance with the contract documents. Includes all excavation, backfill, and compaction related to the structure. Measurement and payment will be made in accordance with paragraph 1.6.F above.

16. Concrete Junction Box – FRPM to Steel Pipe: Includes the structure between the end of the 8-foot diameter FRPM and the start of the existing 8-foot diameter steel pipe as shown on the Drawings. Includes all concrete, steel, and other products required by the design drawings for construction of the structure. Also includes all labor and equipment necessary to complete the Work in accordance with the contract documents. Includes all excavation, backfill, and compaction related to the structure. Measurement and payment will be made in accordance with paragraph 1.6.F above.

17. 4 & 6 Inch Services: Includes all labor, equipment, materials, and placement of items required to construct the 4 and 6 inch services shown on the Project Drawings. Final connection will be made by District personnel. Locations of these services can be reviewed in a table in Service detail of the Drawings. This bid item is intended to provide water to District customers and the bid quantity may vary as services are desired in the field. Measurement and payment will be made in accordance with paragraph 1.6.F above.

18. 24 Inch Service: Includes all labor, equipment, materials, and placement of items for the 24 inch service near station 323+00 in accordance with the Project Drawings. The 8 foot diameter pipe will require a 8 foot by 2 foot tee (incidental to the FRPM piping), and other appurtenances as shown on the Drawings. Measurement and payment will be made in accordance with paragraph 1.6.F above.

19. Pipe Drain: Includes all labor, equipment, materials, and placement of items required to construct the pipe drains shown on the Project Drawings. The tee is incidental to the FRPM piping. This bid item is intended to provide the District with the ability to dewater the pipelines during the maintenance season. The exact position of these pipe drains should be verified with the Engineer in the field before placement. Measurement and payment will be made in accordance with paragraph 1.6.F above.

20. 4 Foot Manhole Access: Includes all labor, equipment, materials, and placement of items required to construct the 4 foot manhole access points in accordance with the Project Drawings. The 8 and foot diameter pipes will require a 4 foot diameter blind-flanged watertight tee facing upward (incidental to the FRPM piping). The blind flange and tee will be protected by a manhole structure (included in this bid item) as shown in the Drawings. Measurement and payment will be made in accordance with paragraph 1.6.F above.

21. Air Vents: Includes all labor, equipment, materials, and placement of items required to construct the air vents in accordance with the Project Drawings. The tee is incidental to the FRPM piping. The air vent will be protected by a manhole structure as shown in the Drawings. Measurement and payment will be made in accordance with paragraph 1.6.F above.

22. Concrete Flume: Includes the concrete flume section as shown on the Project Drawings. Includes all concrete, steel, and other products required to construct the flume section. Also includes all labor and equipment necessary to complete the Work in accordance with the contract documents. Includes all surface preparation, excavation, backfill, and compaction related to the structure. Measurement and payment will be made in accordance with paragraph 1.6.F above.
23. Concrete Canal – Existing Canal: Includes the concrete canal section as shown on the Project Drawings. Includes all concrete, steel, liner, and other products required to construct canal. Also includes all labor and equipment necessary to complete the Work in accordance with the contract documents. Includes all shaping, excavation, fill, and compaction related to the structure. Material is located at or adjacent to the existing facility sufficient for shaping the subgrade. Measurement and payment will be made in accordance with paragraph 1.6.F above.

24. Concrete Canal – Import for 5 FT Embankment Required: Includes the concrete canal section as shown on the Project Drawings. Includes all concrete, steel, liner, and other products required to construct the canal. Also includes all labor and equipment necessary to complete the Work in accordance with the contract documents. Includes all shaping, excavation, fill, and compaction related to the structure. Material is not located at or adjacent to the existing facility for shaping the subgrade and will need to be imported from another source. Sources (material) must be approved by the Engineer prior to import. Measurement and payment will be made in accordance with paragraph 1.6.F above.

25. Concrete Canal – Import for 12 FT Embankment Required: Includes the concrete canal section as shown on the Project Drawings. Includes all concrete, steel, liner, and other products required to construct the canal. Also includes all labor and equipment necessary to complete the Work in accordance with the contract documents. Includes all shaping, excavation, fill, and compaction related to the structure. Material is not located at or adjacent to the existing facility for shaping the subgrade and will need to be imported from another source. Sources (material) must be approved by the Engineer prior to import. Measurement and payment will be made in accordance with paragraph 1.6.F above.

26. Concrete Transition Structure: Includes the structure that transitions between earthen canal and concrete canal, concrete canal and inlet/outlet structures, concrete canal and flumes, and other similar transitions. Includes all concrete, steel, and other products required to construct the structure. Also includes all labor and equipment necessary to complete the Work in accordance with the contract documents. Includes all excavation, imported fill, backfill, and compaction related to the structure. Measurement and payment will be made in accordance with paragraph 1.6.F above.

27. 24 Inch Storm Drain: Includes all labor, equipment, materials and other activities associated with excavation, installation, backfill, compaction and grading of storm drainage into and out of the storm drain as shown on the Project Drawings. Work covered under this item includes placement of rock for erosion protection as shown on the drawings. This bid item is intended to carry stormwater under new canal or flume structures and the bid quantity may vary as drainages are addressed in the field. Measurement and payment will be made in accordance with paragraph 1.6.F above.

28. O&M Roads – Crushed Base Course: Includes all labor, equipment and other activity associated with cut, fill, grading, and improvements of O&M roads within the Project Limits. Also includes base course material, placement, compaction, and grading of material defined in Section 02200 Earthwork. O&M road to be a minimum of 10 feet wide and have a minimum of 6 inches of crushed surface base course. Measurement and payment will be made in accordance with paragraph 1.6.F above.

1.7 NONPAYMENT FOR REJECTED OR UNUSED PRODUCTS

A. Payment will not be made for following:
1. Loading, hauling, and disposing of rejected material (from fill).
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.

1.8 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 Engineer.

B. Partial Payment: Partial payment for materials delivered to the Project Site and stockpiled in the staging area may be made if the Contractor submits a topographic survey of the stockpile area before and after materials have been stockpiled that is acceptable to the Engineer. The cost of such survey work will be considered incidental to the Work and there shall be no separate payment for survey work. The Contractor shall coordinate the survey work with the Engineer to ensure that the work will be acceptable when submitted.

C. 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 01035**  
**AMENDING AND SUPPLEMENTING CONTRACT DOCUMENTS**

**PART 1 - GENERAL**

**1.1 PROPOSAL REQUESTS**

A. 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. Contractor’s written proposal shall be transmitted to Engineer promptly, but not later than 10 days after Contractor’s receipt of Owner’s written request. Proposal shall remain firm for a maximum period of 30 days after receipt by Engineer.

E. Owner’s request for proposal or Contractor’s failure to submit such proposal within the required time period will not justify a Claim for an adjustment in Contract Price or Contract Times.

**1.2 CLAIMS**

A. Include, at a minimum:

1. Specific references including (i) Project Drawing numbers, (ii) Specification section and article/paragraph number, and (iii) Submittal type, Submittal number, and date reviewed, Engineer’s comment, 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 (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 Times: 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 Engineer may otherwise require.

**1.3 WORK CHANGE DIRECTIVES**

A. Procedures:

1. Engineer will:
   a. Initiate, including a description of the Work involved and any attachments.
   b. Affix signature, demonstrating Engineer’s recommendation.
   c. Transmit four copies to Owner for authorization.

2. Owner will:
   a. Affix signature, demonstrating approval of the changes involved.
   b. Return three copies to Engineer, who will retain one copy, send one copy to the Resident Project Representative or other field representative, and forward one copy to Contractor.
3. Upon completion of Work covered by the Work Change Directive or when final Contract Times and Contract Price are determined, Contractor shall submit documentation for inclusion in a Change Order.

4. Contractor’s documentation shall include but not be limited to:
   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 Times and Contract Price for Work. On request of Engineer, provide additional data necessary to support documentation.

B. 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.

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

1.4 CHANGE ORDERS

A. Procedure:
   1. Engineer will prepare five copies of proposed Change Order and transmit such with Engineer’s written recommendation and request to Contractor for signature.
   2. Contractor shall, upon receipt, either: (i) promptly sign copies, retaining one for its file, and return remaining four copies to Engineer for Owner’s signature, or (ii) return unsigned four copies with written justification for not executing Change Order.
   3. Engineer will, upon receipt of Contractor signed copies, promptly forward Engineer’s written recommendation and partially executed four copies for Owner’s signature, or if Contractor fails to execute the Change Order, Engineer will promptly so notify Owner and transmit Contractor’s justification to Owner.
   4. Upon receipt of Contractor-executed Change Order, Owner will promptly either:
      a. Execute Change Order, retaining one copy for its file and returning three copies to Engineer, or
      b. Return to Engineer unsigned copies with written justification for not executing Change Order.
   5. Upon receipt of Owner-executed Change Order, Engineer will transmit one copy to Contractor, one copy to Resident Project Representative or other field representative, and retain one copy, or if Owner fails to execute the Change Order, Engineer will promptly so notify Contractor and transmit Owner’s justification to Contractor.
   6. Upon receipt of Owner-executed Change Order, Contractor shall:
      a. Perform Work covered by Change Order.
      b. Revise Schedule of Values to adjust Contract Price and submit with next Application for Payment.
      c. Revise Progress Schedule to reflect changes in Contract Times, 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 Price or Contract Times, 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.
1.5 COST OF THE WORK

A. In determining the supplemental costs allowed in Paragraph 11.01.A.5 of the General Conditions for rental equipment and machinery, the following will apply.

B. Rental of construction equipment and machinery and the parts thereof having a replacement value in excess of $1,000, whether owned by Contractor or rented or leased from others, shall meet the following requirements:

1. Full rental costs for leased equipment shall 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 shall 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 shall be used.

2. Rates shall apply to equipment in good working condition. Equipment not in good condition, or larger than required, may be rejected by Engineer or accepted at reduced rates.

3. Leased Equipment: For equipment leased or rented in arm’s length transactions from outside vendors, maximum rates shall be determined by the following actual usage/Blue Book Payment Category:
   a. Less than 8 hours: Hourly Rate.
   b. 8 or more hours but less than 7 days: Daily Rate.
   c. 7 or more days but less than 30 days: Weekly Rate.
   d. 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 Engineer shall be the basis that equipment was on and utilized at the Project Site. In addition to the leasing rate above, equipment operational costs shall 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 shall be based upon actual equipment usage to the nearest quarter hour, as recorded by Engineer.

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 Engineer, shall be paid at the leasing rate determined above, excluding operational costs.

7. Owned and Other Equipment in Use: Equipment rates for owned equipment or equipment provided in other than arm’s length transaction shall 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 shall be based upon actual equipment usage as recorded by Engineer. This rate shall 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, shall be paid for at the ownership hourly expense rate developed in accordance with the CECG, provided its presence and necessity onsite has been documented by Engineer. Payment for idle time of portions of a normal workday, in conjunction with original contract Work, will not be allowed. In no event shall idle time claimed in a day for a particular piece of equipment exceed the normal Work or shift schedule established for the Project. It is agreed that this rate shall represent payment in full for Contractor’s direct costs. When Engineer 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 shall apply to the operating equipment during the first shift. For subsequent shifts, up to 2 in a 24-hour day, operating rate shall be the sum of the total hourly CECG operating cost and 60 percent of the CECG ownership and overhaul expense. Payment for idle or standby time for second and third shifts shall be 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 will be 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 shall cease for that equipment and any other owned equipment idled by the breakdown.

15. If any part of the Work is shut down by Owner, standby time will be paid during nonoperating hours if diversion of equipment to other Work is not practicable. Engineer 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 Engineer, 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 shall be presented to Engineer for approval; or
   c. Request Engineer to establish a rate.

### 1.6 FIELD ORDER

A. Engineer will issue Field Orders, with three copies to Contractor.

B. Effective date of the Field Order shall be the date of signature by Engineer, unless otherwise indicated thereon.

C. Contractor shall acknowledge receipt by signing and returning one copy to Engineer.

D. Field Orders will be incorporated into subsequent Change Orders, as a no-cost change to the Contract.

### PART 2 - PRODUCTS (NOT USED)

### PART 3 - EXECUTION (NOT USED)

END OF SECTION
SECTION 01040
COORDINATION

PART 1 - GENERAL

1.1 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 specified herein as a part of Progress Schedule.
   4. The Contractor shall coordinate with the Owner during earth borrow or disposal at properties secured by Owner, if any.
   5. The Contractor is responsible for dust control throughout the work.
   6. The Contractor is responsible for erosion control throughout the work.
   7. The Contractor will notify the Owner at completion of each Service Connection installed. Owner will be responsible for final connection to landowner facilities.

B. Work by Owner:
   1. Owner’s Contact Person:
      a. Justin Harter
      b. Telephone Number: (509) 697-4177.
   2. Work to be performed by Owner:
      a. The Owner will coordinate/communicate with adjacent land owners during the progress of the work.

1.2 OWNER-FURNISHED PRODUCTS

A. None Anticipated.

1.3 UTILITY NOTIFICATION AND COORDINATION

A. Coordinate the Work with various utilities within Project limits. Notify applicable utilities prior to commencement of Work, if damage occurs, or if conflicts or emergencies arise during Work.

1.4 ADJACENT FACILITIES AND PROPERTIES

A. After Effective Date of the Agreement and before Work at Site is started, Contractor, Engineer, and affected property owners and utility owners shall make a thorough examination of pre-existing conditions including existing buildings, structures, fences, signs, mail boxes, landscaping, and other improvements in vicinity of Work, as applicable, which could be damaged by construction operations.

B. Periodic re-examination shall be jointly performed to include, but not limited to, cracks in structures, settlement, leakage, and similar conditions.

1.5 REFERENCE POINTS AND SURVEYS

A. Owner’s Responsibilities: Benchmarks have been established along the route of the proposed Work.
B. Contractor’s Responsibilities: Provide additional survey required to lay out the Work. Protect benchmarks and stakes placed by Owner. Contractor shall replace disturbed benchmarks and stakes at own expense.

C. Canal, Flume, and Pipeline Alignment: Alignment of new facilities to be constructed will predominantly follow existing canals and flumes alignments. Contractor will work with Engineer and Owner to modify the alignments to minimize imported fill, provide ample offsets from hillsides, and provide space for O&M roads.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION
SECTION 01062
MAJOR EQUIPMENT SUPPLIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. A listing of the equipment for the Project, which is considered to be major equipment.
   2. A listing of the approved suppliers of said major equipment.
   3. Certain instructions concerning the bidding of major equipment.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.

1.2 DEFINITIONS

A. Manufacturers or suppliers, as used in the context of "approved manufacturers or suppliers of major equipment," shall mean the manufacturers or suppliers listed in the ACCEPTABLE MANUFACTURERS OF MAJOR EQUIPMENT Article of this Specification Section.

1.3 INSTRUCTIONS FOR BIDDING MAJOR EQUIPMENT

A. Furnish, for base bid, equipment by any of the suppliers listed in the ACCEPTABLE MANUFACTURERS OF MAJOR EQUIPMENT Article of this Specification Section, or as added to the ACCEPTABLE MANUFACTURERS OF MAJOR EQUIPMENT Article of this Specification Section by addendum.

B. Name only one (1) of said suppliers in the schedule of major equipment suppliers found in the Proposal.

C. Proposal shall be considered irregular and subject to rejection if the Bidder:
   1. Fails to list an approved supplier for each item.
   2. Lists more than one approved supplier for each item.

D. If the Bidder fails to list an approved supplier, the Owner has the sole right to select one (1) of the suppliers from the list of manufacturers in the ACCEPTABLE MANUFACTURERS OF MAJOR EQUIPMENT Article of this Specification Section.

E. If the Bidder lists more than one (1) approved supplier, the Owner has the sole right to select one (1) of the suppliers so listed.

F. Requests for prequalification of equipment to be listed in the ACCEPTABLE MANUFACTURERS OF MAJOR EQUIPMENT Article of this Specification Section must comply specifically with applicable provisions of the Contract Documents.
   1. Refer to Specification Section 00100.

1.4 ACCEPTABLE MANUFACTURERS OF MAJOR EQUIPMENT

A. Major Equipment and Acceptable Manufacturers:
   1. Section 02664 – Canal Liners
      a. IPG Aquamaster Novathene.
      b. Huesker.
   2. Section 15061 - Pipe: Steel
      a. Northwest Pipe.
      b. Ameron.
   3. Section 15076 - Pipe: Fiberglass Reinforced Polymer Mortar (FRPM)
a. Hobas.

4. Section 15103 - Butterfly Valves
   a. DeZurik.
   b. Clow.
   c. Mueller.
   d. Pratt.

END OF SECTION
## PART 1 - GENERAL

### 1.1 UNITS OF MEASUREMENT

- A (amp) = ampere(s)
- ACFM = actual CFM
- AIC = amps interrupting capacity
- AWG = American Wire Gage
- BF = board foot (feet)
- BHP = brake horsepower
- BTU = British thermal unit
- BTUH = British thermal units per hour
- C = centigrade
- cc = cubic centimeter
- CCM/SEC = cubic centimeter(s) per second
- CF = cubic feet
- CFH = cubic feet per hour
- CFM = cubic feet per minute
- CM = centimeter(s)
- CM/SEC = centimeter(s) per second
- CPS = cycle(s) per second
- CU = cubic
- CU FT = cubic feet
- CU IN = cubic inch(es)
- CU M = cubic meter(s)
- CY = cubic yard(s)
- Db = decibel(s)
- DbmV = decibel millivolts
- DEG = degree(s) (angular)
- DegC = degree(s) Centigrade
- DegF = degree(s) Fahrenheit
- F = Fahrenheit
- FBM = board measure
- FPM = feet per minute
- FPS = feet per second
- FT = feet, foot
- FV = face velocity
- G = gram(s)
- GA = gage
- GAL = gallon(s)
- GAL/SF = gallon(s) per square foot
- GPH = gallon(s) per hour
- GPM = gallon(s) per minute
- GPS = gallon(s) per second
- HD = head
- HP = horsepower
- HR = hour(s)
- Hz = hertz
- IN = inch(es)
<table>
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<th>Abbreviation</th>
<th>Description</th>
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<td>IN Hg</td>
<td>inches, mercury</td>
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<tr>
<td>IN-LB</td>
<td>inch-pounds (force)</td>
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<tr>
<td>IN WG</td>
<td>inches, water gage</td>
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<tr>
<td>IPS</td>
<td>iron pipe size</td>
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<td>K</td>
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<td>K value</td>
<td>thermal conductivity (BTU/IN/HR/SF/DegF)</td>
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<td>RH</td>
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<td>standard CFM</td>
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<td>SF</td>
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<td>square inch(es)</td>
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<td>saybolt seconds universal</td>
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### STANDARD ABBREVIATIONS AND SYMBOLS

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### 1.2 TERMINOLOGY

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<td>OC</td>
<td>on center, overcurrent</td>
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NACHES-SELAH IRRIGATION DISTRICT
MAIN CANAL FLUME REPLACEMENT & OTHER CANAL IMPROVEMENTS - Issued For Bid
STANDARD ABBREVIATIONS AND SYMBOLS
01070 - 9
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<td>vinyl wall covering</td>
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<td>wide flange</td>
<td>wall mounted</td>
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<td>with</td>
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<td>waterproof(ing)</td>
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<td>working point</td>
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<tr>
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<td>single speed</td>
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<td>one winding</td>
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<tr>
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<td>two winding</td>
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### 1.3 ORGANIZATIONS AND STANDARDS

- **ANSI** American National Standards Institute
- **ASHRAE** American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc.
- **ASME** American Society of Mechanical Engineers
- **ASTM** ASTM International
- **CS** Commercial Standard (U.S.Department of Comm.)
- **FM** FM Global
- **FS** Federal Specification
- **IEEE** Institute of Electrical and Electronic Engineers
- **IES** Illuminating Engineering Society
- **IPCEA** Insulated Power Cable Engineers Association
- **NBS** National Bureau of Standards
- **NEC** National Electrical Code
- **NECA** National Electrical Contractors Association
- **NECS** National Electrical Code Standards
- **NEMA** National Electrical Manufacturers Association
- **NFPA** National Fire Protection Association
- **SMACNA** Sheet Metal and Air Conditioning National Contractors Association, Inc.
- **UL** Underwriters Laboratories, Inc.

**END OF SECTION**
SECTION 01200
PROJECT MEETINGS

PART 1 - GENERAL

1.1 GENERAL

A. Engineer will schedule physical arrangements for meetings throughout progress of the Work, prepare meeting agenda with regular participant input and distribute with written notice of each meeting, preside at meetings, record minutes to include significant proceedings and decisions, and reproduce and distribute copies of minutes within 7 days after each meeting to participants and parties affected by meeting decisions.

1.2 PRECONSTRUCTION CONFERENCE

A. Contractor shall be prepared to discuss the following subjects, as a minimum:
   1. Required schedules.
   2. Status of Bonds and insurance.
   3. Sequencing of critical path work items.
   4. Progress payment procedures.
   5. Project changes and clarification procedures.
   6. Use of Site, access, office and storage areas, security and temporary facilities.
   7. Major product delivery and priorities.
   8. Contractor’s safety plan and representative.

B. Attendees will 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 representatives.
   7. Others as appropriate.

1.3 PRELIMINARY SCHEDULES REVIEW MEETING

A. As set forth in General Conditions and Section 01320, Progress Schedules.

1.4 PROGRESS MEETINGS

A. Engineer will schedule regular progress meetings at Site, conducted weekly (or upon a schedule agreed to by the Owner, Contractor, and Engineer) to review the Work progress, Progress Schedule, Schedule of Submittals, Application for Payment, contract modifications, and other matters needing discussion and resolution.

B. Attendees will include:
   1. Owner’s representative(s), as appropriate.
   2. Contractor, Subcontractors, and Suppliers, as appropriate.
   3. Engineer’s representative(s).
   4. Others as appropriate.

1.5 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 01320
CONSTRUCTION PROGRESS SCHEDULE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Specific requirements for the preparation, submittal, updating, status reporting and management of the construction Progress Schedule.

B. Related Specification Sections include, but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms and Conditions of the Contract.
   2. Division 01 - General Requirements.

1.2 QUALITY ASSURANCE

A. The person preparing and revising the construction Progress Schedule shall be experienced in the preparation of schedules of similar complexity.

B. Within five (5) days from award of the Contract, Contractor shall submit to Engineer the name of the person responsible for the preparation, maintenance, updating and revision of all schedules.
   1. Qualifications necessary:
      a. At least five (5) years verifiable experience in the preparation and updating of complex construction schedules for projects of similar type, size and complexity.

1.3 DEFINITIONS

A. The following definitions shall apply to this Specification Section:
   1. BASELINE SCHEDULE: The initial as-bid, detailed, cost and resource loaded Progress Schedule prepared by the Contractor to define its plan for constructing the Project as required by the Contract Documents, and accepted by the Owner or Engineer as meeting the requirements of the Contract Documents for specified constraints, sequences, milestones and completion dates.
   2. RECORD SCHEDULE: The initially accepted Baseline Schedule, or subsequently approved Revised Baseline Schedules, updated each month to reflect actual start and finish dates of schedule activities and all time impact events whether caused by Contractor or Owner or factors beyond the control of either party.
   3. REVISED BASELINE SCHEDULE: The initially accepted Baseline Schedule revised to reflect only approved changes.
   4. WORKING SCHEDULE: A schedule developed from the Record Schedule, utilizing scheduling software features not allowed for Baseline and Record Schedules at the Contractor's sole discretion, to indicate the Contractor’s plan for executing the Work, and providing for schedule recovery when approved time extensions are not sufficient to provide for timely completion due to Contractor inefficiencies beyond the control of the Owner or outside the risks accepted by the Owner.

1.4 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Scheduler qualifications.
   3. Baseline Schedule: Submitted within 10 days after Effective Date of Agreement.
5. Revised Baseline Schedules.
7. Look-Ahead Schedules.

1.5 GENERAL REQUIREMENTS

A. Contractor shall prepare and submit Baseline and Record Schedules and updates and revisions to them as specified herein.
1. The Baseline and Record Schedules shall be a calendar day-based and cost-loaded Critical Path Method (CPM) network diagram with supporting data.
2. Engineer will work with the Contractor to identify the actual level of schedule detail required.

B. Disallowed Scheduling Software Features:
1. The following specific features are not allowed to be applied in the Baseline and Record Schedules:
   a. Resource leveling.
   b. Activity or event constraints, other than those specified by the Contract Documents.
   c. Leads and lags:
      1) Create specific activities with specific durations in-lieu-of leads and lags.
      2) Durations shall have positive values.
   d. Default progress data:
      1) Start and finish dates shall not be automatically updated.
      2) Update with actual start and finish dates documented from field reports.
      3) Work activities shall be updated by actual Work progression, not cash flow driven.
      4) Updating of activity percent complete and remaining duration shall be independent functions, not one parameter calculated from the other.
      5) Out-of-sequence progress shall be accounted for through retained logic, not a default option of progress override.
   e. Multiple calendars.
2. Any float suppression techniques or other software features that corrupts the pure mathematical model calculating the critical path.
   a. The following CPM schedule outputs will be rejected without further review:
      1) Schedules indicating the start of the critical path at a date point or activity beyond the date of Notice to Proceed, or schedules indicating a discontinuous critical path from Notice to Proceed to Contract completion.
      2) Schedules defining critical activities as those on a path or paths having some minimum value of float.
      3) Schedules with multiple critical paths.
      4) Schedules indicating a completion date beyond the contractual completion date.
3. Contractor, at Contractor's sole discretion, may employ the disallowed scheduling software features for Contractor's exclusive use in preparing a Working Schedule.

C. Float Time:
1. Neither the Owner nor the Contractor owns the float; the project owns the float.
2. As such, liability for delay of the project completion date rests with the party actually causing delay to the project completion date.

D. By preparing and submitting the Baseline Schedule, the Contractor represents that it can and intends to execute the Work and portions thereof within the specified times and constraints and that its bid covers the costs associated with the execution of the Work in accordance with the Construction Schedule.

E. Contractor shall provide an electronic copy on CD media for the Baseline Schedule and Record Schedule and all monthly updates of both to accompany hard copies of the schedules and tabular reports.
1. Electronic submittal shall be in a format compatible with Primavera.
1.6 SUBMITTAL PACKAGES

A. Baseline Schedule:
   1. CPM time-scaled network diagram:
      a. Three (3) prints of each sheet.
      b. Minimum sheet size: 11 IN x 17 IN.
      c. Provide electronic format (CD-ROM).
   2. Supporting data:
      a. Three (3) sets of a list of project activities including the following:
         1) Holidays that will be observed during construction.
         2) Number of planned working days and shifts per week.

B. Monthly updates that include the following:
   2. Revised Baseline Schedule as appropriate.
      a. Update to reflect approved Change Orders occurring since the prior update.
      b. If no new approved Chang Orders since prior update, provide a narrative report
         indicating such, and acknowledging the pertinence of the previously approved Baseline
         Schedule.
   3. Updated Record Schedule.
   4. Explanation of changes in logic, duration of activities.
   5. The number of opaque reproductions which Contractor requires, plus three (3) copies which
      will be distributed by the Engineer.
      a. Do not submit fewer than three (3) copies.

C. Look-Ahead Rolling Schedule:
   1. A three-week rolling schedule shall be provided by the Contractor at each progress meeting.
      a. The schedule shall provide an accurate representation of the work performed the
         previous week and work planned for the current week and subsequent two (2) weeks.
   2. The schedule shall be provided in a tabular format with bars representing work duration.
      a. The schedule shall refer to activity ID numbers on the Baseline and Record Schedules.
      b. Activities that are on the critical path and activities that are behind schedule shall be
         noted by color, highlight, or underscore.
   3. Derived from the Working Schedule, if applicable.

D. Narrative Schedule Report:
   1. Schedule reports for Initial Baseline and Revised Baseline Schedules shall include the
      following minimum data for each activity:
      a. Preceding and succeeding activities.
      b. Activity description and number.
      c. Durations of activities:
         1) Original durations.
         2) Remaining durations.
      d. Earliest start date (by calendar date).
      e. Earliest finish date (by calendar date).
      f. Actual start date (by calendar date).
      g. Actual finish date (by calendar date).
      h. Latest start date (by calendar date).
      i. Latest finish date (by calendar date).
      j. Float.
      k. Percentage of activity completed.
      l. Activity constraints specified by the Contract Documents.
      m. Type of Tabulation (Initial or Updated).
      n. Project Duration.
      o. Project Contractual Completion Date.
      p. The date of commencement of the Work as stated in the Notice to Proceed.
q. If an updated (revised) schedule, cite the new project completion date and project status and date of revision.
2. Shall be organized in the following sequence with all applicable documents included:
   a. Contractor's transmittal letter.
   b. Work completed during the period.
   c. Identification of unusual conditions or restrictions regarding labor, equipment or material.
   d. Description of the current critical path.
   e. Changes to the critical path and scheduled completion date since the last schedule submittal.
   f. Description of problem areas.
   g. Current and anticipated delays:
      1) Cause of delay.
      2) Impact of delay on other activities, milestones and completion dates.
      3) Corrective action and schedule adjustments to correct the delay.
   h. Pending items and status thereof:
      1) Permits.
      2) Change orders.
      3) Time adjustments.
      4) Non-compliance notices.
   i. Reasons for an early or late scheduled completion date in comparison to the contract completion date.

1.7 PRE-CONSTRUCTION SCHEDULING CONFERENCE

A. Contractor shall schedule and Engineer will conduct a pre-construction scheduling conference with Contractor's project manager and construction scheduler.
   1. Conference must take place within 10 business days after Effective Date of the Agreement.
   2. Engineer will review the requirements of this Specification Section and other specified scheduling and sequencing requirements with Contractor.

B. Contractor shall submit a general time-scaled logic diagram displaying the major activities and sequence of planned operations.
   1. Contractor shall be prepared to discuss the proposed work plan and schedule methodology that comply with the Contract requirements.
   2. If Contractor proposes deviations to specified construction staging of the project, then the general time-scaled logic diagram shall also display the deviations and resulting time impacts.
   3. Contractor shall be prepared to discuss the proposal.

C. Contractor shall additionally submit the alphanumeric coding structure and the activity identification system for labeling the work activities.
   1. Each activity description shall indicate its associated scope or location of work by including terms, such as the following:
      a. Specification Section.
      b. Type of work.
      c. Building or Unit name or number.
      d. Station to station; column lines or wall line numbers; levels or elevations; etc.

D. Contractor shall provide the Preliminary Schedule of Values for the lump sum items of work to be performed.
   1. This document must match the total quantities and costs associated with the scheduled tasks.

E. Engineer will review the logic diagram, coding structure, and activity identification system, and provide required Baseline Schedule changes to Contractor for implementation within three (3) business days following the Conference.
F. The initial project schedule will be reviewed to determine if the proposed level of effort is sufficient to accomplish the work (based on quantities included in the bid) in the time frame allotted. If the proposed level of effort fails to complete the work in the allotted time frame, Owner and Engineer will negotiate with the Contractor for an acceptable adjustment. Once a schedule has been accepted by the Owner and the Engineer, compliance with that schedule will be necessary to show appropriate diligence in prosecution of the work. Liquidated damages will only be considered based on a failure to meet the quantities included on the bid form within the given schedule.

G. Scheduling Conferences are required on a biweekly basis until agreement to the Baseline Schedule is reached.
   1. Contractor to provide copies of the revised schedule.
   2. Contractor to address specific comments from the previous meeting.
   3. Contractor to revise the narrative as required.

1.8 BASELINE SCHEDULE

A. Schedule shall include, but not be limited to, activities that show the following that are applicable to the project:
   1. Project characteristics, salient features, or interfaces, including those with outside entities, that could affect time of completion.
   2. Project start date, scheduled completion date and other milestones.
   3. Work performed by Contractor, subcontractors and suppliers.
   4. Submittal development, delivery, review and approval, including those from Contractor, subcontractors and suppliers.
   5. Procurement, delivery, installation and testing of materials, plants and equipment.
   7. Utility notification and relocation.
   9. Finish work and final cleanup.
  10. Project float as the predecessor activity to the scheduled completion date.

B. Schedule shall have not less than 20 and not more than 100 activities, unless otherwise authorized by the Engineer.
   1. The number of activities shall be sufficient to assure adequate planning of the project, to permit monitoring and evaluation of progress, and to do an analysis of time impacts.
   2. Schedule activities shall include the following:
      a. A clear and legible description.
      b. Start and finish dates.
      c. A duration of not less than one (1) working day, except for event activities, and not more than 20 working days, unless otherwise authorized by the Engineer.
      d. At least one (1) predecessor and one (1) successor activity, except for project start and finish milestones.
      e. Required constraints: Only contractually required constraints may be inserted into the Baseline Schedule.
      f. Codes for responsibility, stage, work shifts, location and contract pay item numbers.

C. Early Completion Time:
   1. Contractor may show early completion time on any schedule provided that the requirements of the contract are met.
   2. Contractor may increase early completion time by improving production, reallocating resources to be more efficient, performing sequential activities concurrently or by completing activities earlier than planned.

D. Working durations shall be planned to incorporate the effects of normal weather impacts.

1.9 RECORD SCHEDULE

A. Develop Record Schedule based on approved Baseline and Revised Baseline Schedules.
1. All restrictions on use of constraints, leads and lags, resource leveling, etc., shall also apply to Record Schedules.

B. The Record Schedule will be updated once per month for monitoring progress.
   1. Contractor may submit one (1) additional update per month for its own convenience.

C. Indicate progress by making entries on the most recently accepted version of the network diagram and supporting data to show:
   1. Activities completed.
   2. Activities started.
   3. Remaining duration for each activity started but not yet completed.
   4. Percent complete based on value of work in place and value of equipment or material delivered and properly stored.
   5. Status of activity due to be completed by the next scheduled progress meeting.

D. Computerized Record Schedule and percent completion of Work shall be used to verify Contractor's payment requests.
   1. Progress payments will not be processed by the Engineer unless the updated Record Schedule has been submitted concurrently with a pay request and found acceptable by the Engineer.

1.10 REVISIONS TO RECORD SCHEDULE

A. Contractor shall submit data for a revised Record Schedule within five (5) days of the occurrence of any of the following:
   1. When contractor-caused delay in completion of any activity or group of activities indicates an overrun of the Contract Time or Control Dates by 15 working days or 10 percent of the remaining duration, whichever is less.
   2. When delays in submittals, deliveries, or work stoppages are encountered making necessary the replanning or rescheduling of the Work.
   3. When the schedule does not represent the actual progress of the Work.
   4. When a change order significantly affects the contract completion date.

B. The revised Record Schedule shall be the basis of a Working Schedule showing:
   1. How Contractor intends to return to schedule.
   2. How Contractor intends to avoid falling behind schedule on future activities.

C. Show changes on the network diagram and supporting data including:
   1. New activities and their duration.
   2. Modifications to existing activities.

D. Provide written narrative report as needed to define:
   1. Problem areas, anticipated delays, and impact on the current schedule.
   2. Corrective action recommended, and its effect.
   3. Major changes in scope.
   4. Revised projections of progress and completion.

E. Except as provided in the following subparagraphs 1 and 2, the cost of revisions to the Record Schedule resulting from changes in the Work shall be included in the cost for the change in the Work, and shall be based on the complexity of the revision or Change Order, man-hours expended in analyzing the change, and the total cost of the change.
   1. The cost of revision to the Construction Schedule not resulting from authorized changes in the Work shall be the responsibility of the Contractor.
   2. The cost of revision to the Construction Schedule for the Contractor's convenience shall be the responsibility of the Contractor.

F. The revised network diagram and supporting data for the Record Schedule shall be submitted to the Engineer upon completion of the revisions, but not later than the next progress meeting.

G. Revisions to the Record Schedule for the Contractor's convenience:
   1. Must be approved by the Engineer before Contractor changes the sequence of Work.
1.11 TIME IMPACT ANALYSIS (TIA)

A. The accepted initial Baseline Schedule or subsequently accepted Revised Baseline Schedule shall be used for TIA.

B. Contractor shall submit a written TIA to the Engineer with each request for adjustment of Contract Time, or when Contractor or Engineer consider that an approved or anticipated change may impact the critical path or contract progress.
   1. The TIA must be attached to any change order prior to approval of any change to time or cost.

C. The TIA shall illustrate the impacts of each change or delay on the current scheduled completion date or internal milestone, as appropriate.
   1. The analysis shall use the Baseline or Revised Baseline Schedule (accepted Baseline Schedule) that has a data date closest to and prior to the event.
   2. If the Engineer determines that the accepted Baseline Schedule used does not appropriately represent the conditions prior to the event, the accepted Baseline Schedule shall be updated to the day before the event being analyzed.
   3. The TIA shall include an impact schedule developed from incorporating the event into the accepted Baseline Schedule by adding or deleting activities, or by changing durations or logic of existing activities as appropriate to the nature of the change event.
   4. If the impact schedule shows that incorporating the event modifies the critical path and scheduled completion date of the accepted Baseline Schedule, the difference between scheduled completion dates of the two (2) schedules shall be equal to the adjustment of Contract Time.

D. Contractor shall submit a TIA in duplicate within 15 working days of receiving a written request for a TIA from the Engineer.
   1. Contractor shall allow the Engineer two (2) weeks after receipt to approve or reject the submitted TIA.
   2. All approved TIA schedule changes shall be shown on the next update schedule.

E. In the event of a TIA rejection:
   1. If a TIA submitted by the Contractor is rejected by the Engineer, the Contractor shall meet with the Engineer to discuss and resolve issues related to the TIA.
   2. If agreement is not reached, the Contractor will be allowed 15 days from the meeting with the Engineer to give notice.
   3. Contractor shall only show actual as-built work, not unapproved changes related to the TIA, in subsequent update schedules.
   4. If agreement is reached at a later date, approved TIA schedule changes shall be shown on the next update schedule.
   5. Engineer will withhold remaining payment on the schedule contract item if a TIA is requested by Engineer and not submitted by Contractor within 15 working days.
   6. The schedule item payment will resume on the next estimate after the requested TIA is submitted.
      a. No other contract payment will be retained regarding TIA submittals.

F. Contractor shall also submit a narrative report with each updated analysis which shall include but not be limited to, a description of current and anticipated problem areas, delaying factors and their impact, and an explanation of corrective actions taken or proposed.

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

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

END OF SECTION
SECTION 01340
SUBMITTALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Mechanics and administration of the submittal process for:
      a. Shop Drawings.
      b. Samples.
      c. Miscellaneous submittals.
      d. Operation and Maintenance Manuals.
   2. General content requirements for Shop Drawings.
   3. Content requirements for Operation and Maintenance Manuals.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.
   3. Sections in Division 02 through Division 16 identifying required submittals.

1.2 DEFINITIONS

A. Shop Drawings:
   1. See General Conditions.
   2. Product data and samples are Shop Drawing information.

B. Operation and Maintenance Manuals:
   1. Contain the information required for proper installation and maintenance of building materials and finishes.
   2. Contain the technical information required for proper installation, operation and maintenance of process, electrical and mechanical equipment and systems.

C. Miscellaneous Submittals:
   1. Submittals other than Shop Drawings and Operation and Maintenance Manuals.
   2. Representative types of miscellaneous submittal items include but are not limited to:
      a. Construction schedule.
      b. Concrete, soil compaction, and pressure test reports.
      c. Manufacturer's installation certification letters.
      d. Warranties.
      e. Construction photographs.
      f. Survey data.
      g. Cost breakdown (Schedule of Values).

1.3 SUBMITTAL SCHEDULE

A. Schedule of Shop Drawings:
   1. Submitted and approved within 20 days of receipt of Notice to Proceed.
   2. Account for multiple transmittals under any specification section where partial submittals will be transmitted.

B. Shop Drawings: Submittal and approval prior to 50 percent completion.

C. Completed Equipment Record Sheets: Initial submittal within 60 days after date Shop Drawings are approved.
1.4 PREPARATION OF SUBMITTAL DRAWINGS

A. Format:
   1. Prepared with computer aided design (CAD) software.
   2. Printed on 11 by 17 IN sheets.

B. Drawings shall include a title block containing the following:
   1. Plant, facility, or site name.
   2. Drawing title.
   3. Drawing number.
   4. Revision list with revision number and date
   5. Drawing date.
   6. Drawing scale.
   7. Manufacturer name, address, and telephone number.

C. Cover sheet for each drawing set shall indicate the following:
   1. Plant, facility, or site name.
   2. Project name.
   4. Revision number.
   5. Issue date.

D. Table of contents sheet(s) shall indicate the following for each drawing in the set:
   1. Drawing number.
   2. Drawing title.
   3. Sheet number.

E. Legend and abbreviation sheet shall indicate the following:
   a. Description of symbols and abbreviations used.

1.5 PREPARATION OF SUBMITTALS

A. General:
   1. All submittals and all pages of all copies of a submittal shall be completely legible.
   2. Submittals which, in the Engineer's sole opinion, are illegible will be returned without review.

B. Shop Drawings:
   1. Scope of any submittal and letter of transmittal:
      a. Limited to a single Specification Section, except where otherwise noted in contract documents.
      b. Do not submit under any Specification Section entitled (in part) "Basic Requirements" unless the product or material submitted is specified, in total, in a "Basic Requirements" Section.
   2. Numbering letter of transmittal:
      a. Include as prefix the Specification Section number followed by a series number, "-xx", beginning with "01" and increasing sequentially with each additional transmittal.
      b. If more than one (1) submittal under any Specification Section, assign consecutive series numbers to subsequent transmittal letters.
   3. Describing transmittal contents:
      a. Provide listing of each component or item in submittal capable of receiving an independent review action.
      b. Identify for each item:
         1) Manufacturer and Manufacturer's Drawing or data number.
         2) Contract Document tag number(s).
         3) Unique page numbers for each page of each separate item.
      c. When submitting "or-equal" items that are not the products of named manufacturers, include the words "or-equal" in the item description.
   4. Contractor stamping:
a. General:
   1) Contractor's review and approval stamp shall be applied either to the letter of transmittal or a separate sheet preceding each independent item in the submittal.
      a) Contractor's signature and date shall be wet ink signature.
      b) Shop Drawing submittal stamp shall read "(Contractor's Name) has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval as stipulated under General Conditions Paragraph 6.17C."
      c) Letters of transmittal may be stamped only when the scope of the submittal is one (1) item.
   2) Submittals containing multiple independent items shall be prepared with an index sheet for each item listing the discrete page numbers for each page of that item, which shall be stamped with the Contractor's review and approval stamp.
      a) Individual pages or sheets of independent items shall be numbered in a manner that permits Contractor's review and approval stamp to be associated with the entire contents of a particular item.

b. Electronic stamps:
   1) Contractor may electronically embed Contractor's review and approval stamp to either the letter of transmittal or a separate index sheet preceding each independent item in the submittal.
   2) Contractor's signature and date on electronically applied stamps shall be wet ink signature.

5. Resubmittals:
   a. Number with original root number and a suffix letter starting with "A" on a (new) duplicate transmittal form.
   b. Do not increase the scope of any prior transmittal.
   c. Account for all components of prior transmittal.
      1) If items in prior transmittal received "A" or "B" Action code, list them and indicate "A" or "B" as appropriate.
         a) Do not include submittal information for items listed with prior "A" or "B" Action in resubmittal.
      2) Indicate "Outstanding-To Be Resubmitted At a Later Date" for any prior "C" or "D" Action item not included in resubmittal.
         a) Obtain Engineer's approval to exclude items.

6. For 8-1/2 x 11 IN, 8-1/2 x 14 IN, and 11 x 17 IN size sheets, provide three (3) copies of each page for Engineer plus the number required by the Contractor.
   a. The number of copies required by the Contractor will be defined at the Preconstruction Conference, but shall not exceed three (3).
   b. All other size sheets:
      1) Submit one (1) reproducible transparency or high resolution print and one (1) additional print of each Drawing until approval is obtained.
      2) Utilize mailing tube; do not fold.
      3) The Engineer will mark and return the reproducible to the Contractor for his reproduction and distribution.

7. Provide clear space (3 IN SQ) for Engineer stamping of each component defined in PREPARATION OF SUBMITTALS – Contractor Stamping.

8. Contractor shall not use red color for marks on transmittals.
   a. Duplicate all marks on all copies transmitted, and ensure marks are photocopy reproducible.
   b. Outline Contractor marks on reproducible transparencies with a rectangular box.

9. Transmittal contents:
   a. Coordinate and identify Shop Drawing contents so that all items can be easily verified by the Engineer.
   b. Identify equipment or material use, tag number, Drawing detail reference, weight, and other Project specific information.
c. Provide sufficient information together with technical cuts and technical data to allow an evaluation to be made to determine that the item submitted is in compliance with the Contract Documents.

d. Submit items such as equipment brochures, cuts of fixtures, product data sheets or catalog sheets on 8-1/2 x 11 IN pages.

1) Indicate exact item or model and all options proposed.

e. When a Shop Drawing submittal is called for in any Specification Section, include as appropriate, scaled details, sizes, dimensions, performance characteristics, capacities, test data, anchoring details, installation instructions, storage and handling instructions, color charts, layout Drawings, rough-in diagrams, wiring diagrams, controls, weights and other pertinent data in addition to information specifically stipulated in the Specification Section.

1) Arrange data and performance information in format similar to that provided in Contract Documents.

2) Provide, at minimum, the detail specified in the Contract Documents.

f. If proposed equipment or materials deviate from the Contract Drawings or Specifications in any way, clearly note the deviation and justify the said deviation in detail in a separate letter immediately following transmittal sheet.

10. Samples:

a. Identification:

1) Identify sample as to transmittal number, manufacturer, item, use, type, project designation, tag number, standard Specification Section or Drawing detail reference, color, range, texture, finish and other pertinent data.

2) If identifying information cannot be marked directly on sample without defacing or adversely altering samples, provide a durable tag with identifying information securely attached to the sample.

b. Include application specific brochures, and installation instructions.

c. Provide Contractor's stamp of approval on samples or transmittal form as indication of Contractor's checking and verification of dimensions and coordination with interrelated work.

d. Resubmit samples of rejected items.

C. Miscellaneous Submittals:

1. Prepare in the format and detail specified in Specification requiring the miscellaneous submittal.

1.6 TRANSMITTAL OF SUBMITTALS

A. Shop Drawings, Samples and Operation and Maintenance Manuals:

1. Transmit all submittals to:

HDR
2805 Saint Andrews Loop, Suite A
Pasco, WA 99301
Attn: Allan Evans, PE
Email: Allan.Evans@hdrinc.com
Phone: 509-546-2067

2. Utilize two (2) copies of attached Exhibit "A" to transmit all Shop Drawings and samples.

3. Utilize two (2) copies of attached Exhibit "B" to transmit all Operation and Maintenance Manuals.

4. All submittals must be from Contractor.

a. Submittals will not be received from or returned to subcontractors.

b. Operation and Maintenance Manual submittal stamp may be Contractor's standard approval stamp.

5. Provide submittal information defining specific equipment or materials utilized on the Project.
a. Generalized product information, not clearly defining specific equipment or materials to be provided, will be rejected.

B. Miscellaneous Submittals:
1. Transmit under Contractor's standard letter of transmittal or letterhead.
2. Submit in triplicate or as specified in individual Specification Section.
3. Transmit to:

HDR
2805 Saint Andrews Loop, Suite A
Pasco, WA 99301
Attn: Allan Evans, PE
Email: Allan.Evans@hdrinc.com
Phone: 509-546-2067

4. Provide copy of letter of transmittal without attachments to Owner's Resident Project Representative.
   a. Exception for concrete, soils compaction and pressure test reports.
      1) Transmit one (1) copy of test reports to Resident Project Engineer.
      2) Transmit one (1) copy of test reports to location and individual indicated above for other miscellaneous submittals.

C. Expedited Return Delivery:
1. Include prepaid express envelope or air bill in submittal transmittal package for any submittals Contractor expects or requires express return mail.
2. Inclusion of prepaid express envelope or air bill does not obligate Engineer to conduct expedited review of submittal.

D. Electronic submittals will not be accepted except for approved Operation and Maintenance Manuals as required by this Specification.

1.7 ENGINEER'S REVIEW ACTION

A. Shop Drawings and Samples:
1. Items within transmittals will be reviewed for overall design intent and will receive one of the following actions:
   a. A - FURNISH AS SUBMITTED.
   b. B - FURNISH AS NOTED (BY ENGINEER).
   c. C - REVISE AND RESUBMIT.
   d. D - REJECTED.
   e. E - ENGINEER'S REVIEW NOT REQUIRED.
2. Submittals received will be initially reviewed to ascertain inclusion of Contractor's approval stamp.
   a. Submittals not stamped by the Contractor or stamped with a stamp containing language other than that specified herein will not be reviewed for technical content and will be returned without any action.
3. In relying on the representation on the Contractor’s review and approval stamp, Owner and Engineer reserve the right to review and process poorly organized and poorly described submittals as follows:
   a. Submittals transmitted with a description identifying a single item and found to contain multiple independent items:
      1) Review and approval will be limited to the single item described on the transmittal letter.
      2) Other items identified in the submittal will:
         a) Not be logged as received by the Engineer.
         b) Be removed from the submittal package and returned without review and comment to the Contractor for coordination, description and stamping.
c) Be submitted by the Contractor as a new series number, not as a re-submittal number.

b. Engineer, at Engineer’s discretion, may revise the transmittal letter item list and descriptions, and conduct review.
   1) Unless Contractor notifies Engineer in writing that the Engineer’s revision of the transmittal letter item list and descriptions was in error, Contractor’s review and approval stamp will be deemed to have applied to the entire contents of the submittal package.

4. Submittals returned with Action "A" or "B" are considered ready for fabrication and installation.
   a. If for any reason a submittal that has an "A" or "B" Action is resubmitted, it must be accompanied by a letter defining the changes that have been made and the reason for the resubmittal.
   b. Destroy or conspicuously mark "SUPERSEDED" all documents having previously received "A" or "B" Action that are superseded by a resubmittal.

5. Submittals with Action "A" or "B" combined with Action "C" (Revise and Resubmit) or "D" (Rejected) will be individually analyzed giving consideration as follows:
   a. The portion of the submittal given "C" or "D" will not be distributed (unless previously agreed to otherwise at the Preconstruction Conference).
      1) One (1) copy or the one (1) transparency of the "C" or "D" Drawings will be marked up and returned to the Contractor.
         a) Correct and resubmit items so marked.
      b. Items marked "A" or "B" will be fully distributed.
   c. If a portion of the items or system proposed are acceptable, however, the major part of the individual Drawings or documents are incomplete or require revision, the entire submittal may be given "C" or "D" Action.
      1) This is at the sole discretion of the Engineer.
      2) In this case, some Drawings may contain relatively few or no comments or the statement, "Resubmit to maintain a complete package."
      3) Distribution to the Owner and field will not be made (unless previously agreed to otherwise).

6. Failure to include any specific information specified under the submittal paragraphs of the Specifications will result in the submittal being returned to the Contractor with "C" or "D" Action.

7. Calculations required in individual Specification Sections will be received for information purposes only, as evidence calculations have been performed by individuals meeting specified qualifications, and will be returned stamped "E. Engineer's Review Not Required" to acknowledge receipt.

8. Transmittals of submittals which the Engineer considers as "Not Required" submittal information, which is supplemental to but not essential to prior submitted information, or items of information in a transmittal which have been reviewed and received "A" or "B" Action in a prior submittal, will be returned with Action "E. Engineer's Review Not Required."

9. Samples may be retained for comparison purposes.
   a. Remove samples when directed.
   b. Include in bid all costs of furnishing and removing samples.

10. Approved samples submitted or constructed, constitute criteria for judging completed work.
    a. Finished work or items not equal to samples will be rejected.

**B. Operation and Maintenance Manuals:**

1. Engineer will review and indicate one of the following review actions:
   a. A - ACCEPTABLE.
   b. B - FURNISH AS NOTED
   c. C - REVISE AND RESUBMIT.
   d. D - REJECTED
2. Acceptable paper copy submittals will be retained with the transmittal form returned with a request for one (1) additional paper copy and two (2) electronic copies on CD-ROM.

3. Deficient submittals (paper copy and/or electronic copy) will be returned along with the transmittal form which will be marked to indicate deficient areas.

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

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

END OF SECTION
PART 1 - GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this section:
   2. U.S. Weather Bureau: Rainfall-Frequency Atlas of the U.S. for Durations From 30 Minutes to 24 Hours and Return Periods From 1 to 100 Years.

1.2 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:
      a. Electric power supply and distribution plans.
      b. Water supply and distribution plans.
      c. Sanitary facilities.
   3. Temporary Construction Submittals:
      a. Access Roads: Routes, cross-sections, and drainage facilities.
      b. Contractor’s field office, storage yard, and storage building plans, including gravel surfaced area.
      c. Staging area location plan.
   4. Temporary Control Submittals:
      a. Air pollution control plan.
      b. Noise control plan.
      c. Plan for disposal of waste materials and intended haul routes.

1.3 MOBILIZATION

A. Mobilization shall include, but not be limited to, these principal items:
   1. Obtaining required permits.
   2. Moving Contractor’s field offices and equipment required for first month operations onto Site.
   3. Installing temporary construction power, wiring, and lighting facilities.
   4. Providing onsite communication facilities, including high speed internet capabilities.
   5. Providing onsite sanitary facilities and potable water facilities as specified and as required by Laws and Regulations, and governing agencies.
   6. Providing power for field offices, yard lighting, and maintenance equipment (as necessary)
   7. Arranging for and erection of Contractor’s work and storage yard.
   8. Posting OSHA required notices and establishing safety programs and procedures.
   9. Having Contractor’s superintendent at Site full time.

B. Use area designated for Contractor’s temporary facilities as shown on Drawings. If other area is desired, propose in writing to Engineer for review.

1.4 PROTECTION OF WORK AND PROPERTY

A. Comply with Owner’s safety rules while on Owner’s property. Notify Owner of any conflicts between the Contractor’s Project Safety Plan and any Owner Safety requirements.

B. Keep Owner and Engineer informed of serious onsite accidents and related claims.
PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 TEMPORARY UTILITIES

A. Power:
1. 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 Engineer as substantially complete.
2. Cost of electric power will be borne by Contractor.

B. Lighting: 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. Costs for temporary heat shall be borne by Contractor responsible for constructing structure or building as specified in Section 01010, Summary of Work.
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.
4. Provide portable unit heaters, complete with controls, oil- or gas-fired, and suitably vented to outside as required for protection of health and property.

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 and bear costs of transporting and storing necessary water for construction. No potable water is available at the Site. Sanitary and Personnel Facilities: Provide and maintain facilities for Contractor’s employees, Subcontractors, and all other onsite employers’ employees. Service, clean, and maintain facilities and enclosures.


3.2 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. Schedule the Work so construction will not interfere with irrigation of cultivated lands or pasturelands. Construction may proceed during irrigation season, provided Contractor constructs temporary irrigation ditches, turnouts, and miscellaneous structures acceptable to property owners.
4. Provide continuous access for livestock through farm areas. Do not cut off ready access to portions of farmlands in which livestock are pastured. Maintain existing fences required to restrain livestock. Keep gates closed and secure.
5. 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.

6. 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.

7. Protect, shore, brace, support, and maintain underground pipes, conduits, drains, and other underground utility construction uncovered or otherwise affected by construction operations.

8. 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.

9. 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.

10. Maintain original Site drainage wherever possible.

B. Site Security:
   1. Erect a temporary security fence for protection of people and animals from falling, tripping, and other injury. Maintain fence throughout construction period when hazards are present.
   2. 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 as required by the Washington Vehicle Code and in sufficient quantity to safeguard 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 Contractor’s employees, other employer’s employees, and others who may be affected by the Work.
   3. Provide to protect existing facilities and adjacent properties from potential damage.
   4. Locate to enable access by facility operators and property owners.
   5. Protect streets, roads, highways, and other public thoroughfares that are closed to traffic by effective barricades with acceptable warning signs.
   6. Locate barricades at the nearest intersecting public thoroughfare on each side of the blocked section.
   7. Illuminate barricades and obstructions with warning lights from sunset to sunrise.

D. Signs and Equipment:
   1. Conform to requirements of manual published by the Washington State Department of Transportation and Yakima County.
   2. Use to alert general public of construction hazards.

E. Waterways: Keep ditches, culverts, and natural drainages free of silt and debris.

F. Dewatering: See Section 02240, Dewatering.

G. Archaeological Finds:
   1. General: Should finds of an archaeological or paleontological nature be made within the limits of the Site, immediately notify Owner and Engineer and proceed in accordance with the General Conditions. Continue the Work in other areas without interruption.
   2. Archaeological Finds: Evidence of human occupation or use of an area within the contract limits prior to the Year 1840. Evidence may consist of skeletons, stone, or other utensils, or evidence of habitations or structures.
3. Paleontological Finds: Evidence of prehistoric plant or animal life, such as skeletons, bones, fossils, or casts and other indications such as pictographs.
4. Owner may order the Work stopped in other areas if, in Owner’s opinion, the find is more extensive than may appear from uncovered material.
5. Protection of Finds:
   a. Cover, fence, or otherwise protect finds until notice to resume the Work is given.
   b. Cover finds with plastic film held in place by earth, rocks, or other weights placed outside the find. Should additional backfilling be necessary for safety or to prevent caving, place backfill material loosely over the plastic film.
   c. Sheet or shore as necessary to protect excavations underway. Place temporary fence to prevent unauthorized access.
   d. Dewater finds made below water table as necessary to protect construction Work underway. Divert groundwater or surface runoff away from find by ditching or other acceptable means.
6. Removal of Finds:
   a. All finds are property of Owner. Do not remove or disturb finds without Owner’s written authorization.
   b. Should Owner elect to have a find removed, provide equipment, labor, and material to permit safe removal of find without damage. Provide transportation for delivery to individuals, institutions, or other places as Owner may find desirable, expedient, or required by law.

3.3 TEMPORARY CONTROLS

A. Air Pollution Control:
   1. Minimize air pollution from construction operations.
   2. Burning: Of waste materials, rubbish, or other debris will not be permitted on or adjacent to Site.
   3. Conduct operations of trucking to cause a minimum of dust. Give unpaved streets, roads, detours, or haul roads used in construction area a dust-preventive treatment or periodically water to prevent dust. Strictly adhere to applicable environmental regulations for dust prevention.
   4. An air-pollution control plan, if required, shall be submitted to the Engineer and local regulatory agency for review. A permit shall be applied for by Contractor at the appropriate regulatory agency and approved permit shall be posted onsite prior to any work conducted at the Site.

B. Noise Control:
   1. Noise Control Plan: Propose plan to mitigate construction noise and to comply with noise control ordinances, including method of construction, equipment to be used, and acoustical treatments.

C. Water Pollution Control:
   1. Prior to commencing excavation and construction, obtain Engineer’s agreement with detailed plans showing procedures intended to handle and dispose of sewage, groundwater, and stormwater flow, including dewatering pump discharges.
   2. 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,” and “Erosion and Sediment Control-Surface Mining in Eastern United States.”
   3. Do not dispose of volatile wastes such as mineral spirits, oil, chemicals, or paint thinner in storm or sanitary drains. Disposal of wastes into streams or waterways is prohibited. Provide acceptable containers for collection and disposal of waste materials, debris, and rubbish.
   4. Comply with Storm Water Pollution Prevention Permit obtained during mobilization. Coordinate compliance activities with the Engineer and Owner.
D. Erosion, Sediment, and Flood Control: Refer to Section 02270, Soil Erosion and Sediment Control.

E. Dust control in borrow areas, fill area, and roads.

F. Control of dirt and debris on public roads.

3.4 STORAGE YARDS AND BUILDING

A. Coordinate requirements with Section 01600, Material and Equipment.

B. Temporary Storage Yards: Construct temporary storage yards for storage of products that are not subject to damage by weather conditions.

C. 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.

3.5 ACCESS ROADS

A. Refer to Section 02010, Site Access Roads.

3.6 INSPECTION ACCESS

A. Contractor to provide a means of ingress/egress, including safety tie-off points as required, to support access by construction inspector.

B. Contractor to provide all equipment, permitting, personnel, etc. for construction inspector to enter confined spaces as required.

3.7 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. Assure 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, close, 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.

3.8 CLEANING DURING CONSTRUCTION

A. In accordance with General Conditions, as may be specified in other Specification sections, and as required herein.

B. Wet down exterior surfaces prior to sweeping to prevent blowing dust and debris. At least weekly, sweep all floors, and pick up all debris and dispose.

C. Provide approved containers for collection and disposal of waste materials, debris, and rubbish. At least at weekly intervals, dispose of such waste materials, debris, and rubbish offsite.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Scheduling of product delivery.
   2. Packaging of products for delivery.
   3. Protection of products against damage from:
      a. Handling.
      b. Exposure to elements or harsh environments.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.

C. Payment:
   1. No payment will be made to Contractor for equipment or materials not properly stored and
      insured or without approved Shop Drawings.
      a. Previous payments for items will be deducted from subsequent progress estimate(s) if
         proper storage procedures are not observed.

1.2 DELIVERY

A. Scheduling: Schedule delivery of products or equipment as required to allow timely installation
   and to avoid prolonged storage.

B. Packaging: Deliver products or equipment in manufacturer's original unbroken cartons or other
   containers designed and constructed to protect the contents from physical or environmental
   damage.

C. Identification: Clearly and fully mark and identify as to manufacturer, item, and installation
   location.

D. Protection and Handling: Provide manufacturer's instructions for storage and handling.

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

PART 3 - EXECUTION

3.1 PROTECTION, STORAGE AND HANDLING

A. Manufacturer's Instruction:
   1. Protect all products or equipment in accordance with manufacturer's written directions.
      a. Store products or equipment in location to avoid physical damage to items while in
         storage.
      b. Handle products or equipment in accordance with manufacturer's recommendations and
         instructions.
   2. Protect equipment from exposure to elements and keep thoroughly dry.

3.2 FIELD QUALITY CONTROL

A. Inspect Deliveries:
1. Inspect all products or equipment delivered to the site prior to unloading.
   a. Reject all products or equipment that are damaged, used, or in any other way unsatisfactory for use on Project.

B. Monitor Storage Area: Monitor storage area to ensure suitable temperature and moisture conditions are maintained as required by manufacturer or as appropriate for particular items.

END OF SECTION
SECTION 01601
JOB CONDITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Job conditions.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.

1.2 PROJECT CONDITIONS

A. Prior to installation of material and other work, verify with subcontractors, material manufacturers, and installers that the substrate or surface to which those materials attach is acceptable for installation of those materials. (Substrate is defined as grade or subgrade surfaces to which materials are installed.

B. Correct unacceptable substrate until acceptable for installation of materials.

C. The Work crosses multiple drainages and Contractor should be aware of potential storm or snowmelt events which could adversely impact the Work. The canal may intercept water upstream of the actual worksite and be conveyed down to where Work is being performed.

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

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

END OF SECTION
SECTION 01782
OPERATION AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Administration of the submittal process for Operation and Maintenance Manuals.
   2. Content requirements for Operation and Maintenance Manuals.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.
   3. Sections in Division 02 through Division 16 identifying required Operation and Maintenance Manual submittals.

1.2 DEFINITIONS

A. Equipment Operation and Maintenance Manuals:
   1. Contain the technical information required for proper installation, operation and maintenance of process, electrical and mechanical equipment and systems.

B. Building Materials and Finishes Operation and Maintenance Manuals:
   1. Contain the information required for proper installation and maintenance of building materials and finishes.

1.3 SUBMITTALS REQUIRED

A. List of all the Operation and Maintenance Manuals required by the Contract as identified in Division 02 - SITE WORK through Division 15 - MECHANICAL.

B. Operation and Maintenance Manuals:
   1. Draft and final electronic copies.
   2. Final paper copy.

1.4 OPERATION AND MAINTENANCE MANUAL SUBMITTAL MILESTONES

A. List of Required Operation and Maintenance Manuals:
   1. Submit list within 30 days after Notice to Proceed.

B. Draft Operation and Maintenance Manuals:
   1. Submit approvable draft manuals in electronic format (PDF) within 30 days after Shop Drawing approval.

C. Final Operation and Maintenance Manuals:
   1. Final approval of Operation and Maintenance Manuals in electronic format (PDF) must be obtained 30 days prior to equipment start-up.

1.5 SUBMITTAL PREPARATION

A. General:
   1. All pages of the Operation and Maintenance Manual submittal shall be legible.
      a. Submittals which, in the Engineer’s sole opinion, are illegible will be rejected without review.
   2. Identify each equipment item in a manner consistent with names and identification numbers used in the Contract Documents, not the manufacturer’s catalog numbers.
   3. Neatly type any data not furnished in printed form.
4. Owner's use of manufacturer's Operation and Maintenance Manuals:
   a. Operation and Maintenance Manuals are provided for Owner's use, reproduction and distribution as training and reference materials within Owner's organization:
      1) Applicable to both paper copy and electronic files.
      2) Applicable to materials containing copyright notice as well as those with no copyright notice.

B. Operation and Maintenance Manual Format and Delivery:
1. Draft electronic submittals:
   b. Create one (1) PDF file for each equipment Operation and Maintenance Manual.
   c. Do not password protect nor lock the PDF document.
   d. Drawings or other graphics must be converted to PDF file format from the original drawing file format and made part of the PDF document.
   e. Scanning of drawings is to be used only where actual file conversion is not possible and drawings must be scanned at a resolution of 300 dpi or greater.
   f. Rotate drawings that are normally viewed in landscape mode so that when the PDF file is opened the drawing is in the appropriate position for viewing.
   g. Create bookmarks in the navigation frame, for the Operation and Maintenance Manual cover, the Table of Contents, and each top level entry in the Operation and Maintenance Table of Contents.
   h. Using Adobe Acrobat Standard or Adobe Acrobat Professional, set the PDF document properties, initial view as follows:
      1) Select File \(\rightarrow\) Properties \(\rightarrow\) Initial View.
      2) Select the Navigation tab: Bookmarks Panel and Page.
      3) Select the Page layout: Single Page.
      4) Select the Magnification: Fit Page.
      5) Select Open to page: 1.
      6) Set the file to open to the cover page of the manual with bookmarks to the left, and the first bookmark linked to the cover page.
   i. Set the PDF file "Fast Web View" option to open the first several pages of the document while the rest of the document continues to load.
      1) To do this:
         a) Select Edit \(\rightarrow\) Preferences \(\rightarrow\) Documents \(\rightarrow\) Save Settings.
         b) Check the Save As optimizes for Fast Web View box.
   j. PDF file naming convention:
      1) Use the Specification Section number, the manufacturer’s name and the equipment description, separated by underscores.
      2) Example: 11083_Sanitaire_Coarse_Bubble_Diffusers.pdf.
      3) Do not put spaces in the file name.

C. Equipment Operation and Maintenance Manual Content:
1. Provide a cover page as the first page of each manual with the following information:
   a. Manufacturer(s) Name and Contact Information.
   b. Vendor’s Name and Contact Information.
   c. Date (month, year).
   d. Project Owner and Project Name.
   e. Specification Section.
   f. Model Numbers.
2. Provide the following detailed information:
   a. Equipment function, normal and limiting operating characteristics.
   b. Instructions for assembly, disassembly, installation, alignment, adjustment, and inspection.
   c. Operating instructions for start-up, normal operation, control, shutdown, and emergency conditions.
d. Lubrication and maintenance instructions.

e. Troubleshooting guide.

f. Mark each sheet to clearly identify specific products and component parts and data applicable to the installation for the Project; delete or cross out information that does not specifically apply to the Project.

g. Pump and blower curves:
1) Manufacturer’s certified curve when required by the associated Specification Section, otherwise provide the manufacturer’s catalog curve.

h. Parts lists:
1) A parts list and identification number of each component part of the equipment.
2) Exploded view or plan and section views of the equipment with a detailed parts callout matching the parts list.
3) A list of recommended spare parts.
4) List of spare parts provided as specified in the associated Specification Section.
5) A list of any special storage precautions which may be required for all spare parts.

i. General arrangement, cross-section, and assembly drawings.

j. Electrical diagrams, including elementary diagrams, wiring diagrams, connection diagrams, and interconnection diagrams.

k. Test data and performance curves.

l. As-constructed fabrication or layout drawings and wiring diagrams.

m. Copy of the equipment manufacturer’s warranty meeting the requirements of the Contract.

n. Copy of any service contracts provided for the specific piece of equipment as part of the Contract.

3. Additional information as required in the associated equipment or system Specification Section.

D. Operation and Maintenance Manuals for Building Materials and Finishes:

1. Building products, applied materials and finishes:
   a. Include product data, with catalog number, size, composition and color and texture designations.
   b. Provide information for ordering custom manufactured products.

2. Necessary precautions:
   a. Include product MSDS for each approved product.
   b. Include any precautionary application and storage guidelines.

3. Instructions for care and maintenance:
   a. Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods and recommended schedule for cleaning and maintenance.

4. Moisture protection and weather exposed products:
   a. Include product data listing, applicable reference standards, chemical composition, and details of installation.
   b. Provide recommendations for inspections, maintenance and repair.

5. Additional requirements as specified in individual product specifications.

1.6 TRANSMITTAL OF SUBMITTALS

A. Operation and Maintenance Manuals:

1. Transmit all submittals to:

   HDR
   2805 Saint Andrews Loop, Suite A
   Pasco, WA 99301
   Attn: Allan Evans, PE
   Email: Allan.Evans@hdrinc.com
   Phone: 509-546-2067
2. Transmittal form: Use Operation and Maintenance Manual Transmittal, Exhibit A.
3. Transmittal numbering:
   a. Number each submittal with the Specification Section number followed by a series number beginning with ".01" and increasing sequentially with each additional transmittal, followed by ".OM" (for example: 11061-01-OM).
4. Submit draft and final Operation and Maintenance Manual in electronic format (PDF) via email or via thumb drive to Engineer, until manual is approved.
5. All submittals must be from Contractor; submittals will not be received from or returned to subcontractors.

B. Expedited Return Delivery:
   1. Include prepaid express envelope or air bill in submittal transmittal package for any submittals Contractor expects or requires express return mail.
   2. Inclusion of prepaid express envelope or air bill does not obligate Engineer to conduct expedited review of submittal.

1.7 ENGINEER'S REVIEW ACTION

A. Draft Electronic (PDF) Submittals:
   1. Engineer will review and indicate one of the following review actions:
      a. A - ACCEPTABLE
      b. B - FURNISH AS NOTED
      c. C - REVISE AND RESUBMIT
      d. D - REJECTED
   2. Submittals marked as Acceptable or Furnish As Noted will be retained with the transmittal form returned with a request for final paper and electronic submittals.
   3. Copies of submittals marked as Revise and Resubmit or Rejected will be returned with the transmittal form marked to indicate deficient areas.
   4. Resubmit until approved.
      a. All cost associated with the review and approval of Operation and Maintenance Manuals resubmitted more than once shall be borne by the Contractor with said costs being deducted from the Contract Price.

B. Final Paper Copy Submittals:
   1. Engineer will review and indicate one (1) of the following review actions:
      a. A - ACCEPTABLE
      b. D - REJECTED
   2. Submittals marked as Acceptable will be retained with the transmittal form returned as noted.
   3. Submittals marked as Rejected will be returned with the transmittal form marked to indicate deficient areas.
   4. Resubmit until approved.

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

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

END OF SECTION
SECTION 02010
SITE ACCESS ROADS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. This section describes requirements for the construction of temporary and permanent site access roads for the project site.

1.2 SUBMITTALS

A. Submit written description of site access and construction traffic to the Engineer per Section 01340, Submittals. The Contractor is responsible for preparation and adequacy of any traffic control plans necessary to perform the work and submit such to the Engineer.

B. Submit to the Engineer any signing and traffic detouring plans in drawing form addressing both site access and County Road crossing construction traffic control. Include the following:
   1. Locations of any posted road closures with maps of detour routes to provide clear guidance to construction traffic as approved by the Engineer.
   2. All construction warning signs, flag persons, or other proposed traffic operations to provide for safe traffic access for construction site and construction traffic during the construction. Address methods of handling two-way traffic on the access roads.

C. Submit the name of the Contractor’s designated traffic safety supervisor. The safety supervisor shall be available 24 hours per day to contact and a backup shall be designated if the safety supervisor is not available. This person shall be sure that construction traffic operations and devices comply with Contract Specifications and Contractor’s traffic control plans.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL

A. Design, construct, and maintain all construction roads necessary for access and construction. Control traffic as necessary for safe driving conditions.

B. Prior to the start of construction operations, notify the Engineer, Washington Department of Transportation, and Yakima County in whose jurisdiction the project lies, giving the expected starting date, completion date, and the name and telephone number of a responsible person who may be contacted at any hour in the event of a condition requiring immediate correction. Complete and submit Yakima County required permit applications. Obtain required permits prior to start of Work.

C. Use only the new roads shown on the Drawings and the existing access roads, unless allowed otherwise in writing by the Engineer.

D. Install and maintain devices and drainage structures suitable to the Engineer to prevent accumulation of excessive water and erosion of the access road surface, drainage ditches and related areas.

E. Post signs to prevent public vehicular access to the site during working hours and gates or barricades to prevent public access to the site during non-working hours for the duration of the work. The Contractor is fully responsible for work area safety.

F. Control/detour traffic at these locations and in conformance with the plans approved by the Engineer.
G. Post speed limits and include these speed limits on the traffic control plan.

H. Furnish, install, construct, maintain, and remove detours, road closures, signs, barricades, K-rail, fences, gates, flag men, radios, flares, miscellaneous traffic devices, drainage facilities, paving, and such other items and services as are necessary to adequately safeguard the public from hazard and inconvenience. All such work shall comply with the ordinances, directives, and regulations of authorities with jurisdiction over the public roads in which the construction takes place and over which detoured traffic is routed by the Contractor.

I. After devices have been installed, maintain and keep them in good repair and working order until no longer required. Replace such devices that are lost or damaged to such an extent as to require replacement, regardless of the cause of such loss or damage. When and where flagmen or radio controllers are an essential part of the traffic control plan (such as during working hours) they shall remain in effect until the plan indicates they are no longer necessary (such as after the construction site has been closed down for the night).

J. Provide gravel, crushed rock, or other stabilization material to permit access by all motor vehicles at all times.

Upon completion of construction, restore Washington State, Yakima County, Owner, and private roads to condition prior to construction. Photos should be taken of all access points and areas susceptible to damage before mobilization.

3.2 TRAFFIC CONTROL DEVICES AND SIGNS

A. Construction signing, striping, barricades, and other traffic control devices used for handling traffic shall conform to the latest edition of the Federal Highway Administration "Manual on Uniform Traffic Control Devices for Streets and Highways" (MUTCD).

B. Signs shall be reflectorized when they are used during hours of darkness. Provide cones, pylons, barricades, or posts used in the diversion of traffic with flashers or other illumination if in place during hours of darkness.

C. Maintain a 24-hour emergency service to remove, install, relocate, and maintain warning devices and furnish to the authority having jurisdiction names and telephone numbers of three persons responsible for this emergency service. In the event these persons do not promptly respond or the authority having jurisdiction deems it necessary to call out other forces to accomplish emergency service, the Contractor will be held responsible for the cost of such emergency service.

D. During the duration of a detour, cover all signs not in accordance with the traffic control plan.Relocate existing signs to provide visibility from all relocated traffic lanes.

3.3 LAND OWNER ACCESS

A. Provide access for the Owner and local land owners using existing access roads to access their lands in all areas of the construction site.

3.4 CONSTRUCTION OF ACCESS ROADS

A. Conform to requirements of Section 02200, Earthwork.

END OF SECTION
SECTION 02110
SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Site clearing, tree protection, stripping topsoil and demolition.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 1 - General Requirements.
   3. Section 02200 - Earthwork.
   4. Section 02270 - Soil Erosion and Sediment Control.

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

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect existing trees and other vegetation designated to remain on the drawings against damage.

B. Owner will obtain any necessary authority and/or permission for borrow or disposal of earth on adjacent properties.

3.2 DEMOLISHION & DISPOSAL

A. Demolish and properly dispose of wood flumes, trestles, supports, and footings as designated on the Drawings. Note that all wood to be demolished and disposed of is treated with creosote as a wood preservative. Steel beams on the County Road Crossing become property of the Contractor and can be salvaged as desired. Demolition of the County Road Crossing will be performed in conjunction with a traffic control plan as required.

B. Demolish and properly dispose of concrete flumes, trestles, inlet structures, outlet structures, transition structures, canal panels, supports, and footings as designated on the Drawings.

C. All wood, concrete, and asphalt demolished must be hauled off site to a State approved disposal site for the material.

D. Contractor is responsible to protect irrigation piping. Existing service pipelines that will remain in service will be saw-cut and capped, extending a minimum of 12 inches above grade as shown in the standard details, then painted purple.

E. Contractor shall protect existing structures and canals not being removed. If facilities to remain are damaged, Contractor is responsible for repair.

3.3 SITE CLEARING

A. Topsoil Removal:
   1. Strip topsoil to a depth of 12 inches across the areas designated on the Project Drawings as a borrow, fill, piping, disposal, or site access road area (except as otherwise noted).
      a. Remove heavy growths of grass before stripping.
      b. Stop topsoil stripping at a sufficient distance from trees designated to remain to prevent damage to main root system.
c. Separate from underlying subsoil or objectionable material.
d. Strip soils only as necessary for use for excavation or stockpiling (plus margin).

2. Stockpile topsoil where directed as shown on the drawings.
   a. Construct storage piles to freely drain surface water.

B. Clearing and Grubbing:
   1. Clear from within limits of construction all trees not marked to remain.
      a. Include shrubs, brush, downed timber, rotten wood, heavy growth of grass and weeds,
         vines, rubbish, structures and debris.
   2. Grub (remove) from within limits of construction all stumps, roots, root mats, logs and
      debris encountered.
      a. Totally grub under areas where fill will be placed.

C. Disposal of Waste Materials:
   1. Do not burn combustible materials on site.
   2. Place all waste materials (not including construction debris) in the unsuitable materials
      stockpile as approved by the Engineer.
   3. Do not bury organic matter on site.

3.4 ACCEPTANCE

A. Upon completion of the site clearing, obtain Engineer's acceptance of the extent of clearing,
   depth of stripping and rough grade.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Excavation.
   2. Fill materials.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.
   3. Section 02010 - Site Access Roads
   4. Section 02110 - Site Clearing
   5. Section 02221 - Trenching, Backfilling, and Compacting for Utilities
   6. Section 02240 - Dewatering
   7. Section 02270 - Soil Erosion and Sediment Control.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. Washington State Department of Transportation (WSDOT), Standard Specifications for
      Road, Bridge, and Municipal Construction, 2010, M41-10.
   2. ASTM International (ASTM):
      a. D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using
         Standard Effort (12,400 ft-lbf/ft3).
      b. D1557, Standard Test Method for Laboratory Compaction Characteristics of Soil Using
         Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m)).
      c. D3786, Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and
         Nonwoven Fabrics: Diaphragm.
      d. D4253, Standard Test Methods for Maximum Index Density and Unit Weight of Soils
         Using a Vibratory Table.
      e. D4254, Standard Test Methods for Minimum Index Density and Unit Weight of Soils
         and Calculation of Relative Density.

1.3 SUBMITTALS

A. Soil Testing:
   1. See Specification Section 01340 for requirements for the mechanics and administration of
      the submittal process.
   2. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Manufacturer's installation instructions.
   3. Soil Testing Laboratory – Contractor will coordinate with the Owner to select a mutually
      acceptable soils testing laboratory. Documentation of mutual acceptance will be handled
      via e-mail trail.
   4. Test reports:
      a. Contractor is to prepare and submit soil inspection and testing results for QC testing
         done by the Contractor. Test results to include both passing and failed tests. Failed
         tests shall be clearly marked to track replacement passing tests.

B. Material Submittals:
1. Contractor to have testing company retrieve 3 samples of each material type listed herein that are proposed for use and have gradation and proctor testing performed. Results will be provided to Engineer for review.

2. If materials delivered to site appear to vary from initially tested material, additional testing may be required by Engineer at Contractor’s expense.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

A. Native/Common Backfill: Native on-tie material excavated for Project. Material must be free of wood, plant material, garbage.

B. Granular Material (Base Course): WSDOT Standard Specifications; 9-03.9(3) Crushed Surfacing; Base Course.

C. Granular Material (Top Course): WSDOT Standard Specifications; 9-03.9(3) Crushed Surfacing; Top Course.

D. Ballast (for Pipe Drain and Storm Drain outlets): WSDOT Standard Specification 9-03.9(1).

**PART 3 - EXECUTION**

**3.1 PROTECTION**

A. Protect existing surface and subsurface features on-site and adjacent to site as follows:

1. Provide barricades, coverings, or other types of protection necessary to prevent damage to existing items indicated to remain in place.

2. Protect and maintain bench marks, monuments or other established reference points and property corners.
   a. If disturbed or destroyed, replace at own expense to full satisfaction of Owner and controlling agency.

3. Verify location of utilities.
   a. Omission or inclusion of utility items does not constitute non-existence or definite location.
   b. Secure and examine local utility records for location data.
   c. Take necessary precautions to protect existing utilities from damage due to any construction activity.
   d. Repair damages to utility items at own expense.
   e. In case of damage, notify Engineer at once so required protective measures may be taken.

4. Provide barriers and other means to limit public access to excavation and/or the work site as necessary to protect public safety.

5. Maintain stockpiles and excavations in such a manner to prevent inconvenience or damage to structures on-site or on adjoining property.

6. Avoid surcharge or excavation procedures which can result in heaving, caving, or slides.

B. Salvageable Items: Carefully remove items to be salvaged, and store on Owner's premises unless otherwise directed.

C. Dispose of waste materials, legally, off site.
   1. Burning, as a means of waste disposal, is not permitted.

**3.2 SITE EXCAVATION AND GRADING**

A. The work includes all operations in connection with excavation, borrow, construction of fills, rough grading, and disposal of excess materials in connection with the preparation of the site(s) for construction of the proposed facilities.
B. Excavation and Grading: Perform as required by the Contract Drawings.
   1. The Contract Drawings indicate existing grade and finished grade is to match existing grade except as approved or directed by the Owner.
      a. Perform other layout work required.
      b. Replace property corner markers to original location if disturbed or destroyed.
   2. Preparation of ground surface for fills:
      a. Before fill is started, scarify to a minimum depth of 6 IN in all proposed fill areas and compact. Discs, rippers, etc. are acceptable means of scarifying.
      b. Where ground surface is steeper than one vertical to four horizontal, plow surface in a manner to bench and break up surface so that fill material will bind with existing surface.
   3. Preparation of ground surface for concrete canal lining, canal transitions, and structures:
      a. Remove all organics, debris, etc.
      b. Remove all sharp rocks and all rocks larger than 4 IN.
      c. Compact subgrade to at least 95 percent per ASTM D698.
      d. Shape subgrade for liner, transition, or structure installation.
   4. Protection of finish grade:
      a. During construction, shape and drain excavations.
      b. Maintain ditches and drains to provide drainage at all times.
      c. Protect graded areas against action of elements prior to acceptance of work.
      d. Reestablish grade where settlement or erosion occurs.
   5. Gravel Road:
      a. Gravel road shall be constructed where indicated on the Drawings.
      b. Surface shall be compacted and graded smooth prior to gravel placement.
      c. Finished road shall be base course, 6-inches thick and 10-feet wide.

C. Imported and Borrow Materials:
   1. Provide necessary amount of approved fill compacted to density equal to at least 95 percent per ASTM D698.
   2. Include cost of all imported material in original proposal. Borrow material to be used within right-of-way.
   3. Fill material to be approved by the Engineer prior to placement.

D. Construct fills as required by the Contract Drawings:
   1. Construct and fills at locations and to lines of grade indicated.
      a. Completed fill shall correspond to shape of typical cross section or contour indicated regardless of method used to show shape, size, and extent of line and grade of completed work.
   2. Provide approved fill material which is free from roots, organic matter, trash, frozen material, and stones having maximum dimension greater than 6 IN.
      a. Ensure that stones larger than 4 IN are not placed in upper 6 IN of fill.
      b. Do not place material in layers greater than 12 IN loose thickness.
      c. Place layers horizontally and compact each layer prior to placing additional fill.
   3. Compact by sheepfoot, pneumatic rollers, vibrators, or by other equipment as required to obtain specified density. Coordinate the use of vibratory equipment with the Engineer to limit impacts on potentially unstable soils in areas adjacent to the work.
      a. Control moisture for each layer necessary to meet requirements of compaction. It is the Contractor’s responsibility to find an adequate water source for moisture conditioning.

3.3 USE OF EXPLOSIVES

A. Blasting with any type of explosive is prohibited.

3.4 FIELD QUALITY CONTROL

A. The Contractor will be responsible for scheduling and any costs associated with testing for ongoing Quality Control throughout the work.
B. Testing for Quality Assurance will be carried out by the District.
C. Moisture density relations have been established for native materials.
D. The Contractor will coordinate the selection of a certified geotechnical testing firm with the District so that the same firm is performing testing for both Quality Control and Quality Assurance to minimize complications from differing test results.
E. Extent of compaction testing will be as necessary to assure compliance with Specifications.
F. The Contractor will provide the Owner with a minimum of 24 HR advance notice when ready for compaction or subgrade testing and inspection.
G. Should any compaction density test or subgrade inspection fail to meet Specification requirements, perform corrective work as necessary.
H. The Contractor is responsible for the cost of any Quality Control measures it deems necessary to assure compliance with these specifications. The Owner will direct the materials testing company to perform testing on installed materials for the purpose of Quality Assurance.

3.5 COMPACATION DENSITY REQUIREMENTS
A. Obtain approval from Engineer with regard to suitability of soils and acceptable subgrade prior to subsequent operations.
B. Provide dewatering system necessary to complete compaction and construction requirements.
C. Remove frozen, loose, wet, or soft material and replace with approved material as directed by Engineer.
D. Given the season the work will be done, covering of materials during evening hours may be required to keep materials from freezing.
E. Stabilize subgrade and excavation slopes with well graded granular materials as directed by Engineer.
F. Compact all fill material to at least 95 percent per ASTM D698 unless otherwise directed in Section 02221 – Trenching, Backfilling, and compacting for Utilities.

3.6 SPECIAL REQUIREMENTS
A. Erosion Control to be carried out on a daily basis shall include activities to:
   1. Conduct work to minimize erosion of site.
   2. Construct stilling areas to settle and detain eroded material.
   3. Remove eroded material washed off site.
   4. Clean adjacent public streets daily of any spillage of dirt, rocks or debris from equipment entering or leaving site

END OF SECTION
SECTION 02221
TRENCHING, BACKFILLING, AND COMPACTING FOR UTILITIES

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Excavation, trenching, backfilling and compacting for all underground utilities.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.
   3. Section 02200 - Earthwork.
   4. Section 03311 - Concrete Mixing, Placing, Jointing, and Curing.

1.2 QUALITY ASSURANCE
A. Referenced Standards:
   1. ASTM International (ASTM):
      b. D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
      c. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
      e. D4253, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

B. Qualifications: Hire an independent soils laboratory to conduct in-place moisture-density tests for backfilling to assure that all work complies with this Specification Section.

1.3 DEFINITIONS
A. Excavation: All excavation will be defined as unclassified.

1.4 SUBMITTALS
A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Manufacturer's installation instructions.
   3. Submit respective pipe or conduit manufacturer's data regarding bedding methods of installation and general recommendations.
   4. Submit sieve analysis reports on all granular materials.

B. Miscellaneous Submittals:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Trench shield (trench box) certification if employed:
      a. Specific to Project conditions.
      b. Re-certified if members become distressed.
c. Certification by registered professional structural engineer, registered in the state where the Project is located.

d. Engineer is not responsible to, and will not, review and approve.

1.5 PROJECT CONDITIONS

A. Avoid overloading or surcharge a sufficient distance back from edge of excavation to prevent slides or caving.
   1. Maintain and trim excavated materials in such manner to be as little inconvenience as possible to public and adjoining property owners.

B. Provide full access to public and private premises and fire hydrants, at street crossings, sidewalks and other points as designated by Owner to prevent serious interruption of travel.

C. Protect and maintain bench marks, monuments or other established points and reference points and if disturbed or destroyed, replace items to full satisfaction of Owner and controlling agency.

D. Verify location of existing underground utilities. Note the fiber-optic line near the Naches-Wenas Road crossing.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Backfill Material:
   1. As approved by Engineer.
      a. Free of rock cobbles, roots, sod or other organic matter, and frozen material.
      b. Moisture content at time of placement: 3 percent plus/minus of optimum moisture content as specified in accordance with ASTM D698.
   2. Pipe Bedding Material: WSDOT Standard Specifications; 9-03.9(3) Crushed Surfacing; Base Course
   3. Pipe Zone Material
      b. Some materials on site meet the sand or gravel specification as required; see test pit information available upon request from Owner.
   4. Common Trench Backfill (above pipe zone material)
      a. Description: Native material free of organics, rocks larger than 6 IN, frozen material, or waste material.
   5. Controlled Density Fill (CDF):
      a. Description: CDF shall be a mixture of cement, fly ash, fine sand, water, and air having a consistency which will flow under a very low head.
      b. Material characteristics:
         1) The approximate quantities of each component per cubic yard of mixed material shall be as follows:
            a) Cement (Type I or II): 50 LBS.
            b) Fly ash: 200 LBS.
            c) Fine sand: 2,700 LBS.
            d) Water: 420 LBS.
            e) Air content: 10 percent.
         2) Actual quantities shall be adjusted to provide a yield of 1 cubic yard with the materials used.
         3) Approximate compressive strength should be 85 to 175 psi.
         4) Fine sand shall be an evenly graded material having not less than 95 percent passing the No. 4 sieve and not more than 5 percent passing the No. 200 sieve.
5) Mixing and handling of the material shall be in accordance with Specification Section 03311.

B. Bedding Materials:
   1. As approved by the Soils Engineer.
   2. Granular bedding materials:
      a. ASTM D2321 Class 1B.
      1) Well-graded crushed stone.

PART 3 - EXECUTION

3.1 GENERAL

A. Remove and dispose of unsuitable materials as directed by Soils Engineer to site provided by Contractor.

3.2 EXCAVATION

A. Unclassified Excavation: Remove rock excavation, clay, silt, gravel, hard pan, loose shale, and loose stone as directed by Soils Engineer.

B. Excavation for Appurtenances:
   1. See Specification Section 02200 for applicable requirements.

C. Groundwater Dewatering:
   1. It is not anticipated that groundwater dewatering will be necessary for this project.
   2. Where groundwater is encountered during excavation, install a dewatering system to prevent softening and disturbance of subgrade to allow subgrade stabilization, pipe, bedding and backfill material to be placed in the dry, and to maintain a stable trench wall or side slope.
   3. Groundwater shall be drawn down and maintained at least 1 FT below the bottom of any trench or manhole excavation prior to excavation.
   4. Dispose of groundwater to an area which will not interfere with construction operations or damage existing construction.
   5. Shut off dewatering system at such a rate to prevent a quick upsurge of water that might weaken the subgrade.
   6. Cost of groundwater dewatering shall be included in the unit price of the pipe installation.

D. Trench Excavation:
   1. Excavate trenches by open cut method to depth shown on Drawings and necessary to accommodate work.
      a. Support existing piping where proposed work crosses at a lower elevation.
      1) Stabilize excavation to prevent undermining of existing piping.
   2. Any trench or portion of trench, which is opened and remains idle for seven (7) calendar days, or longer, as determined by the Owner, may be directed to be immediately refilled, without completion of work, at no additional cost to Owner.
      a. Said trench may not be reopened until Owner is satisfied that work associated with trench will be prosecuted with dispatch.
   3. Observe following trenching criteria:
      a. Trench size:
         1) Excavate width to accommodate free working space sufficient to accommodate the Contractor’s compaction equipment needed to achieve compaction.
         2) Maximum trench width at top of pipe or conduit may not exceed outside diameter of utility service by more than the following dimensions:

<table>
<thead>
<tr>
<th>OVERALL DIAMETER</th>
<th>EXCESS DIMENSION</th>
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235609  
NACHES-SELAH IRRIGATION DISTRICT  
SEPTEMBER 2014  
MAIN CANAL FLUME REPLACEMENT & OTHER CANAL IMPROVEMENTS - Issued For Bid  
TRENCHING, BACKFILLING, AND COMPACTING FOR UTILITIES  
02221 - 3
3) Keep trenches free of surface water runoff.
   a) Include cost in Bid.
   b) No separate payment for surface water runoff pumping will be made.

3.3 PREPARATION OF FOUNDATION FOR PIPE LAYING

A. Over-Excavation:
   1. Backfill and compact to 90 percent of maximum dry density per ASTM D698.
   2. Backfill with granular bedding material as option.

B. Rock Excavation:
   1. Excavate minimum of 6 IN below bottom exterior surface of the pipe or conduit.
   2. Backfill to grade with suitable earth or granular material.
   3. Form bell holes in trench bottom.

C. Subgrade Stabilization:
   1. Stabilize the subgrade when directed by the Owner.
   2. Observe the following requirements when unstable trench bottom materials are encountered.
      a. Notify Owner when unstable materials are encountered.
         1) Define by drawing station locations and limits.
      b. Remove unstable trench bottom caused by Contractor failure to dewater, rainfall, or
         Contractor operations.
         1) Replace with subgrade stabilization with no additional compensation.

3.4 BACKFILLING METHODS

A. Do not backfill until tests to be performed on system show system is in full compliance to
   specified requirements.

B. Carefully Compacted Backfill (pipe zone material):
   1. Furnish where indicated on Drawings, specified for trench embedment conditions and for
      compacted backfill conditions up to 6 IN above top of pipe or conduit.
   2. Comply with the following:
      a. Place backfill in lifts not exceeding 8 IN (loose thickness).
      b. Hand place, shovel slice, and pneumatically tamp all carefully compacted backfill.
      c. Observe specific manufacturer's recommendations regarding backfilling and compaction.
      d. Compact each lift to specified requirements.

C. Common Trench Backfill (above pipe zone material):
   1. Perform in accordance with the following:
      a. Place backfill in lift thicknesses capable of being compacted to densities specified.
      b. Observe specific manufacturer's recommendations regarding backfilling and compaction.
      c. Avoid displacing joints and appurtenances or causing any horizontal or vertical
         misalignment, separation, or distortion.
      d. Minimum of 2.5 FT of cover over top of pipe, maximum of 10 FT.

D. Water flushing for consolidation is not permitted.

E. CDF:
   1. CDF shall be:
      a. Discharged from a mixer by any means acceptable to the Engineer into the area to be
         filled.
b. Placed in 4 FT maximum lifts to the elevations indicated or as limited by potential to “float” the pipe.
   1) Allow 12 HR set-up time before placing next lift or as approved by the Engineer.
   2) Contractor shall place CDF lifts in such a manner as to prevent flotation of the pipe.
   2. CDF shall not be placed on frozen ground.
   3. Subgrade on which CDF is placed shall be free of disturbed or softened material and water.
   4. CDF batching, mixing, and placing may be started if weather conditions are favorable, and the air temperature is 34 DegF and rising.
   5. At the time of placement, CDF must have a temperature of at least 40 DegF.
   6. Mixing and placing shall stop when the air temperature is 38 DegF or less and falling.
   7. Each filling stage shall be as continuous an operation as is practicable.
   8. Contractor shall prevent traffic contact with CDF for at least 24 HRS after placement or until CDF is hard enough to prevent rutting by construction equipment.
   9. CDF shall not be placed until water has been controlled or groundwater level has been lowered in conformance with the requirements of the preceding Groundwater Dewatering paragraph in PART 3 of this Specification Section.
   10. CDF will be used for backfill for the 8-foot diameter piping that will cross a Yakima County Road (Naches Wenas Road). The piping will be backfilled with CDF from County right of way (row) line to row line, from bottom of pipe to below base course material.

3.5 COMPACTION

A. General:
   1. Place and assure bedding, backfill, and fill materials achieve an equal or higher degree of compaction than undisturbed materials adjacent to the work.
   2. In no case shall degree of compaction below minimum compactions specified be accepted.

B. Compaction Requirements:
   1. Unless noted otherwise on Drawings or more stringently by other Specification Sections, comply with following minimum trench compaction criteria.
      a. Bedding material:

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>SOIL TYPE</th>
<th>COMPACTION DENSITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>All locations</td>
<td>Gravel - as defined by pipe manufacturer</td>
<td>75 percent relative density by ASTM D4253 and ASTM D4254</td>
</tr>
</tbody>
</table>

b. Carefully compacted backfill (pipe zone material):

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>SOIL TYPE</th>
<th>COMPACTION DENSITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>All applicable areas</td>
<td>Sand – as defined by pipe manufacturer</td>
<td>90 percent of maximum dry density by ASTM D698</td>
</tr>
<tr>
<td>Gravel - as defined by pipe manufacturer</td>
<td>&gt;70 percent relative density per ASTM4253</td>
<td></td>
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</tbody>
</table>

c. Common trench backfill:

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>SOIL TYPE</th>
<th>COMPACTION DENSITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>All applicable areas</td>
<td>Cohesive soils</td>
<td>90 percent of maximum dry density by ASTM D698</td>
</tr>
</tbody>
</table>

3.6 FIELD QUALITY CONTROL

A. Testing:
1. Perform moisture-density tests as directed by the Owner.
2. Perform tests through recognized testing laboratory approved by Owner.
3. Costs of tests to be paid as defined in Section 805 Supplemental Conditions.
4. Perform additional tests as directed until compaction meets or exceeds requirements.
5. Reference to Engineer in this Specification Section will imply Soils Engineer when employed by Owner and directed by Engineer to undertake necessary inspections as approvals as necessary.
6. Assure Owner has immediate access for testing of all soils related work.
7. Ensure excavations are safe for testing personnel.

END OF SECTION
SECTION 02240
DEWATERING

PART 1 - GENERAL

1.1 SUBMITTALS
   A. Submittals shall be made in accordance with the Section 01340, Submittals, and the requirements of this section.
   B. Informational Submittals:
      1. List of equipment proposed for dewatering.
      2. Copies of permits obtained for dewatering that are required by authorities having jurisdiction.
   C. Furnish, operate, and maintain all materials and equipment necessary for dewatering.

PART 2 - EXECUTION

2.1 GENERAL
   A. Remove and control water during periods when necessary to properly accomplish Work. All excavations, foundation preparation, construction of the embankment, and excavations in the borrow areas shall be done in the dry.
   B. If performance criteria are not being achieved, modify the dewatering system until performance criteria are achieved.

2.2 SURFACE WATER CONTROL
   A. See Section 01500, Construction Facilities and Temporary Controls, Article Temporary Controls.
   B. Control and redirect surface runoff before water enters excavation.
   C. Remove surface runoff controls when no longer needed.

2.3 SUBSURFACE WATER CONTROL
   A. It is not expected that significant amounts of water will be encountered in the excavations. Small seeps will likely be encountered that will need to be routed and pooled for extraction.
   B. Review any available data and information regarding existing groundwater conditions recorded from observation wells, piezometers, and drain pipe flow measurements near the project site.

2.4 DISPOSAL OF WATER
   A. Treat water collected by dewatering operations, as required by regulatory agencies, prior to discharge.
   B. Discharge water as required by discharge permit and in manner that will not cause erosion or flooding, or otherwise damage existing facilities, completed Work, or adjacent property.
   C. Remove solids from treatment facilities and perform other maintenance of treatment facilities as necessary to maintain their efficiency.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Soil erosion and sediment control.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.
   3. Section 02200 Earthwork

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1.3 SUBMITTALS

A. Ecology approved Storm Water Pollution Prevention Plan (SWPPP).
B. Yakima Regional Clean Air Authority approved Dust Control Plan.
C. Spill Prevention, Control, and Countermeasures Plan (SPCC Plan).

PART 2 - PRODUCTS

2.1 MATERIALS

A. Straw bales, twine tied.
B. Silt Fence.
C. Pipe Riser and Barrel: 16 GA corrugated metal pipe (CMP) of size indicated.
D. Stone for Stone Filter: 2 IN graded gravel or crushed stone.
E. Grass Seed: Annual ryegrass.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prior to General Stripping Topsoil and Excavating:
   1. Write, submit, and gain approval of SWPPP.
   2. Install perimeter dikes and swales.
   3. Excavate and shape sediment basins and traps.
   4. Construct pipe spillways and install stone filter where required.
   5. Machine compact all berms, dikes and embankments for basins and traps.
   6. Install straw bales where indicated.
      a. Provide two stakes per bale.
      b. First stake angled toward previously installed bale to keep ends tight against each other.
B. Construct sediment traps where indicated on Drawings during rough grading as grading progresses.

C. Temporarily seed basin slopes and topsoil stockpiles:
   1. Rate: 1/2 LB/1000 SF.
   2. Reseed as required until good stand of grass is achieved.

3.2 DURING CONSTRUCTION PERIOD

A. Update SWPPP as appropriate and maintain a current copy on the project site.

B. Maintain Basins, Dikes, Traps, Stone Filters, Straw Bales, etc.:
   1. Inspect regularly especially after rainstorms.
   2. Repair or replace damaged or missing items.

C. After rough grading, sow temporary grass cover over all exposed earth areas not draining into sediment basin or trap.

D. Construct inlets as soon as possible.
   1. Excavate and tightly secure straw bales completely around inlets as detailed on Drawings.

E. Provide necessary swales and dikes to direct all water towards and into sediment basins and traps.

F. Do not disturb existing vegetation (grass and trees).

G. Excavate sediment out of basins and traps when capacity has been reduced by 50 percent.
   1. Remove sediment from behind bales to prevent overtopping.

H. Topsoil and Fine Grade Slopes and Swales, etc.: Seed and mulch as soon as areas become ready.

3.3 NEAR COMPLETION OF CONSTRUCTION

A. Eliminate basins, dikes, traps, etc.

B. Grade to finished or existing grades.

C. Fine grade all remaining earth areas, then hydroseed all areas where bare ground remains with “dryland” mix.
   1. Minimum mix requirements per acre for Hydroseed (submit actual proposal):
      50 lbs seed – 15 lbs Sheep fescue, 15 lbs Siberian wheat grass, 5 lbs Critana thickskike wheatgrass, 15 lbs Annual ryegrass
      400 lbs 16-16-16 fertilizer, 50% 6 month flow release N
      2000 lbs Wood fiber mulch
      50 lbs Type A tackifier

END OF SECTION
PART 1 - GENERAL

1.1 SUBMITTALS
   A. Shall be made in accordance with Section 01340, Submittals. In addition, the following specific information shall be provided.
   B. Informational Submittal: Borrow Plan, detailing development, operation, and reclamation of each borrow area.

1.2 WEATHER LIMITATIONS
   A. Except as approved by Engineer, do not operate borrow areas when ground is frozen or when borrow is too wet to achieve required compaction.

1.3 SEQUENCING AND SCHEDULING
   A. Clearing, Grubbing, and Stripping: Complete applicable Work specified in Section 02200, Site Preparation, prior to borrow area development.
   B. Install and operate dewatering systems, specified in Section 02240, Dewatering.

PART 2 - PRODUCTS

2.1 BORROW AREAS
   A. Borrow areas designated on the Drawings.
   B. Borrow areas obtained by the Contractor. Contractor is responsible for all required permits, risk, and liability for use of borrow areas other than those shown on the Drawings.

PART 3 - EXECUTION

3.1 BORROW PIT OPERATION
   A. Review Borrow Plan with Engineer prior to excavating from borrow pits. Obtain Engineer’s acceptance of deviations from Borrow Plan prior to their implementation.
   B. Always keep borrow areas neat and orderly, and work them in systematic manner. Continuously keep borrow areas graded to drain, and take necessary precautions to control erosion and prevent offsite sediment releases.
   C. Operate the borrow excavations in the dry. Dewater as defined in Section 02240, Dewatering.
   D. Do not excavate more borrow material than required for Work. Leave surplus material in place.

3.2 OBSTRUCTIONS
   A. Remove or protect as specified in Section 01500, Construction Facilities and Temporary Controls, Article Protection of Work and Property.

END OF SECTION
SECTION 02423
STORM DRAINAGE SYSTEM

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Storm drainage systems (for underdrains).
   2. Storm drainage pipe.
   3. Inlets, headwalls, flumes and flared end sections.
B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.

1.2 QUALITY ASSURANCE
A. Referenced Standards:
   1. American Association of State Highway and Transportation Officials (AASHTO):
      a. M36, Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains (Equivalent
         ASTM A760).
      b. M190, Bituminous-Coated Corrugated Metal Culvert Pipe and Pipe Arches.
      c. M330, HDPE Pipe.
   2. ASTM International (ASTM):
      a. ASTM A760, Standard Specification for Corrugated Steel Pipe, Metallic-Coated for
         Sewers and Drains.
      b. ASTM F2736, HDPE Pipe.
   3. Standard Specifications for Road and Bridge Construction for the State of Washington:
      a. Standard Details.

1.3 SUBMITTALS
A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of
      the submittal process.
   2. Layout drawings.
   3. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
   4. Certifications.
   5. Test reports.
   6. Submit all tests and certification in a single coordinated submittal.
      a. Partial submittals will not be accepted.
B. Submit schedules and details for structures and joints.

PART 2 - PRODUCTS

2.1 MATERIALS
A. Flared End Sections:
   2. Bituminous coated: AASHTO M190, Type A.
   3. Jointing: Same as pipe.
B. Corrugated Metal Pipe (CMP):
   1. AASHTO M36 (ASTM A760), 16 GA.
   2. Bituminous coated: AASHTO M190, Type A.

C. High Density Polyethylene Pipe (HDPE):
   1. ASTM D3350, SDR 32.5 minimum.

D. CMP Joint Sealer:
   1. Cold applied asphalt joint compound.
   2. Preformed flexible pipe joint sealing compound.

PART 3 - EXECUTION

3.1 PREPARATION
   A. Comply with Specification Section 02221.

3.2 INSTALLATION
   A. Install products in accordance with manufacturer's instructions.
   B. Comply with Specification Section 02221.
   C. Pipeline is intended to be installed below flumes and canal as necessary to convey stormwater under the facilities. Storm drain pipe shall have a minimum of 12 IN between the top storm drain and the facility being crossed under.
   D. Storm Drain to consist of a galvanized inlet structure, up to 100 FT of 24 IN CMP or HDPE pipe and fittings, 10 FT of CMP outlet pipe (if remainder of pipe is HDPE), and 2 CY of ballast at the outfall. Erosion protection rock shall be Ballast per WSDOT Standard Specification 9-03.9(1).

3.3 FIELD QUALITY CONTROL
   A. Verify and coordinate installation.

END OF SECTION
SECTION 02515
PRECAST CONCRETE MANHOLE STRUCTURES

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Precast concrete manhole structures and appurtenant items.
      a. Drain manholes and appurtenances.
      b. Storm sewer manholes and appurtenances.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.
   4. Section 03208 - Reinforcement.
   5. Section 03308 - Concrete Materials and Proportioning.
   6. Section 09905 - Painting and Protective Coatings.

1.2 QUALITY ASSURANCE
A. Referenced Standards:
   1. ASTM International (ASTM):

1.3 SUBMITTALS
A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Manufacturer's installation instructions.
   3. Fabrication and/or layout drawings:
      a. Include detailed diagrams of manholes showing typical components and dimensions, reinforcements and other details.
      b. Itemize, on separate schedule, sectional breakdown of each manhole structure with all components and refer to drawing identification number or notation.
      c. Indicate knockout elevations for all piping entering each manhole.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS
A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. Manhole rings, covers (perforated for air vents) and frames:
      a. Neenah Foundry.
      b. Deeter Foundry.
2. Black mastic joint compound:
   b. Tufflex.
   c. Plastico.
3. Premolded joint compound:
   a. Ram Nec.
   b. Kent Seal.
4. Emulsified fibrated asphalt compound:

2.2 MANHOLE STRUCTURE COMPONENTS

A. Manhole Components:
   2. Minimum wall thickness: 5 IN.
   3. Minimum base thickness: 12 IN.
   4. Provide the following components for each manhole structure:
      a. Base (precast) with integral bottom section or (cast-in-place).
      b. Precast bottom section(s).
      c. Precast barrel section(s).
      d. Precast adjuster ring(s).
      e. Precast concrete transition section.
      f. Precast flat top with recessed pick points.
   5. Unless dimensioned or specifically noted on Drawings, provide manhole section with minimum 48 IN inside dimensions.

B. Nonpressure Type Frames and Cover:
   2. Use only cast iron of best quality, free from imperfections and blow holes.
   3. Furnish frame and cover of heavy-duty construction a minimum total weight of 450 LBS.
   5. Furnish unit with solid nonventilated lid for access manholes and ventilated lid for air vents.
      Provide with concealed pickholes.
      a. Letter covers "DRAIN".
   6. Ensure minimum clear opening of 24 IN DIA.

C. Manhole Concrete:
   1. Provide all sanitary manholes constructed with Portland ASTM C150, Type I or II cement with a tricalcium aluminate content not to exceed 8 percent.
   2. Mix aggregate shall be a minimum of 50 percent crushed limestone.
   3. Provide 3000 psi nonshrink grout.

PART 3 - EXECUTION

3.1 MANHOLE CONSTRUCTION

A. General:
   1. Construct cast-in-place concrete base slabs where shown on drawings.

B. Build each manhole to dimensions and elevations shown on plans.

C. For all horizontal mating surfaces between concrete and concrete or concrete and metal, trowel apply to clean surface black mastic joint compound to a minimum wet thickness of 1/4 IN immediately prior to mating the surfaces.

D. Seal all pipe penetrations in manhole.
   1. Form pipe openings smooth and well shaped.
   2. After installation, seal cracks with, non shrink grout.
3. After grout cures, wire brush smooth and apply two coats emulsified fibrated asphalt compound to minimum wet thickness of 1/8 IN to ensure complete seal.

E. Set and adjust frame and cover final 6 IN (minimum) to 18 IN (maximum) to match finished grade elevation using precast adjuster rings.

END OF SECTION
SECTION 02664
CANAL LINERS

PART 1 - GENERAL

1.1 WORK INCLUDES
A. This section covers the work necessary for construction of the geomembrane liner beneath the concrete canal liner.

1.2 DEFINITIONS
A. Boot: Watertight collar fabricated from geomembrane sheet for sealing geomembrane to pipes and other objects that penetrate geomembrane.
B. Panel: Piece of geomembrane composed of two or more sheets, factory seamed together.
C. Sheet: Seamless piece of geomembrane.
D. Relative Compaction: As defined in Section 02200, Earthwork.
E. Watertight: Geomembrane installation, free of flaws and defects that would allow passage of water and gasses, liquids, and solids to be contained under anticipated service conditions.

1.3 SUBMITTALS
A. Shall be made in accordance with Section 01340, Submittals. In addition, the following specific information shall be provided.
B. Action Submittals:
   1. Shop Drawings:
      a. Manufacturer’s specifications, literature for geomembrane furnished, and products used to complete installation.
      b. Polymer Resin: Product identification and Supplier.
      c. Geomembrane sheet/panel layout with proposed size, number, position, and sequence of sheet/panel placement, and location of field seams.
      d. Proposed equipment for material placement.
      e. Procedures for material installation.
      f. Interface shear test results as specified herein.
C. Informational Submittals:
   1. Qualifications:
      a. Manufacturer.
      b. Installer.
      c. Fabricator.
   2. Production dates for geomembrane.
   3. Quality Assurance Program(s): Written description of geomembrane manufacturer’s, fabricator’s, and installer’s formal programs for manufacturing, factory fabricating (seaming), handling, installing, field seaming, testing, and repairing geomembrane.
   4. Description of Factory and Factory Seaming Techniques, Including Quality Control Procedures: Quality control procedures shall include raw materials inspection and testing, factory seam requirements, factory seam testing, transportation of panels to job site, storage, and onsite handling.
   5. Manufacturer’s Certificate of Compliance in accordance with Section 01062, Major Equipment Suppliers.
   6. Recommended methods for handling and storage of products.
   7. Factory Test Results: Peel and shear tests of factory seams in accordance with ASTM D4545 and for parent material in accordance with ASTM D882.
   8. Geomembrane Installer’s Certification of Subsurface Acceptability:
a. Form attached at end of this section.
9. Manufacturer’s Certificate of Proper Installation.
10. Record Documents: Include panel and sheet numbers, seaming equipment and operator identification, temperature and speed setting of equipment, date seamed, identity and location of each repair, cap strip, penetration, boot, and Sample taken from installed geomembrane for testing.
11. Material and seam test results.
12. Special guarantee.

1.4 QUALIFICATIONS

A. Manufacturer: Has successfully manufactured a minimum of 10 million square feet of geomembrane material specified.

B. Fabricator and Installer: Has successfully installed a minimum of five projects (installing a minimum of 20,000 square feet of geomembrane per project), with the geomembrane product specified in applications similar to the project.

C. In the event that the fabricator is different than the installer, separate qualifications shall be provided for each.

D. Minimum qualifications stated above will be deemed met if the firm or cumulative experience of key personnel (supervisors and trained installation/testing technicians) proposed for this Project has minimum experience specified. If key personnel provision is used to qualify the firm, submit letter stating key personnel meet the minimum experience requirements and those individuals are available and committed to this Project.

1.5 COORDINATION MEETINGS

A. Meet at least once prior to commencing each of the following activities:
   1. Meet at least once prior to commencing installation of geomembrane. Provide a minimum of 2 weeks notice prior to meeting.
   2. Others as needed to maintain communication and progress.

B. Attendees:
   1. Contractor’s designated quality control representative.
   2. Engineer.
   3. Representatives of geomembrane installer.
   4. Others requested by Engineer.

C. Topics:
   1. Specifications and Drawings.
   2. Submittal requirements and procedures.
   3. Schedule for beginning and completing geomembrane installation.
   4. Training for installation personnel.
   5. Installation crew size.
   6. Establishing geomembrane marking system, to include sheet identification, defects, and satisfactory repairs, to be used throughout Work.

D. Seam Installation Demonstration: Performed by geomembrane installer, for each type of seam required.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Conform to requirements of Section 01600, Project Delivery, Storage, and Handling.

B. Geomembrane:
   1. Individually package each sheet or fabricated panel of geomembrane in heavy cardboard, fully enclosed, and protect from damage during shipment.
   2. Mark each package with identification of material type, size, and weight.

C. Epoxy Adhesive:
   1. Control temperature above 60 degrees F.
2. If stored at temperatures below 60 degrees F, test adhesive prior to use to determine if adhesive meets specified requirements.
3. Dispose of cartridges if shelf life has expired.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not install geomembrane or perform seaming under the following conditions, unless it can be demonstrated to satisfaction of Engineer that performance requirements can be met under these conditions:
   1. Relative humidity is more than 90 percent.
   2. Raining or snowing.
   3. Frost is in ground.
   4. Excessive wind.

B. Do not place materials on geomembrane when ambient temperature is less than 35 degrees F or greater than 90 degrees F, unless it can be demonstrated to the satisfaction of Engineer that such materials can be placed at temperatures outside this range without damage to geomembrane.

1.8 SEQUENCING AND SCHEDULING

A. Prior to shipment of liner to Project site, factory test results must be submitted and verified for acceptance by Engineer.

B. Before placing geomembrane, place and prepare the subgrade and place the geotextile as shown.

1.9 SPECIAL GUARANTEE

A. Provide manufacturer’s extended guarantee or warranty, with Owner named as beneficiary, in writing, as special guarantee. Special guarantee shall provide for correction, or at option of Owner, removal and replacement of Work specified in this Specification section found defective during periods below, commencing on date of Substantial Completion. Duties and obligations for correction or removal and replacement of defective Work as specified in General Conditions.
   1. Guaranty geomembrane against manufacturing defects, deterioration due to ozone, ultraviolet, and other exposure to elements for period of 20 years on a pro rata basis.
   2. Guaranty geomembrane against defects in material and factory seams for period of 2 years.
   3. Guaranty geomembrane against defects resulting from installation for period of 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. IPG NovaThene Aquamaster, Truro, NS, Canada.

B. Huesker Synthetic GmbH, Charlotte, NC.

2.2 GEOMEMBRANES

A. IPG NovaThene Aquamaster ArmorLiner 24 NWLD, polypropylene nonwoven layer top and bottom, 24 mil woven coated polyethylene middle layer.

B. Hueskers Canal3® 8208, top layer of polypropylene nonwoven and bottom layer of polyester nonwoven, 20 mil polyethylene middle layer.

2.3 CHEMICAL ADHESIVE

A. Manufacturer: Clifton Adhesive, Inc., Wayne, NJ, or as recommended by geomembrane manufacturer.

B. Contractor to ensure that selected adhesive is compatible with supplied geomembrane.

C. Use seaming chemical adhesives, including bodied chemical adhesive. Used only for making geomembrane connections for required penetrations or small seams where wedge welding is impractical.
D. Color: Clear or same as geomembrane.
E. Film Tearing Bond: Provided within 48 hours of field seaming for seams.

2.4 HOT-MELT ADHESIVE
A. Control temperature above 60 degrees F. If stored at temperatures below 60 degrees F, test adhesive prior to use to determine if adhesive meets specified requirements.
B. Dispose of cartridges if shelf life has expired.

2.5 PANEL FABRICATION
A. Fabricators: Provide qualifications of fabricators.
B. Factory Fabricate: Up to 25,000 square feet to minimize field seams. Larger panels may be acceptable with approval of the Engineer.
C. Panel Marking:
   1. Mark each panel with prominent, unique indelible identification conforming to approved panel/sheet layout.
   2. Indicate proper direction for unrolling or unfolding to facilitate layout and positioning at Site.
D. Seams:
   1. Do not use prepared adhesive tapes for seaming.
   2. Completely bond edges, including encapsulated edges, so that no loose edge is present on topside of fabricated panel.
   3. Provide film tearing bond between sheets.
   4. Make with hot wedge with minimum 1/2-inch lap. Liquid solvent based adhesive, with minimum 3/4-inch overlap, will only be allowed at locations where it is unpractical to use hot-wedge welding (for example, around pipe penetrations), and only as approved by the Engineer.
      a. Bonded Seam Strength: Minimum 40 mils: 77.6 pounds per inch width, as determined in accordance with ASTM D4545, ASTM D6392 (for heat bonded seams), and ASTM D882 (for solvent bonded seams).
      b. Peel Adhesion: Minimum 4 pounds per inch width, as determined in accordance with ASTM D4545, ASTM D6392 (for heat bonded seams), and ASTM D413 (for solvent bonded seams).
   5. Hot-melt adhesive for seaming as recommended by Hueskers.

2.6 FACTORY TESTING
A. Factory seams shall be tested by air lance in accordance with ASTM D4545.

PART 3 - EXECUTION

3.1 PREPARATION
A. Do not place geomembrane until condition of the subgrade is approved by the Engineer. The General Contractor shall coordinate closely with the liner installation subcontractor to assure that the General Contractor is aware during bidding and while performing the work of all liner subgrade requirements. The General Contractor shall coordinate with the liner subcontractor to assure that the proper subgrade preparation is accomplished, following the steps and details as required to satisfy all requirements of the liner manufacturer in preparing the subgrade. The Contractor shall ensure that the lining subcontractor will accept the subgrade as an acceptable base for the liner relative to providing the liner warranty required by the contract documents.
B. Subgrade: Maintain in smooth, uniform, and compacted condition, as specified in Section 02200, Earthwork, during installation of geomembrane.
3.2 GEOMEMBRANE INSTALLATION

A. Do not commence installation of the membrane liner or field seam unless Contractor can demonstrate successful performance and test results showing seams meet strength specifications.

B. Protection During Construction:
   1. Do not use geomembrane surfaces as a work area for preparing patches, storing tools and supplies, or other uses. Use protective cover as Work surface, if necessary.
   2. Instruct workers about requirements for protection of geomembrane such as, handling geomembrane material in high winds, handling of equipment, and walking on geomembrane surfaces. Shoes of personnel walking on geomembrane shall be smooth bonded sole or be covered with smooth type of overboot. Prohibit smoking, eating, or drinking on geomembrane, placing heated equipment directly on geomembrane, or other activities that may damage geomembrane.
   3. Do not operate equipment without spark arrestors in vicinity of geomembrane material nor place generators or containers of flammable liquid on geomembranes.
   4. Protect from vehicle traffic and other hazards.
   5. Keep free of debris during placement.
   6. Prevent uplift, displacement, and damage by wind.
   7. Only small rubber-tired equipment, with maximum tire inflation pressures of 5 pounds per square inch, shall be allowed directly on geomembrane, unless otherwise approved by Engineer.

C. Placement:
   1. Unless specified otherwise, each product required for completion of geomembrane installation shall be installed in strict accordance with geomembrane manufacturer’s recommendations.
   2. Reduce field seaming to the minimum possible. Horizontal seams (transverse to slope direction) on slopes steeper than 5H:1V will not be acceptable. Seams parallel to toe shall be at least 5 feet from toe.
   3. Prevent wrinkles, folds, or other distress that can result in damage or prevent satisfactory alignment or seaming. Provide for factors such as expansion, contraction, overlap at seams, anchorage requirements, seaming progress, and drainage.
   4. Temporarily weight sheets with sandbags as necessary to anchor or hold down in position during installation. Use sandbags continuously along edges to reduce wind flow under sheet.
      a. Bag Fabric: Sufficiently close knit to preclude fines from working through bags.
      b. Bags: Contain not less than 40 nor more than 60 pounds of sand having 100 percent passing No. 8 screen and shall be securely closed after filling to prevent sand loss.
      c. Do not use tires or paper bags, whether or not lined with plastic. Burlap bags, if used, shall be lined with plastic.
      d. Immediately remove damaged or improperly sealed bags from work area, and immediately clean up spills.
   5. Anchor perimeter of geomembrane as approved by Engineer.
   6. Place overlying geotextile and soil cover immediately following completion of geomembrane installation and field testing as acceptable to Engineer.

D. Field Seams:
   1. Adjust edges to be seamed and temporarily anchor to prevent wrinkling and shrinkage.
   2. Wipe sheet contact surfaces clean to remove dirt, dust, moisture, and other foreign materials and prepare contact surfaces in accordance with hot wedge fusion seaming method accepted by Engineer.
   3. Lap sheet edges minimum of 4 inches to form seams. The following welding shall be used:
      a. Hot Wedge Welding: For all primary seams single hot wedge fusion welding shall be used.
      b. Chemical Adhesion Welding: For small seams where hot wedge fusion welding is impractical, chemical adhesion welding is acceptable.
      c. Hot-Melt Adhesive: For Huesker and IPG seams as recommended by the Manufacturer.
      d. Hot Air Welding: Not acceptable.
   4. Make with seam supported on a firm, smooth surface. Avoid seam intersections involving more than three thicknesses of geomembrane material and offset seam intersections at least 2 feet.
   5. Extend seams through anchor trench to sheet edges.
   6. Capping of Field Seams:
a. Where lap seam is not possible, use 6-inch-wide (minimum) cover strip of same thickness as geomembrane (and from same roll, if available).

b. Position strip over center of field seam and seal entire width in accordance with seaming requirements.

7. When ambient conditions result in temperature below 85 degrees F at time of seaming, warm geomembrane material, adhesive, or solvent by artificial means to temperature above 85 degrees F.

8. Accessories:
   a. Rags: Use clean, white cotton rags for seaming procedures. When rag shows discoloration from use, discard and replace with fresh one.
   b. Scissors: Blades with rounded points.

9. Uneven Seams: Avoid fishmouths, pleats, folds, and tucks in field seams. Repair each one by slitting out far enough from seam to dissipate it and patch in accordance with this Specification.


3.3 PLACING PRODUCTS OVER GEOMEMBRANE

A. Prior to placing material over geomembrane, notify Engineer. Do not cover installed geomembrane until after Engineer provides authorization to proceed.

B. Where shown, place concrete over geomembrane as soon as practical and before any shutdown of more than 2 days.

C. If tears, punctures, or other geomembrane damage occurs during placement of overlying products, remove overlying products as necessary to expose damaged geomembrane, and repair damage as specified in Article Repairing Geomembrane.

D. Geomembrane installer shall remain available during placement of overlying products to repair geomembrane if damaged.

3.4 REPAIRING GEOMEMBRANE

A. Damaged Geomembrane Surface: Mark and correct injury due to scuffing, penetration by foreign objects, or distress from rough subgrade by replacement or covering and sealing geomembrane with additional layer of geomembrane material of proper size.

B. Repair damaged or rejected seams with pieces of flat and unwrinkled geomembrane material free from defects and seams. Patches shall be tightly bonded on completion of repair work.

C. Patch shall be neat in appearance and of size 6 inches larger in directions than areas to be repaired. Round corners of each patch to minimum 1-inch radius.

D. Prepare contact surfaces and seam patch in accordance with Paragraph Field Seams.
   1. Pull and hold flat receiving surface in area to be patched.
   2. Bond patches less than 12 inches in narrowest plan dimension across their entire width.
   3. Seam each patch more than 12 inches across in narrowest dimension with minimum bonded width of 6 inches along edge, with no free edge remaining.

3.5 FIELD QUALITY CONTROL

A. The Owner will arrange for services of an independent testing laboratory to perform seam strength testing. However, seam integrity testing (air lance testing) shall be performed by the Installer, as specified below.

B. Installer’s Certification: Prior to starting geomembrane installation and daily thereafter for installation on subgrade, certify in duplicate that surface upon which geomembrane will be installed is acceptable.

C. Identify each test by date of Sample, date of test, Sample location, name of individual who performed test, standard test method used, list of departures from standard test methods, at a minimum.

D. Observation and Nondestructive Seam Testing:
1. Visually inspect geomembrane sheets, seams, anchors, seals, and repairs for defects as installation progresses and again on completion.
2. In addition, check seams and repairs using metal probe. Run metal probe, such as dull-pointed ice pick, along entire length of each seam, including repairs, to check for continuity of seams and absence of leak paths.
3. For single hot wedge fusion or chemical adhesion seams, test each seam and repair, using air lance device as specified.
4. Air Lance Testing: Perform on each seam, including patches and factory seams in accordance with the following:
   a. Air Lance:
      1) Created with 3/16-inch diameter orifice at minimum pressure of 50 psi, held not more than 2 inches from seam edge.
      2) Direct jet of air at edges of seams and patches to result in lifting of unbonded seam areas.
   b. Perform air lancing in presence of Engineer and allow sufficient time for Engineer to mark leaks or suspicious areas for repair.

E. Field Seam Sampling:
1. Verify that seaming equipment and operators are performing adequately. Produce test seam Samples for testing by the independent testing laboratory at beginning of each shift for each seaming crew. In addition, if seaming has been suspended for more than 1/2 hour, or if breakdown of seaming equipment occurs, produce test seam Samples prior to resuming seaming.
2. Minimum Sample Size: 12 inches wide plus seam width, and 30 inches long.
3. Trial Seams:
   a. Frequency: At the beginning of each seaming period, and at least once per 5-hour work period for each seaming apparatus.
   b. Produce Samples using the same materials, equipment, personnel, and procedures as field seams made at time of the Work in progress and under same conditions.
   c. For each trial seam, provide sample for each type of seam used; i.e., single hot wedge fusion, and chemical adhesion.
4. Destructive Sampling:
   a. Frequency: One Sample per 1,000 feet of field seam, or as determined by Engineer.
   b. Remove Samples from field seams at locations selected by Engineer.
   c. Repair field seams in accordance with repair procedures specified in these Specifications.
5. Sample Identification:
   a. Number, date, and identify each Sample as to personnel making seam and location of Sample or location of field seam work in progress at time Sample is made.
   b. Mark location of Sample, or location of field seam in progress at time Sample is made, on panel/sheet layout drawing.
   c. Include at a minimum:
      1) Panel and sheet numbers.
      2) Seaming equipment and operator identification.
      3) Temperature and speed setting of equipment.
      4) Date seamed.
      5) Identity and location of each repair and Sample taken from installed geomembrane for testing.

F. Field Seam Strength Sample Testing:
1. Field Testing Equipment:
   a. Tensiometer:
      1) Motor driven with jaws capable of traveling at a measured rate of 2 inches per minute.
      2) Equipped with a gauge which measures force in unit pounds exerted between jaws.
      3) Provide certificate of calibration from manufacturer, dated a minimum of 1 year from date of initial field seam testing for this Project.
2. Test at least five specimens per each seam test method (shear and peel). Four out of five specimens must meet the minimum requirements for field seam acceptance.
3. Bonded Seam Strength of 40-mil PVC:
a. In Shear: Minimum 77.6 pounds per inch width as determined in accordance with ASTM D6392 (for heat bonded seams) and D882 (for solvent bonded seams).
b. In Peel: Minimum film tearing bond 15 pounds per inch as determined in accordance with ASTM D6392 (for heat bonded seams) and D413 (for solvent bonded seams).

4. Testing by the independent testing laboratory shall include tensile and peel strength tests.

5. Test Failure: Each Sample tested shall be required to pass. If Sample fails, entire field seam from which it was taken shall be considered as failure shall be rejected due to nonconformance with Specification requirements. Comply with following corrective measures:
   a. Trial Seam Failure: Rerun field weld test using same Sample. If that test passes, Engineer may assume an error was made in first test and accept field seam. If second test fails, cap each field seam represented by failed Sample and submit new test Sample made during capping procedure.
   b. Destructive Sample Failure: Rerun field weld test using new Sample from same seam. If that test passes, Engineer may assume an error was made in first test and accept field seam. If second test fails, either cap field seam between two previous passed seam test locations that include failed seam or take another Sample on each side of failed seam location (10 feet minimum), and test both. If both pass, cap field seam between two locations. If either fails, repeat process of taking Samples for test. Each field seam shall be bounded by two passed test locations prior to acceptance.

3.6 MANUFACTURER’S SERVICES

A. In accordance with Section 01062, Major Equipment Suppliers.

B. Provide authorized representative of geomembrane manufacturer onsite for technical supervision and assistance during installation of geomembrane system, and also during inspection of geomembrane prior to installation, during preparation and inspection of surfaces on which geomembrane is to be placed, and during placement of soil cover or other products over installed geomembrane.

3.7 CLEANUP

A. Clean up work area as the Work proceeds. Take particular care to ensure that no trash, tools, and other unwanted materials are trapped beneath geomembrane and that scraps of geomembrane material are removed from work area prior to completion of installation.

3.8 SUPPLEMENT

A. The supplement listed below, following “End of Section,” is part of this Specification:
   1. Geomembrane Installer’s Certification of Subsurface Acceptability.

END OF SECTION
GEOMEMBRANE INSTALLER’S CERTIFICATION

OF

SUBSURFACE ACCEPTABILITY

Geomembrane installer, _____________________________

and Contractor, _____________________________

for Naches-Selah Irrigation District Main Canal Flume Replacement & Other Canal Improvements Project, hereby certify that supporting surfaces are acceptable for installation of geomembrane, undersigned having personally inspected condition of prepared surfaces. This certification is for areas shown on Attachment __________ or as defined as follows:

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

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Condition of supporting surfaces in defined area meets or exceeds minimum requirements for installation of geomembrane.

Signed: _____________________________  Signed: _____________________________

Installer  Contractor

Date Signed  Date Signed

Witness: _____________________________  Date: _____________________________
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Formwork requirements for concrete construction.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.
   3. Section 03311 - Concrete Mixing, Placing, Jointing, and Curing.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Concrete Institute (ACI):
      a. 116R, Cement and Concrete Terminology.
      b. 347, Guide to Formwork for Concrete.
   2. Building code:
      a. International Code Council (ICC):

B. Qualifications:
   1. Formwork, shoring and reshoring to be designed by a professional structural engineer currently registered in the state where the Project is located and having a minimum of three (3) years experience in this type of design work:
      a. Above qualifications apply to slabs and beams not cast on the ground, wall and column pours over 15 FT high.

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

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

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

1.3 DEFINITIONS

A. Words and terms used in these Specifications are defined in ACI 116R.

1.4 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for the requirements for the mechanics and administration of the submittal process.
   2. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Manufacturer's installation instructions.
      c. Manufacturer and type of proposed form materials.
      d. Manufacturer and type of proposed form ties.
      e. Manufacturer and type of proposed form coating material.

B. Samples:
   1. A 12 IN SQ sample of the form finish.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. Form Coating:
      a. Euclid.
   2. Prefabricated Forms:
      a. Symons.
      b. Universal.
      c. Simplex.

2.2 MATERIALS

A. Forms for Surfaces Exposed to View:
   1. Wood forms:
      a. New 5/8 or 3/4 IN 5-ply structural plywood of concrete form grade.
      b. Built-in-place or prefabricated type panel.
      c. 4 x 8 FT sheets for built-in-place type except where smaller pieces will cover entire area.
      d. When approved, plywood may be reused.
   2. Metal forms:
      a. Metal forms excluding aluminum may be used.
      b. Forms to be tight to prevent leakage, free of rust and straight without dents to provide members of uniform thickness.

B. Forms for Surfaces Not Exposed to View:
   1. Wood or metal sufficiently tight to prevent leakage.
   2. Do not use aluminum forms.

2.3 ACCESSORIES

A. Form Ties:
1. Commercially fabricated for use in form construction:
   a. Do not use wire ties.
2. Constructed so that ends or end fasteners can be removed without causing spalling at surfaces of the concrete.
3. 3/4 IN minimum to 1 IN maximum diameter cones on both ends.
4. Embedded portion of ties to be not less than 1-1/2 IN from face of concrete after ends have been removed.
5. Provide ties with built-in waterstops in all walls that will be in contact with process liquid during plant operation.
6. Through-wall ties that are designed to be entirely removed are not allowed in all walls that will be in contact with process liquid during plant operation.

PART 3 - EXECUTION

3.1 PREPARATION

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

B. Provide temporary openings at base of column and wall forms and at other points where necessary to facilitate cleaning and observation immediately before concrete is placed, and to limit height of free fall of concrete to prevent aggregate segregation:
   1. Temporary openings to limit height of free fall of concrete shall be spaced no more than 8 FT apart.

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

3.2 ERECTION

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

B. Tolerances:
   1. Variation from plumb:
      a. In lines and surfaces of columns, piers, walls, and in risers:
         1) Maximum in any 10 FT of height: 1/4 IN.
         2) Maximum for entire height: 1/2 IN.
      b. For exposed corner columns, control-joint grooves, and other exposed to view lines:
         1) Maximum in any 20 FT length: 1/4 IN.
         2) Maximum for entire length: 1/2 IN.
   2. Variation from level or from grades specified:
      a. In slab soffits, ceilings, beam soffits and in arises, measured before removal of supporting shores:
         1) Maximum in any 10 FT of length: 1/4 IN.
         2) Maximum in any bay or in any 20 FT length: 3/8 IN.
         3) Maximum for entire length: 3/4 IN.
      b. In exposed lintels, sills, parapets, horizontal grooves, and other exposed to view lines:
         1) Maximum in any bay or in 20 FT length: 1/4 IN.
         2) Maximum for entire length: 1/2 IN.
   3. Variation of linear structure lines from established position in plan and related position of columns, walls, and partitions:
a. Maximum in any bay: 1/2 IN.
   b. Maximum in any 20 FT of length: 1/2 IN.
   c. Maximum for entire length: 1 IN.
4. Variation in sizes and location of sleeves, slab openings, and wall openings: Maximum of +1/2 IN.
5. Variation in horizontal plan location of beam, column and wall centerlines from required location: Maximum of +1/2 IN.
6. Variation in cross sectional dimensions of columns and beams and in thickness of slabs and walls: Maximum of -1/4 IN, +1/2 IN.
7. Footings and foundations:
   a. Variations in concrete dimensions in plan: -1/2 IN, +2 IN.
   b. Misplacement or eccentricity:
      1) 2 percent of footing width in direction of misplacement but not more than 2 IN.
   c. Thickness:
      1) Decrease in specified thickness: 5 percent.
      2) Increase in specified thickness: No limit except that which may interfere with other construction.
8. Establish and maintain in an undisturbed condition and until final completion and acceptance of Project, sufficient control points and bench marks to be used for reference purposes to check tolerances.
9. Regardless of tolerances listed allow no portion of structure to extend beyond legal boundary of Project.
10. To maintain specified tolerances, camber formwork to compensate for anticipated deflections in formwork prior to hardening of concrete.

   C. Make forms sufficiently tight to prevent loss of mortar from concrete.
   D. Place 3/4 IN chamfer strips in exposed to view corners of forms to produce 3/4 IN wide beveled edges.
   E. At construction joints, overlap contact surface of form sheathing for flush surfaces exposed to view over hardened concrete in previous placement by at least 1 IN:
      1. Hold forms against hardened concrete to prevent offsets or loss of mortar at construction joint and to maintain a true surface.
      2. Where possible, locate juncture of built-in-place wood or metal forms at architectural lines, control joints or at construction joints.
   F. Construct wood forms for wall openings to facilitate loosening, if necessary, to counteract swelling.
   G. Anchor formwork to shores or other supporting surfaces or members so that movement of any part of formwork system is prevented during concrete placement.
   H. Provide runways for moving equipment with struts or legs, supported directly on formwork or structural member without resting on reinforcing steel.
   I. Provide positive means of adjustment (wedges or jacks) of shores and struts and take up all settlement during concrete placing operation:
      1. Securely brace forms against lateral deflection.
      2. Fasten wedges used for final adjustment of forms prior to concrete placement in position after final check.

3.3 REMOVAL OF FORMS
A. No construction loads shall be supported on, nor any shoring removed from, any part of the structure under construction except when that portion of the structure in combination with remaining forming and shoring system has sufficient strength to safely support its weight and loads places thereon.
B. When required for concrete curing in hot weather, required for repair of surface defects or when finishing is required at an early age, remove forms as soon as concrete has hardened sufficiently to resist damage from removal operations or lack of support.

C. Remove top forms on sloping surfaces of concrete as soon as concrete has attained sufficient stiffness to prevent sagging:
   1. Perform any needed repairs or treatment required on such sloping surfaces at once, followed by curing specified in Specification Section 03311.

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

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

F. Where no reshoring is planned, leave forms and shoring used to support weight of concrete in place until concrete has attained its specified 28 day compressive strength:
   1. Where a reshoring procedure is planned, supporting formwork may be removed when concrete has reached the concrete strength required by the formwork designer's structural calculations.

G. When shores and other vertical supports are so arranged that non-load-carrying form facing material may be removed without loosening or disturbing shores and supports, facing material may be removed when concrete has sufficiently hardened to resist damage from removal.

3.4 RESHORING

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

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

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

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

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

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

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Reinforcing bar requirements for concrete construction.
B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.

1.2 QUALITY ASSURANCE
A. Referenced Standards:
   1. American Concrete Institute (ACI):
      a. SP 66, ACI Detailing Manual.
      b. 318, Building Code Requirements for Structural Concrete.
      c. 350, Code Requirements for Environmental Engineering Concrete Structures.
   2. ASTM International (ASTM):
      a. A615, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
      b. A706, Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
   3. American Welding Society (AWS):
   4. Concrete Reinforcing Steel Institute (CRSI):
B. Qualifications:
   1. Welding operators, processes and procedures to be qualified in accordance with AWS D1.4.
   2. Welding operators to have been qualified during the previous 12 months prior to commencement of welding.

1.3 SUBMITTALS
A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Manufacturer's installation instructions.
      c. Mill certificates for all reinforcing.
      d. Manufacturer and type of proprietary rebar mechanical splices.
      e. Manufacturer and type of rebar adhesive anchor including installation instructions.
   3. Qualifications of welding operators, welding processes and procedures.
   4. Rebar number, sizes, spacing, dimensions, configurations, locations, mark numbers, lap splice lengths and locations, concrete cover and rebar supports.
   5. Sufficient rebar details to permit installation of reinforcing.
   6. Rebar details in accordance with ACI SP 66.
   7. Locations where proprietary rebar mechanical splices are required or proposed for use.
8. Shop Drawings shall be in sufficient detail to permit installation of reinforcing without reference to Contract Drawings:
   a. Shop Drawings shall not be prepared by reproducing the plans and details indicated on the Contract Drawings but shall consist of completely redrawn plans and details as necessary to indicate complete fabrication and installation of all reinforcing steel.

1.4 DELIVERY, STORAGE, AND HANDLING

   A. Support and store all reinforcing above ground.

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

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURES

   A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
      1. Rebar adhesive anchors:
         a. HIT-HY200 System by HILTI FASTENING SYSTEMS, INC.
         b. Epcon Adhesive Anchoring System by ITW Ramset/Red Head.
         c. Power-Fast by Powers Fastening, Inc.
      2. Rebar mechanical splices:
         a. Lenton Rebar Splicing by Erico, Inc.
         b. Dayton Superior.
         c. Richmond dowel bar splicer system by Richmond Screw and Anchor Co., Inc.
         d. Bar-Grip Systems by Barsplice Products, Inc.

2.2 MATERIALS

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

   B. Reinforcing Bars to be Welded: ASTM A706.

   C. Welded Wire Reinforcement: ASTM A1064, 60,000 psi minimum yield strength, 6”x6” grid, 10 gauge wire.

   D. Smooth Dowel Bars: ASTM A615, grade 60 with metal end cap to allow longitudinal movement equal to joint width plus 1 IN.

   E. Proprietary Rebar Mechanical Splices (Connectors): To develop in tension and compression a minimum of 125 percent of the yield strength of the rebars being connected or spliced.

   F. Welding Electrodes:
      1. E90 meeting requirements of AWS D1.4.

   G. Rebar Adhesive Anchors:
      1. Manufactured for the specific purpose of embedding and developing 125 percent of the yield strength of rebars in hardened concrete.

2.3 ACCESSORIES

   A. Metal Chairs, Runners, Bolsters, Spacers, Hangers, and Other Rebar Supports:
      1. Plastic-coated tips in contact with forms.

   B. Protective plastic caps at mechanical splices.

2.4 FABRICATION

   A. Tolerances:
      1. Sheared lengths: +1 IN.
2. Overall dimensions of stirrups, ties and spirals: +1/2 IN.
3. All other bends: +0 IN, -1/2 IN.

B. Minimum diameter of bends measured on the inside of the rebar to be as indicated in ACI 318 Paragraph 7.2.

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

PART 3 - EXECUTION

3.1 INSTALLATION

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

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

C. Unless indicated otherwise on Drawings, provide splice lengths for reinforcing as follows:
   1. For rebars: Class B splice meeting the requirements of ACI 318, Paragraph 12.15.
   2. For welded wire reinforcement:
      a. Splice lap length measured between outermost cross wires of each fabric sheet shall not be less than one (1) spacing of cross wires plus 2 IN, nor less than 1.5 x development length nor less than 6 IN.
      b. Development length shall be as required for the yield strength of the welded wire reinforcement in accordance with ACI 318, Paragraph 12.8.
   3. Provide splices of reinforcing not specifically indicated or specified subject to approval of Engineer:
      a. Mechanical proprietary splice connectors may only be used when approved or indicated on the Contract Drawings.

D. Welding:
   1. Obtain approval by the Engineer prior to welding reinforcing.
   2. Perform welding of rebars in accordance with requirements of AWS D1.4.
   3. Have each welder place an approved identifying mark near each completed weld.

E. Placing Rebars:
   1. Assure that reinforcement at time concrete is placed is free of mud, oil or other materials that may affect or reduce bond.
2. Reinforcement with rust, mill scale or a combination of both will be accepted as being satisfactory without cleaning or brushing provided dimensions and weights including heights of deformations on a cleaned sample is not less than required by applicable ASTM specification that governs for the rebar supplied.

3. Rebar support:
   a. Uncoated rebar:
      1) Support rebars and fasten together to prevent displacement by construction loads or placing of concrete:
         a) Locate and support reinforcement with bar supports to maintain minimum concrete cover.
         b) Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
      2) Rebar supported on ground:
         a) Slab on grade and other members with only one mat of reinforcing:
            (1) Provide metal bar supports with bottom plate.
            (2) Do not use concrete blocks to support slab-on-grade reinforcing.
         b) All other members: Provide supporting concrete blocks or metal bar supports with bottom plate.
   b. Coated rebar:
      1) Support coated rebars and fasten together to prevent displacement.
      2) Use plastic or nylon ties to hold rebars rigidly in place.
      3) Support rebars by use of plastic or plastic-coated chairs, runners, bolsters, spacers, hangers and rebar supports as required.

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

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

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

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

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

9. Do not tack weld reinforcing.

10. Embed rebars into hardened concrete utilizing adhesive anchor system specifically manufactured for such installation:
    a. Drill hole in concrete with diameter and depth as required to develop 125 percent of the yield strength of the bar according to manufacturer's requirements.
    b. Clean holes per manufacturer's recommendations.
    c. Place adhesive in drilled hole.
    d. Insert rebar into hole and adhesive in accordance with manufacturer's instructions.

### 3.2 FIELD QUALITY CONTROL

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

B. Employ a testing laboratory to perform and report following:
1. Review and approve Contractor proposed welding procedures and processes for conformance with AWS D1.4.
2. Qualify welders in accord with AWS D1.4.
3. Test three (3) samples of each bar size and each type of weld in accord with AWS D1.4:
   a. The tensile strength of each test shall be not less than 125 percent of the required yield strength of the rebar tested.
4. Conduct nondestructive field tests (radiographic or magnetic particle) on not less than one (1) random sample for each 10 welds:
   a. In addition if any welds are found defective, test five (5) previous welds performed by same welder.
5. Visually inspect each weld for presence of cracks, undercuts, inadequate size and other visible defects.

END OF SECTION
SECTION 03308
CONCRETE, MATERIALS AND PROPORTIONING

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Concrete materials, strengths and proportioning for concrete work.
   2. Grouting:
      a. Base plates for columns and equipment.
      b. Dowels and anchors into concrete.
      c. Patching cavities in concrete.
      d. As specified and indicated in the Contract Document.
B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.

1.2 QUALITY ASSURANCE
A. Referenced Standards:
   1. American Concrete Institute (ACI):
      a. 116R, Cement and Concrete Terminology.
      b. 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
      c. 318, Building Code Requirements for Structural Concrete.
      d. 350, Code Requirements for Environmental Engineering Concrete Structures.
   2. ASTM International (ASTM):
      f. C192, Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.
      i. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
   3. Corps of Engineers (COE):

1.3 DEFINITIONS
A. Words and terms used in these Specifications are defined in ACI 116R.

1.4 SUBMITTALS
A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
b. Manufacturer's instructions.
c. Manufacturer and type of proposed admixtures.
d. Manufacturer and type of proposed nonshrink grout and grout cure/seal compound.

3. Certifications:
   a. Certification of standard deviation value in psi for ready mix plant supplying the concrete.
   b. Certification that the fly ash meets the quality requirements stated in this Specification Section, and fly ash supplier's certified test reports for each shipment of fly ash delivered to concrete supplier.
   c. Certification of aggregate gradation.

4. Test reports: Cement mill reports for all cement to be supplied.

1.5 DELIVERY, STORAGE AND HANDLING

A. Storage of Materials:
   1. Store cement and pozzolan in weathertight buildings, bins, or silos which will exclude moisture and contaminants.
   2. Arrange aggregate stockpiles and use in a manner to avoid excessive segregation and to prevent contamination with other materials or with other sizes of like aggregates.
   3. Allow natural sand to drain until it has reached a relatively uniform moisture content before use.
   4. Store admixtures in such a manner as to avoid contamination, evaporation, or damage:
      a. For those used in form of suspensions or non-stable solutions, provide agitating equipment to assure thorough distribution of ingredients.
      b. Protect liquid admixtures from freezing and temperature changes which would adversely affect their characteristics and performance.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

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

   1. Non-shrink grout:
      a. BASF Admixtures, Inc.
      b. Euclid Chemical Company.
      c. U. S. Grout.
      d. Upco.
      e. Set Products, Inc.
      f. L & M Construction Chemicals, Inc.
      g. Sika Corporation

   2. Epoxy grout:
      a. Ceilcote.
      b. Exxon Chemical Company.
      c. U. S. Grout.
      d. Euclid Chemical Company.

   3. Synthetic Fibers (Macro + Micro):
      a. Grace Construction.
      b. Fibermesh 300.
      c. Euclid Chemical Company.

2.2 MATERIALS

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

B. Fly Ash:
1. ASTM C618, Class F or Class C.
2. Non-staining.
3. Suited to provide hardened concrete of uniform light gray color.
4. Maximum loss on ignition: 4 percent.
5. Compatible with other concrete ingredients and having no deleterious effects on the hardened concrete.
6. Produced by source approved by the State Highway Department in the state where the Project is located for use in concrete for bridges.
7. Cement and fly ash type used shall correspond to that upon which selection of concrete proportions was based in the mix design.

C. Admixtures:
2. Water reducing, retarding, and accelerating: Conform to ASTM C494, Types A through E, and provisions of ACI 212.3R.
3. High range water reducers (superplasticizers): Conform to ASTM C494, Types F or G.
4. Admixtures to be chloride free:
   a. Do not use calcium chloride.
5. Provide admixtures of same type, manufacturer and quantity as used in establishing required concrete proportions in the mix design.

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

E. Aggregates for Normal Weight Concrete:
1. ASTM C33.
2. Fine and coarse aggregates to be regarded as separate ingredients.
3. Fine aggregates to be natural, not manufactured.
4. Coarse aggregate sieve analysis:
   a. For lean concrete, concrete topping, and integral wearing course: ASTM C33, size number 7 (maximum 1/2 IN).
   b. For all other concrete: ASTM C33, size number 57 (maximum 1 IN).
5. Provide aggregates approved for bridge construction by the State Highway Department in the State where the Project is located.
6. Pozzolan or other additives shall not be used to compensate for alkali reactivity of aggregates.

F. Maximum total chloride ion content for concrete mix including all ingredients measured as a weight percent of cement:
1. Prestressed concrete: 0.06.
2. All other concrete: 0.10.

G. Sand Cement Grout:
1. Approximately three (3) parts sand, one (1) part Portland cement, 6 ±1 percent entrained air and water to produce a slump which allows grout to completely fill required areas and surround adjacent reinforcing:
   a. Provide sand in accordance with requirements for fine aggregate for concrete.

H. Non-shrink Grout:
1. Nonshrink, nonmetallic, noncorrosive, and nonstaining.
2. Premixed with only water to be added in accordance with manufacturer's instructions at jobsite.
3. Grout to produce a positive but controlled expansion:
   a. Mass expansion shall not be created by gas liberation or by other means.
5. Acceptable manufacturers:
   a. BASF Admixtures, Inc. "Masterflow, 713 Plus".
   b. Euclid Chemical "NS Grout".
   c. Sauereisen Cements "F-100 Level Fill Grout".
   d. U.S. Grout "Five Star Grout".
   e. The Upco Corp "Upcon".
   f. L&M "Crystex".
   g. Sika Corporation "Sika Grout 212".
6. In accordance with COE CRD-C621.

I. Epoxy Grout:
1. Minimum 28 day compressive strength: 6500 psi.
2. Three-component epoxy resin system:
   a. Two (2) liquid epoxy components.
   b. One (1) inert aggregate filler component.
3. Adhesive acceptable manufacturers:
   a. BASF "Masterflow 648 CP".
   b. Exxon Chemical Company "Escoweld 2505."
   c. Sika "Sikadur Hi-Mod."
   d. U.S. Grout "Five Start Epoxy Grout."
   e. Euclid Chemical "E3-G."
4. Aggregate acceptable manufacturers:
   a. BASF "Masterflow 648 CP".
   b. Exxon Chemical Company "Escoweld 2510."
   c. Sika aggregate.
   d. U.S. Grout aggregate.
   e. Euclid Chemical "Euclid aggregate."
5. Aggregate manufacturer shall be the same as the adhesive manufacturer.
6. The aggregate shall be compatible with the adhesive.
7. Each component furnished in separate package for mixing at jobsite.

2.3 MIXES

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

B. Minimum 28 Day Compressive Strengths:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal weight concrete fill/lean concrete (excluding CDF)</td>
<td>3000 psi</td>
</tr>
<tr>
<td>Normal weight concrete pavements – includes canal liner</td>
<td>4000 psi</td>
</tr>
<tr>
<td>Normal weight all other concrete – structures, transitions</td>
<td>4500 psi</td>
</tr>
<tr>
<td>Normal weight precast concrete</td>
<td>5000 psi</td>
</tr>
</tbody>
</table>

C. Air Entrainment:
1. Provide air entrainment in all concrete resulting in a total air content percent by volume as follows:
   a. 1-1/2 IN maximum aggregate size: 4-1/2 to 6-1/2 percent total air content.
   b. 1 IN maximum aggregate size: 5 to 8 percent total air content.
   c. 3/4 IN maximum aggregate size: 5 to 8 percent total air content.
   d. 1/2 IN maximum aggregate size: 5-1/2 to 8 percent total air content.
e. Interior slabs and mats with power trowel finish: Maximum 3 percent total air content.

D. Slump:
1. Walls and columns:
   a. 8 IN maximum for concrete with high range water reducer (superplasticizer).
   b. 4 IN max measured at the point of discharge into the concrete member.
   c. Slump shall be obtained by use of mid-range or high-range water reducer in accordance with ASTM C494.
2. All other members: 4 IN maximum, 3 IN minimum measured at point of discharge into the concrete construction member.
3. Concrete of lower than minimum slump may be used provided it can be properly placed and consolidated.
4. Provide additional water reducing admixture at ready mix plant for concrete that is to be pumped to allow for slump loss due to pumping:
   a. Provide only enough additional water reducing admixtures so that slump of concrete at discharge end of pump hose does not exceed maximum slump specified and the maximum specified water-cement ratio is not exceeded.
5. Slump may be adjusted in the field through the use of water reducers:
   a. Coordinate dosage and mixing requirements with concrete supplier.

E. Proportioning:
1. General:
   a. Proportion ingredients to produce a mixture which will work readily into corners and angles of forms and around reinforcement by methods of placement and consolidation employed without permitting materials to segregate or excessive free water to collect on surface.
   b. Proportion ingredients to produce proper placability, durability, strength and other required properties.
2. Normal weight concrete minimum cement contents and maximum water cement ratios:

<table>
<thead>
<tr>
<th>SPECIFIED STRENGTH (PSI)</th>
<th>MINIMUM CEMENT (LBS/CY)</th>
<th>MAXIMUM WATER CEMENT RATIO BY WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>3000</td>
<td>517*</td>
<td>0.48</td>
</tr>
<tr>
<td>4000</td>
<td>564*</td>
<td>0.45</td>
</tr>
<tr>
<td>4500</td>
<td>611*</td>
<td>0.42</td>
</tr>
<tr>
<td>5000</td>
<td>611*</td>
<td>0.40</td>
</tr>
</tbody>
</table>

3. Fly ash:
   a. For cast-in-place concrete only, a minimum of 5 percent and maximum of 25 percent by weight of Portland cement content per cubic yard may be replaced with fly ash at a rate of 1 LB fly ash for 1 LB cement.
   b. The water to fly ash plus cement ratio not to exceed the maximum water cement ratio specified in this Specification Section.
4. Water reducing, retarding, and accelerating admixtures:
   a. Use in accordance with manufacturer's instructions.
   b. Do not use unless required by these specifications or approved for use by Engineer.
5. High range water reducers (superplasticizers):
   a. Use in accordance with manufacturer's instructions.
   b. Do not use unless required by these Specifications or approved for use by Engineer.
6. Concrete mix proportioning methods for normal weight concrete:
   a. Method 1:
      1) Used when combination of materials proposed is to be evaluated and proportions selected to be on a basis of trial mixes.
2) Produce mixes having suitable proportions and consistencies based on ACI 211.1, using at least three (3) different water cement ratios or cement contents which will produce a range of compressive strengths encompassing the required average strength.

3) Design trial mixes to produce a slump within 0.75 IN of maximum specified, and for air entrained concrete, air content within 0.5 percent specified.

4) For each water cement ratio or cement content, make at least three (3) compression test cylinders for specified test age, and cure in accordance with ASTM C192:
   a) Test for strength at 28 days in accordance with ASTM C39.

5) From results of these tests, plot a curve showing relationship between water cement ratio or cement content and compressive strength.

6) From this curve select water cement ratio or cement content to be used to produce required average strength.

7) Use cement content and mixture proportions such that maximum water cement ratio is not exceeded when slump is maximum specified.

8) Base field control on maintenance of proper cement content, slump, air content and water cement ratio.

9) See paragraph hereafter for definition of required average strength.

b. Method 2:
   1) In lieu of trial mixes, field test records for concrete made with similar ingredients may be used.

   2) Use of proposed concrete mix proportions based on field test records subject to approval by Engineer based on information contained in field test records and demonstrated ability to provide the required average strength.

   3) Field test records to represent materials, proportions and conditions similar to those specified:
      a) Changes in the materials, proportions and conditions within the test records shall have not been more restricted than those for the proposed concrete mix.
      b) Field test records shall meet the requirements of ACI 350 Paragraph 5.3.1.

   4) Required concrete proportions may be established by interpolation between the strengths and proportions of two (2) or more test records each of which meets the requirements of this Specification Section.

7. Required average strength to exceed the specified 28 day compressive strength by the amount determined or calculated in accordance with Paragraph ACI 350 using the standard deviation of the proposed concrete production facility as described in Paragraphs 5.3.1 and 2 of ACI 350.

F. Allowable Shrinkage: 0.048 percent per ASTM C157 after 28 days.

2.4 SOURCE QUALITY CONTROL

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

B. Do not use frozen or partially frozen aggregates.

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Perform concrete tests per Specification Section 03350:
   1. Perform a strength test on all concrete to which water or superplasticizer, above the amount stated in the approved concrete mix design, has been added:
      a. Perform sampling after water or superplasticizer has been added and additional mixing has been performed.

   B. Perform strength test on any concrete to which water has been added at the jobsite.
END OF SECTION
SECTION 03311
CONCRETE MIXING, PLACING, JOINTING, AND CURING

PART 1 - GENERAL

1.1 SUMMARY

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

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.
   3. Section 03108 - Formwork.
   4. Section 03208 - Reinforcement.
   5. Section 03308 - Concrete, Materials and Proportioning.
   6. Section 03348 - Concrete Finishing and Repair of Surface Defects.
   7. Section 03350 - Testing.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Concrete Institute (ACI):
      a. 116R, Cement and Concrete Terminology.
      b. 304R, Guide for Measuring, Mixing, Transporting and Placing Concrete.
      c. 304.2R, Placing Concrete by Pumping Methods.
      d. 305R, Hot Weather Concreting.
      e. 306R, Cold Weather Concreting.
      f. 308R, Guide to Curing Concrete.
      g. 309R, Guide for Consolidation of Concrete.
      h. 350, Building Code Requirements for Environmental Engineering Concrete Structures
   2. ASTM International (ASTM):
      b. C156, Standard Test Method for Water Loss (from a Mortar Specimen) Through Liquid
         Membrane-Forming Curing Compounds for Concrete.
      d. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing
         Concrete.
      e. D994, Standard Specification for Preformed Expansion Joint Filler for Concrete
         (Bituminous Type).
      f. D1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded
         Rubber.
      g. D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete
         Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
   3. Corps of Engineers (COE):
      a. CRD-C572, Specifications for Polyvinylchloride Waterstop.
   4. National Ready Mixed Concrete Association (NRMCA):
      a. Checklist for Certification of Ready Mixed Concrete Production Facilities.
   5. NSF International (NSF).

B. Qualifications:
   1. Ready Mixed Concrete Batch Plant: Certified by NRMCA.

1.3 DEFINITIONS

A. Words and terms used in this Specification Section are defined in ACI 116R.
1.4 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Manufacturer's installation instructions:
         1) Procedure for adding high-range water reducer at the jobsite.
      c. Written descriptions of the distance between construction joints for both crack control and expansion control.
      d. Manufacturers and types:
         1) Joint fillers.
         2) Curing agents.
         3) Construction joint bonding adhesive.
         4) Waterstops.
   3. Certifications:
      b. Waterstops: Products shipped meet or exceed the physical properties specified.

B. Miscellaneous:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Copies of concrete delivery tickets.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery:
   1. Concrete:
      a. Prepare a delivery ticket for each load of ready mixed concrete.
      b. Truck operator shall hand ticket to Contractor at the time of delivery.
      c. Ticket to show:
         1) Mix identification.
         2) Quantity delivered.
         3) Amount of material in each batch.
         4) Outdoor temperature in the shade.
         5) Time at which cement was added
         6) Time of delivery.
         7) Time of discharge.
         8) Amount of water that may be added at the site without exceeding the specified water-cement ratio.
         9) Amount of water added at the site.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the manufacturers listed in the applicable Articles below are acceptable.

2.2 COMPONENTS

A. Neoprene Expansion Joint Fillers:
   1. Acceptable manufacturers:
      a. Permaglaze.
      b. Rubatex.
      c. Williams Products.
   2. Materials:
      a. Closed cell neoprene.
b. ASTM D1056, Type 2, Class C.
c. Compression deflection: As required to limit deflection to 25 percent of joint thickness under pressure from concrete pour height.

B. Asphalt Expansion Joint Fillers:
   1. Acceptable manufacturers:
      a. W R Meadows.

C. Fiber Expansion Joint Fillers:

D. Waterstops, PVC Type:
   1. Acceptable manufacturers:
      b. Vinylex Corporation.
      c. W R Meadows.
   2. Materials:
      a. Virgin polyvinyl chloride compound not containing any scrap or reclaimed materials or pigment.
   3. In expansion joints:
      a. 9 IN wide by 3/8 IN thick tear web type waterstop.
      b. 2 IN minimum horizontal movement without rupturing.
      c. Greenstreak Plastic Products Style #700.
   4. In control joints:
      a. 6 IN wide by 3/8 IN thick with ribs and center bulb.
      b. Greenstreak Plastic Products Style #705.
   5. In all other joints:
      a. 6 IN wide by 3/8 IN thick with ribs and center bulb.
      b. Greenstreak Plastic Products Style #705, #679 or #783.
   6. Provide hog rings or grommets at maximum 12 IN OC along the length of the waterstop.
   7. Provide factory-made waterstop fabrications at all changes in direction, intersections and transitions, leaving only straight butt splices for the field.
   8. Do not avert factory-made ells and T’s in thicker walls.
   9. To be used for new concrete cold joints.

E. Waterstops, Preformed Strip Type:
   1. Acceptable manufacturers:
      a. Waterstop-RX by Cetco.
   2. Materials:
      a. Hydrophilic type waterstop manufactured solely for the purpose of preventing water from traveling through construction joints.
   3. To be used for pipe penetrations and cold joints to existing concrete. Substitution for specified PVC waterstops will not be allowed.

F. Sand cement grout, non-shrink grout and epoxy grout: See Specification Section 03308.

PART 3 - EXECUTION

3.1 PREPARATION

A. General:
   1. Complete formwork:
      a. See Specification Section 03108.
   2. Remove earth, snow, ice, water, and other foreign materials from areas that will receive concrete.
3. Secure reinforcement in place:
   a. See Specification Section 03208.
4. Position expansion joint material, anchors and other embedded items.
5. Obtain approval of reinforcement erection and placement prior to placing concrete.
6. Do not place concrete during rain, sleet, or snow, unless adequate protection is provided and approval is obtained:
   a. Plan size of crews with due regard for effects of concrete temperature and atmospheric conditions on rate of hardening of concrete as required to obtain good surfaces and avoid unplanned cold joints.
   b. Do not allow rainwater to increase mixing water nor to damage surface finish.
7. Prepare all construction joints for proper bond per the Construction Joints - Bonding Paragraph in PART 3 of this Specification Section.
8. Remove hardened concrete and foreign materials from inner surfaces of conveying equipment and formwork.
9. Provide slabs and beams of minimum indicated required depth when sloping structural foundation base slabs and elevated slabs to drains:
   a. For floor slabs on grade, slope top of subgrade to provide slab of required uniform thickness.

B. Preparation of Subgrade for Slabs on Ground:
1. Subgrade drained and of adequate and uniform load-bearing nature.
2. Obtain approval of subgrade compaction density prior to placing slabs on ground.
3. Maintain subgrade at a temperature above 32 DegF before concrete placing begins for a sufficient amount of time to remove frost.
4. Moisten subgrade to eliminate absorption:
   a. Keep subgrade moist at time of concreting.
   b. Allow no free-standing water on subgrade or soft or muddy spots when concrete is placed.

C. Edge Forms and Screeds:
1. Set accurately to produce designated elevations and contours of finished surface.
2. Sufficiently strong to support vibrating screeds or roller pipe screeds, if required.
3. Use strike off templates, or approved vibrating type screeds, to align concrete surfaces to contours of screed strips.

3.2 CONCRETE MIXING

A. General:
1. Provide all concrete from a central plant conforming to Checklist for Certification of Ready Mixed Concrete Production Facilities of the NRMCA.
2. Batch, mix, and transport in accordance with ASTM C94/C94M.
3. Transport of dry materials to be mixed on-site is not allowed.

B. Control of Admixtures:
1. Charge admixtures into mixer as solutions:
   a. Measure by means of an approved mechanical dispensing device.
   b. Liquid considered a part of mixing water.
   c. Admixtures that cannot be added in solution may be weighed or measured by volume if so recommended by manufacturer.
2. Add separately, when two or more admixtures are used in concrete, to avoid possible interaction that might interfere with efficiency of either admixture, or adversely affect concrete.
3. Complete addition of retarding admixtures within one minute after addition of water to cement has been completed, or prior to beginning of last three quarters of required mixing, whichever occurs first.

C. Tempering and Control of Mixing Water:
1. Mix concrete only in quantities for immediate use.
2. Discard concrete which has set.
3. Discharge concrete from ready mix trucks within time limit and drum revolutions stated in ASTM C94/C94M.
4. Addition of water at the jobsite:
   a. See Specification Section 03308 for specified water cement ratio and slump.
   b. Do not exceed maximum specified water cement ratio or slump.
   c. Incorporate water by additional mixing equal to at least half of total mixing required.
   d. Perform strength test on any concrete to which water has been added at the jobsite:
      1) See Specification Section 03350.

3.3 PLACING OF CONCRETE

A. General:
   1. Place concrete at such a rate that concrete, which is being integrated with fresh concrete, is still workable:
      a. Contractor may submit an equivalent concrete mix in order to reduce placement and consolidation issues.
      b. Pumping concrete must be considered.
   2. Comply with ACI 304R and ACI 304.2R.
   3. Deposit concrete:
      a. Continuously to avoid cold joints.
      b. In layers of 12 to 18 IN.
   4. Locate construction joints at locations approved by Engineer:
      a. Plan size of crews with due regard for effects of concrete temperature and atmosphere conditions to avoid unplanned cold joints.
   5. Place slabs in checker board pattern and/or to allow a minimum of 7 days between pours on both sides of the same joint.
   6. Do not deposit concrete which has partially hardened or has been contaminated by foreign materials.
   7. Spreaders:
      a. Temporary: Remove as soon as concrete placing renders their function unnecessary.
      b. Embedded:
         1) Obtain approval of Engineer.
         2) Materials: Concrete or metal.
         3) Ends of metal spreaders coated with plastic coating 2 IN from each end.
   8. Do not begin placing of concrete in supported elements until concrete previously placed in supporting members is no longer plastic and has been in place at least a minimum of 2 HRS.
   9. Deposit concrete as nearly as practicable in its final position to avoid segregation:
      a. Maximum free fall: 4 FT.
      b. Free fall exceeding 4 FT: Place concrete by means of hopper, elephant trunk or tremie pipe extending down to within 4 FT of surface placed upon.
   10. Perform the following operations before bleeding water has an opportunity to collect on surface:
       a. Spread.
       b. Consolidate.
       c. Straightedge.
       d. Darby or bull float.
   11. Use evaporation reducer to reduce surface moisture evaporation of slabs during concrete placement:
       a. Strict adherence to the manufacturer’s instructions of use is essential for intended results.

B. Admixtures:
   1. All admixtures to be introduced at the batch plant in accordance with manufacturer's recommendations.

C. Cold Weather Concrete Placement:
1. Comply with ACI 306R.
2. Do not place concrete on substrates that are below 32 DegF or contain frozen material.
3. Maintain all materials, forms, reinforcement, subgrade and any other items which concrete will come in contact with free of frost, ice or snow at time of concrete placement.
4. Temperature of concrete when discharged at site:

<table>
<thead>
<tr>
<th>AIR TEMPERATURE DEGF</th>
<th>MINIMUM CONCRETE TEMPERATURE, DEGF FOR SECTIONS WITH LEAST DIMENSION LESS THAN 12 IN</th>
<th>MINIMUM CONCRETE TEMPERATURE, DEGF FOR SECTIONS WITH LEAST DIMENSION 12 IN OR GREATER</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 to 45</td>
<td>60</td>
<td>55</td>
</tr>
<tr>
<td>0 to 30</td>
<td>65</td>
<td>55</td>
</tr>
<tr>
<td>below 0</td>
<td>70</td>
<td>60</td>
</tr>
</tbody>
</table>

5. Heat subgrade, forms, and reinforcement so the temperature of the subgrade, forms, and reinforcement will be between 45 and 70 DegF, when temperature of surrounding air is 40 DegF or below at time concrete is placed:
   a. Remove all frost from subgrade, forms and reinforcement before concrete is placed.
6. Combine water with aggregate in mixer before cement is added, if water or aggregate is heated above 90 DegF.
7. Do not mix cement with water or with mixtures of water and aggregate having a temperature greater than 90 DegF.
8. Do not place slabs on ground if temperature is below 40 DegF or if temperature surrounding the slab will be below 40 DegF before structure is enclosed and heated.

D. Hot Weather Concrete Placement:
1. Comply with ACI 305R.
2. Cool ingredients before mixing, or add flake ice or well crushed ice of a size that will melt completely during mixing for all or part of mixing water if high temperature, low slump, flash set, cold joints, or shrinkage cracks are encountered.
3. Temperature of concrete when placed:
   a. Not to exceed 90 DegF.
   b. Not so high as to cause:
      1) Shrinkage cracks.
      2) Difficulty in placement due to loss of slump.
      3) Flash set.
4. Temperature of forms and reinforcing when placing concrete:
   a. Not to exceed 90 DegF.
   b. May be reduced by spraying with water to cool below 90 DegF:
      1) Leave no standing water to contact concrete being placed.

E. Consolidating:
1. Consolidate in accordance with ACI 309R except as modified herein.
2. Consolidate by vibration so that concrete is thoroughly worked around reinforcement, embedded items and into corners of forms:
   a. Eliminate:
      1) Air or stone pockets.
      2) Honeycombing or pitting.
      3) Planes of weakness.
3. Internal vibrators:
   a. Minimum frequency of 8000 vibrations per minute.
   b. Insert and withdraw at points approximately 18 IN apart:
      1) Allow sufficient duration at each insertion to consolidate concrete but not sufficient to cause segregation.
   c. Use in:
1) Beams and girders of framed slabs.
2) Columns and walls.
   d. Size of vibrators shall be in accordance with ACI 309R, Table 5.1.5.
4. Obtain consolidation of slabs with internal vibrators, vibrating screeds, roller pipe screeds, or other approved means.
5. Do not use vibrators to transport concrete within forms.
6. Provide spare vibrators on jobsite during all concrete placing operations.
7. Bring a full surface of mortar against form by vibration supplemented if necessary by spading to work coarse aggregate back from formed surface, where concrete is to have an as-cast finish.
8. Use suitable form vibrators located just below top surface of concrete, where internal vibrators cannot be used in areas of congested reinforcing.
9. Prevent construction equipment, construction operations, and personnel from introducing vibrations into freshly placed concrete after the concrete has been placed and consolidated.

F. Handle concrete from mixer to place of final deposit by methods which will prevent segregation or loss of ingredients and in a manner which will assure that required quality of concrete is maintained:
   1. Use truck mixers, agitators, and non-agitating units in accordance with ASTM C94/C94M.
2. Horizontal belt conveyors:
   a. Mount at a slope which will not cause segregation or loss of ingredients.
   b. Protect concrete against undue drying or rise in temperature.
   c. Use an arrangement at discharge end to prevent segregation.
   d. Do not allow mortar to adhere to return length of belt.
   e. Discharge conveyor runs into equipment specially designed for spreading concrete.
3. Metal or metal lined chutes:
   a. Slope not exceeding 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal.
   b. Chutes more than 20 FT long and chutes not meeting slope requirements may be used provided they discharge into a hopper before distribution.
   c. Provide end of each chute with a device to prevent segregation.
4. Pumping or pneumatic conveying equipment:
   a. Designed for concrete application and having adequate pumping capacity.
   b. Control pneumatic placement so segregation is avoided in discharged concrete.
   c. Loss of slump in pumping or pneumatic conveying equipment shall not exceed 1-1/2 IN.
   d. Do not convey concrete through pipe made of aluminum or aluminum alloy.
   e. Provide pumping equipment without Y sections.

3.4 JOINTS AND EMBEDDED ITEMS

A. Construction Joints - General:
1. Locate joints as indicated on Contract Drawings or as clearly shown on approved Shop Drawings:
   a. Where construction joint spacing shown on Drawings exceeds the joint spacing indicated in Paragraph B. below, submit proposed construction joint location in conformance with this Specification Section.
2. Unplanned construction joints will not be allowed:
   a. If concrete cannot be completely placed between planned construction joints, then it must be removed.
3. In general, locate joints near middle of spans of slabs, beams and girders unless a beam intersects a girder at this point, in which case, offset joint in girder a distance equal to twice the width of the beam.
4. Locate joints in walls and columns at underside of floors, slabs, beams, or girders, and at tops of foundations or floor slabs, unless shown otherwise:
   a. At Contractor's option, beam pockets may be formed into concrete walls.
   b. Size pockets to allow beam reinforcing to be placed as detailed on Drawings.
5. Make joints perpendicular to main reinforcement with all reinforcement continuous across joints.

6. Provide roughened construction joints at all construction joints unless indicated otherwise on Drawings:
   a. Clean the previously hardened concrete interface and remove all laitance.
   b. Intentionally roughen the interface to a full amplitude of 1/4 IN.
   c. Provide recessed flat surface as required to install strip type waterstops.

7. Provide continuous keyways where indicated on Drawings:
   a. Construction joint keyways shall have the following dimensions, unless shown otherwise on Drawings or directed otherwise by Engineer.
   b. Construction joint keyways in walls:
      1) Keyway width, not less than 1/3 and not more than 1/2 the wall thickness measured perpendicular to wall faces.
      2) Keyway depth to be not less than 1-1/2 IN.
      3) Place keyway in wall center unless shown otherwise on Drawings.
   c. Construction joint keyways in footings, foundations, base slabs, and structural or elevated slabs:
      1) Keyway height not less than 1/3 and not more than 1/2 the footing or slab thickness.
      2) Keyway depth not less than 1-1/2 IN.
      3) Keyway in footing or slab center unless shown otherwise on Drawings.
   d. Construction joint keyways in beams:
      1) Keyway height not less than 1/3 and not more than 1/2 the beam depth.
      2) Keyway depth not less than 1-1/2 IN.
      3) Keyway in beam center unless shown otherwise on Drawings.

8. Allow a minimum of 48 HRS before placement of adjoining concrete construction.

B. Construction Joints – Spacing unless shown otherwise on the Drawings or approved by the Engineer:
   1. General – Structures not intended to contain liquid:
      a. Wall vertical construction joints:
         1) 30 FT maximum centers.
         2) At wall intersections, 15 FT maximum and 2 feet minimum from corners.
      b. Wall horizontal construction joints: 20 to 25 FT centers.
      c. Base slab, floor, and roof slab construction joints:
         1) Placements to be approximately square and not to exceed 1600 SF.
         2) Maximum side dimension of a slab pour to be less than:
            a) Twice the length of the short side.
            b) 40 FT.
         3) No re-entrant corners will be allowed in any concrete slab pour unless approved by the engineer. All pours shall be square or rectangular.

2. Structures intended to contain liquids unless shown otherwise on the Drawings or approved by the Engineer:
   a. Wall vertical construction joints:
      1) 24 FT maximum centers.
      2) At wall intersections, 12 FT maximum and 2 feet minimum from corners.
   b. Base slab, floor, and roof slab construction joints:
      1) Placements to be approximately square and not to exceed 1200 SF.
      2) Maximum side dimension of a slab pour to be less than:
         a) One and one half times the length of the short side.
         b) 40 FT.
      3) No re-entrant corners will be allowed in any concrete slab pour unless approved by the engineer. All pours shall be square or rectangular.

C. Construction Joints - Bonding:
1. Obtain bond between concrete pours at construction joints by thoroughly cleaning and removing all laitance from construction joints:
   a. Before new concrete is placed, all construction joints shall be coated with cement grout, or dampened:
      1) General: Use cement grout or dampening for all construction joints.

2. Roughened construction joints:
   a. Roughen the surface of the concrete to expose the aggregate uniformly
   b. Remove laitance, loosened particles of aggregate or damaged concrete at the surface, or at the Contractor's option, use an approved chemical retarder which delays but does not prevent setting of the surface of the mortar in accordance with the manufacturer's recommendations:
      1) Retarded mortar shall be removed within 24 HRS after placing to produce a clean exposed aggregate bonding surface.
   c. Cover the hardened concrete of horizontal joints with a coat of cement grout of similar proportions to the concrete, except substitute fine aggregate for coarse aggregate.
   d. Place 1 IN to 2 IN layer of grout in bottoms of wall or column lifts immediately before placing concrete:
      1) Vibrate grout and first layer of concrete simultaneously.
      2) Place fresh concrete before the grout has attained its initial set.

3. Other keyed construction joints:
   a. Thoroughly clean construction joints and remove all laitance.
   b. Dampen the hardened concrete (but do not saturate) immediately prior to placing of fresh concrete.

D. Locate control joints in slabs on grade as indicated on Drawings.
   1. Time cutting properly with set of concrete, if saw cut joints are required or permitted:
      a. Start cutting as soon as concrete has hardened sufficiently to prevent aggregates being dislodged by saw.
      b. Complete before shrinkage stresses become sufficient to produce cracking.

E. Expansion Joints:
   1. Do not permit reinforcement or other embedded metal items bonded to concrete (except smooth dowels bonded on only one side of joint) to extend continuously through an expansion joint.

2. Use neoprene expansion joint fillers, unless noted otherwise on Drawings.

3. Seal expansion joints as shown on Drawings.

F. Waterstops:
   1. Preformed strip type:
      a. Preformed strip type waterstops will not be allowed to be substituted for PVC or TPE waterstops shown on the drawings unless approved by the Engineer.
      b. Install on smooth surface of hardened concrete by use of nails, adhesive or other means as recommended by manufacturer to prevent movement of waterstop during placement of concrete.
      c. Waterstop to be continuous with splices in accordance with manufacturer’s instructions.
      d. Use only where indicated on Drawings or approved by the Engineer.

2. PVC type:
   a. Position waterstop accurately in forms.
   b. Secure waterstops in correct position using hog rings or grommets spaced along the length of waterstop and tie wire to adjacent reinforcing.
   c. Hold horizontal waterstops in place with continuous supports.
   d. Install according to manufacturer's instructions:
      1) Do not displace reinforcement from required location.
   e. Waterstops to be continuous.
   f. Splice ends with perpendicular butt splice using electrical splicing iron in accordance with manufacturer's instructions.
g. Unless otherwise noted, use for all construction joints in new construction for all structures indicated on Drawings.

G. Other Embedded Items:
1. Place sleeves, inserts, anchors, and embedded items required for adjoining work or for its support, prior to initiating concreting.
2. Do not place electrical conduit, drains, or pipes in or thru concrete slabs, walls, columns, foundations, beams or other structural members unless approved by Engineer.

H. Placing Embedded Items:
1. Position expansion joint material, waterstops, and other embedded items accurately.
2. Support against displacement.
3. Fill voids in sleeves, inserts and anchor slots temporarily with readily removable material to prevent entry of concrete into voids.
4. Provide adequate means for anchoring waterstop in concrete:
   a. Provide means to prevent waterstops in the forms from being folded over by the concrete as it is placed.
   b. Work concrete under the waterstops by hand, so as to avoid the formation of air and rock pockets, when placing roof and floor slab concrete around waterstops.

3.5 FINISHING
A. See Specification Section 03348.
B. Coordinate mixing and placing with finishing.

3.6 INSTALLATION OF GROUT
A. Grout Schedule of Use:
   1. Sand cement grout:
      a. Fill keyways in precast HCU.
      b. General use.
   2. Non-shrinking non-metallic grout:
      a. Filling form tie holes.
      b. Under column and beam base plates.
      c. Other uses indicated on the Drawings.
   3. Epoxy grout:
      a. Patching cavities in concrete.
      b. Grouting of dowels and anchor bolts into existing concrete.
      c. Grouting of equipment base plates where driving motor is 500 HP and above.
      d. Other uses indicated on the Drawings.
B. Grout Installation:
   1. Sand cement grout:
      a. Fill keyways between precast concrete hollow core slabs with sand cement grout.
      b. Consolidate grout by rodding or by other means to assure complete filling of keyways.
      c. Cure grout by one of methods specified.
   2. Non-shrink non-metallic grout:
      a. Clean concrete surface to receive grout.
      b. Saturate concrete with water for 24 HRS prior to grouting.
      c. Mix in a mechanical mixer.
      d. Use no more water than necessary to produce flowable grout.
      e. Place in accordance with manufacturer's instructions.
      f. Provide under beam, column, and equipment base plates, in joints between precast concrete filter slabs, and in other locations indicated on the Drawings.
      g. Completely fill all spaces and cavities below the top of base plates.
      h. Provide forms where base plates and bed plates do not confine grout.
      i. Where exposed to view, finish grout edges smooth.
j. Except where a slope is indicated on the Drawings, finish edges flush at the base plate, bed plate, member or piece of equipment.

k. Coat exposed edges of grout with cure or seal compound recommended by the grout manufacturer.

l. At form tie holes in water containing walls, use epoxy bonding agent and seal surface with epoxy over an area 2 inches larger than the form tie cone on all sides.

3. Epoxy grout:
   a. Mix and place in accordance with manufacturer's instructions.
   b. Apply only to clean, dry, sound surface.
   c. Completely fill all cavities and spaces around dowels and anchors without voids.
   d. Grout base and bed plates as specified for non-shrinking, non-metallic grout.
   e. Obtain manufacturer's field technical assistance as required to assure proper placement.

3.7 CURING AND PROTECTION

A. Protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury immediately after placement, and maintain with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement, hardening, and compressive strength gain:
   1. Follow recommendations of ACI 308 except as modified herein.

B. Apply one of the following curing procedures immediately after completion of placement and finishing, for concrete surfaces not in contact with forms.
   1. Ponding or continuous sprinkling.
   2. Application of absorbent mats or fabric kept continuously wet.
   3. Application of sand kept continuously wet.
   4. Continuous application of steam (not exceeding 150 DegF) or mist spray.
   5. Ponding and Sprinkling in conjunction with application of waterproof sheet materials, conforming to ASTM C171 and only with a program as approved by the Engineer that will keep the surface continuously wet.
   6. Ponding and Sprinkling in conjunction with application of other moisture retaining covering as approved and only with a program as approved by the Engineer that will keep the surface continuously wet.

C. After 7 full days of moist curing application of a curing compound conforming to ASTM C309 may be substituted for moist curing:
   1. Apply curing compound in accordance with manufacturer's recommendations immediately after any water sheen which may develop after finishing has disappeared from concrete surface.
   2. Do not use on any surface against which additional concrete or other material is to be bonded unless it is proven that curing compound will not prevent bond.
   3. Where a vertical surface is cured with a curing compound, the vertical surface shall be covered with a minimum of two (2) coats of the curing compound, 30 mils thick each or as recommended by the manufacturer:
      a. Apply the first coat of curing compound to a vertical surface immediately after form removal and before the surface displays water loss. Apply in one direction only, covering uniformly to a minimum thickness of 30 mils or as recommended by the manufacture.
      b. The vertical concrete surface at the time of receiving the first coat shall be damp with no free water on the surface.
      c. Allow the preceding coat to completely dry prior to applying the next coat.
      d. Apply second coat in direction perpendicular to the first coat application direction, covering uniformly to a minimum thickness of 30 mils.
      e. A vertical surface: Any surface steeper than 1 vertical to 4 horizontal.
      f. Curing compounds used in water treatment plant construction shall be non-toxic and taste and odor free:
1) Curing compound to be NSF approved and have a moisture loss of not more than 2.03 oz/SQ feet per ASTM C156:

D. Curing Concrete In Contact with Forms:
   1. Minimize moisture loss from and temperature gain of concrete placed in forms exposed to heating by sun by keeping forms wet and cool until they can be safely removed.
   2. Moisture cure the top surface of concrete placed in forms according to paragraph 03311-3.7B.
   3. After form removal, cure concrete until end of time prescribed:
      a. Use one of methods listed above.
      b. When approved by the Engineer, placement of the second pour at joints may occur prior to the end of the curing period.
   4. Forms left in place shall not be used as a method of curing in hot weather.
   5. The term "hot weather," where used in these specifications, is defined in ACI 305R.
   6. In hot weather, remove forms from vertical surfaces as soon as concrete has gained sufficient strength so that the formwork is no longer required to support the concrete.

E. Continue curing for at least fourteen (14) days for all water bearing concrete except high early strength concrete for which period shall be at least three (3) days.

F. Continue curing for at least seven (7) days for all concrete except high early strength concrete for which period shall be at least three (3) days:
   1. If one of curing procedures indicated above is used initially, it may be replaced by one of other procedures indicated any time after concrete is one (1) day old, provided concrete is not permitted to become surface dry during transition.

G. Cold Weather:
   1. Follow recommendations of ACI 306R.
   2. Maintain temperature of concrete between 50 and 70 DegF for required curing period, when outdoor temperature is 40 DegF, or less.
   3. Use heating, covering, insulating, or housing of the concrete work to maintain required temperature without injury due to concentration of heat.
   4. Do not use combustion heaters unless precautions are taken to prevent exposure of concrete to exhaust gases which contain carbon dioxide.
   5. Interior slabs in areas intended to be heated shall be adequately protected so that frost does not develop in the supporting subgrade.

H. Hot Weather:
   1. Follow recommendations of ACI 305R.
   2. Make provision for cooling forms, reinforcement and concrete, windbreaks, shading, fog spraying, sprinkling, ponding, or wet covering with a light colored material.
   3. Provide protective measures as quickly as concrete hardening and finishing operations will allow.

I. Rate of Temperature Change:
   1. Keep changes in temperature of air immediately adjacent to concrete as uniform as possible, during and immediately following curing period.
   2. Do not exceed a temperature change of 5 DegF in any 1 HR or 50 DegF in any 24 HR period.

J. Protection from Mechanical Injury:
   1. Protect concrete from damaging mechanical disturbances, such as load stresses, heavy shock, and excessive vibration.
   2. Protect finished concrete surfaces from damage by construction equipment, materials, or methods, and by rain or running water.
   3. Do not load self supporting structures in such a way as to overstress concrete.
3.8 FIELD QUALITY CONTROL

A. Tests in accordance with Specification Section 03350:
   1. Perform a strength test on all concrete to which water or superplasticizer, above the amount stated in the approved concrete mix design, has been added:
      a. Perform sampling after water or superplasticizer has been added and additional mixing has been performed.

B. Field samples of fabricated waterstop fittings (crosses, tees, etc.) will be selected at random by the Engineer for testing by a laboratory at the Owner's expense:
   1. When tested, they shall have a tensile strength across the joints equal to at least 600 psi.

END OF SECTION
SECTION 03348
CONCRETE FINISHING AND REPAIR OF SURFACE DEFECTS

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Concrete finishing and repair of surface defects.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.
   3. Section 03108 - Formwork.
   4. Section 03308 - Concrete, Materials and Proportioning.
   5. Section 03311 - Concrete Mixing, Placing, Jointing and Curing.

1.2 QUALITY ASSURANCE
A. Referenced Standards:
   1. American Concrete Institute (ACI):
      a. 116R, Cement and Concrete Terminology.
   2. ASTM International (ASTM):
      c. D4258, Standard Practice for Surface Cleaning Concrete for Coating.
      d. D4259, Standard Practice for Abrading Concrete.
   3. The Society for Protective Coatings/NACE International (SSPC/NACE):
      a. SP 13/NACE No. 6, Surface Preparation of Concrete.

B. Qualifications:
   1. Applicator of acrylic epoxy must be approved, in writing, by manufacturer.
   2. Manufacturer of acrylic epoxy shall have minimum of five (5) years experience in manufacturing of same with documented performance history for similar installations.
   3. Installer/applicator of acrylic epoxy shall have minimum of three (3) years experience installing similar coatings and shall be licensed or approved in writing by manufacturer to install/apply this product.

1.3 DEFINITIONS
A. Vertical Surface Defects:
   1. Any void in the face of the concrete deeper than 1/8 IN, such as:
      a. Tie holes.
      b. Air pockets (bug holes).
      c. Honeycombs.
      d. Rock holes.
   2. Scabbing:
      a. Scabbing is defect in which parts of the form face, including release agent, adhere to concrete.
   3. Foreign material embedded in face of concrete.
   4. Fins 1/16 IN or more in height.

B. Installer or Applicator:
   1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
   2. Installer and applicator are synonymous.
C. Other words and terms used in this Specification Section are defined in ACI 116R.

1.4 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Manufacturer's installation instructions.
   3. Certifications:
      a. Certification of aggregate gradation.
      b. Certification that products being used will not interfere with bonding of future floor or wall finishes.

B. Miscellaneous Submittals:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's recommendations and requirements for materials used.

1.6 WARRANTY

A. Provide warranty equal to specified manufacturer's standard warranty for all products used.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. Bonding agents:
      a. Euclid Chemical Co.
      b. BASF Admixtures, Inc.
      c. L&M Construction Chemicals, Inc.

2.2 MATERIALS

A. Bonding Agent:
   1. For use only on concrete surfaces not receiving liquid water repellent coating:
      a. High solids acrylic latex base liquid for interior or exterior application as a bonding agent to improve adhesion and mechanical properties of concrete patching mortars.
      b. Euclid Chemical Co. "Flex-Con."
      c. BASF Admixtures, Inc. "Acryl-Set."
      d. L&M Construction Chemicals, Inc. "Everbond."
      e. Thoro System Products "Acryl 60."
   2. For use only on concrete surface receiving liquid water repellent:
      a. Non-acrylic base liquid for interior or exterior application as a bonding agent to improve adhesion and mechanical properties of concrete patching mortars.
   3. For tie holes and larger patches as described in paragraph 3.1E.3b of this Section:
      a. Epoxy bonding agent with pot life that allows proper placement of patch as prescribed by manufacturer.
      b. Sikadur 32 Hi Mod LPL when no reinforcing steel is exposed.
      c. Sika Armatec 110 when reinforcing is exposed.

B. Cement:
   1. ASTM C150, Type II Portland.

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

D. Water: Potable.


F. Cementitious Epoxy Patch:
   1. SikaTop 122 Plus.

2.3 MIXES

A. Bonding Grout: One (1) part cement to one (1) part aggregate.

B. Patching Mortar:
   1. One (1) part cement to two and one-half (2-1/2) parts aggregate by damp loose volume:
      a. Substitute white Portland cement for a part of gray Portland cement to produce color
         matching surrounding concrete.

PART 3 - EXECUTION

3.1 PREPARATION

A. For methods of curing, see Specification Section 03311.

B. Preparation of Bonding Grout Mixture:
   1. Mix cement and aggregate.
   2. Mix bonding agent and water together in separate container in accordance with
      manufacturer's instructions.
   3. Add bonding agent/water mixture to cement/aggregate mixture.
   4. Mix to consistency of thick cream.
   5. Bonding agent itself may be used as bonding grout if approved by manufacturer and
      Engineer.

C. Preparation of Patching Mortar Mixture:
   1. Mix cement and aggregate.
   2. Mix bonding agent and water together in separate container in accordance with
      manufacturer's instructions.
   3. Add only enough bonding agent/water mixture to cement/aggregate mixture to allow
      handling and placing.
   4. Let stand with frequent manipulation with a trowel, until mix has reached stiffest
      consistency to allow placement.

D. Clean surfaces in accordance with ASTM D4258 to remove dust, dirt, form oil, grease, or other
   contaminants prior to abrasive blasting, chipping, grinding or wire brushing:
   1. Abrasive blast surfaces in accordance with ASTM D4259 and SSPC SP 13/NACE No. 6 to
      completely open defects down to sound concrete and remove laitance:
      a. If additional chipping or wire brushing is necessary, make edges perpendicular to
         surface or slightly undercut.
      b. No featheredges will be permitted.
   2. Rinse surface with clean water and allow surface water to evaporate prior to repairing
      surface defects.

E. Repairing Surface Defects:
   1. This method of repairing surface defects is to be used only on vertical concrete surfaces, in
      tanks containing water, surfaces to receive liquid water repellent and exterior surfaces.
   2. Fill and repair using patching mortar mix specified in the MIXES Article in PART 2 of this
      Specification Section:
      a. Use nonshrink grout to fill tieholes as outlined in this Specification Section.
   3. If required by bonding agent manufacturer, etch surfaces with a muriatic acid solution
      followed by a thorough rinse with clean water:
3.1 CONCRETE FINISHING AND REPAIR OF SURFACE DEFECTS

a. Test concrete to determine pH level and continue flushing with clean water until surface pH is within acceptable limits.

4. Dampen area to be patched and an area at least 6 IN wide surrounding it prior to application of bonding grout.

5. Brush bonding grout into the surface after the surface water has evaporated.

6. Allow bonding grout to set for period of time required by bonding agent manufacturer before applying premixed patching mortar.

7. Fill tie holes with nonshrink, nonmetallic grout:
   a. Where exposed to view and scheduled to receive concrete Finish #2 or #5, hold grout below surface of concrete and fill with patching mortar to match surrounding concrete.

8. Fill all other defects with patching mortar:
   a. Match color of surrounding wall.
   b. Do not use acrylic bonding agent in patching mortar for filling defects in surfaces to be treated with liquid water repellent.

9. Consolidate grout or mortar into place and strike off so as to leave patch slightly higher than surrounding surface.

10. Leave undisturbed for at least 60 minutes before finishing level with surrounding surface:
    a. Do not use metal tools in finishing a patch in a formed wall which will be exposed or coated with other materials.

11. Keep areas damp in accordance with grout manufacturer or bonding agent manufacturer’s directions.

3.2 INSTALLATION AND APPLICATION

A. Do not repair surface defects or apply wall or floor finishes when temperature is or is expected to be below 50 DegF:
   1. If necessary, enclose and heat area to between 50 and 70 DegF during repair of surface defects and curing of patching material:
      a. Use only clean fuel, indirect fired heating apparatus.

B. Concrete Finishes for Vertical Wall Surfaces:
   2. Finish #1 - As cast rough form finish:
      a. Selected forming materials are not required.
      b. Prepare surface in accordance with the PREPARATION Article in PART 3 of this Specification Section and repair the following surface defects:
         1) Tie holes.
         2) Honeycombs deeper than 1/4 IN.
         3) Air pockets deeper than 1/4 IN.
         4) Rock holes deeper than 1/4 IN.
      c. Chip or rub off fins exceeding 1/4 IN in height.
      d. Use at unexposed surfaces such as foundations and backfilled surfaces of walls not to be waterproofed.
   3. Finish #2 - As cast form finish:
      a. Form facing material shall produce a smooth, hard, uniform texture:
         1) Use forms specified for surfaces exposed to view in accordance with Specification Section 03108.
      b. Prepare surface in accordance with the PREPARATION Article in PART 3 of this Specification Section and repair the following surface defects:
         1) Tie holes.
         2) Honeycombs deeper than 1/4 IN or larger than 1/4 IN DIA.
         3) Air pockets deeper than 1/4 IN or larger than 1/4 IN DIA.
         4) Rock holes deeper than 1/4 IN or larger than 1/4 IN DIA.
         5) Scabbing.
      c. Chip or rub off fins exceeding 1/8 IN in height:
         1) Finish shall provide uniform color and texture.
d. Provide this finish for all exposed interior surfaces.

4. Finish #6 - Cork floated finish:
   a. Form facing material shall produce a smooth, hard, uniform texture:
      1) Use forms specified for surfaces exposed to view in accordance with Specification
         Section 03108.
   b. Prepare surface in accordance with Article 3.1 and repair all surface defects.
   c. Remove formwork as soon as possible, within 2 to 3 days of placement where possible.
   d. Mix one (1) part portland cement and one (1) part fine sand with bonding agent/water
      mixture to produce a stiff mortar.
   e. Dampen wall surface.
   f. Apply mortar with rubber float or trowel, filling all surface voids.
   g. Compress mortar into voids using slow speed grinder or stone.
   h. If the mortar surface dries too rapidly to permit compaction and finishing, apply a small
      amount of water using a fog spray.
   i. Produce the final texture with a cork float using a swirling motion.
   j. Construct mock-up per Article 1.2.
   k. Provide this finish on all exterior exposed surfaces.

C. Related Unformed Surfaces (Except Slabs):
   1. Strike smooth and level tops of walls or buttresses, horizontal offsets, and similar unformed
      surfaces occurring adjacent to formed surfaces after concrete is placed.
   2. Float surface to a texture consistent with that of formed surfaces:
      a. If more than one (1) finish occurs immediately adjacent to unformed surface, provide
         surface with most stringent formed surface requirement.
   3. Continue treatment uniformly across unformed surfaces.

D. Concrete Finishes for Horizontal Slab Surfaces:
   1. General:
      a. Tamp concrete to force coarse aggregate down from surface.
      b. Screed with straightedge, eliminate high and low places, bring surface to required finish
         elevations; slope uniformly to drains.
      c. Dusting of surface with dry cement or sand during finishing processes not permitted.
   2. Unspecified slab finish:
      a. When type of finish is not indicated, use following finishes as applicable:
         1) Surfaces intended to receive bonded applied cementitious applications: Scratched
            finish.
         2) Surfaces intended to receive roofing except future floors, or waterproofing
            membranes: Floated finish.
         3) Floors and roof surfaces which are future floors intended as walking surfaces or for
            reception of floor coverings: Troweled finish.
         4) Garage floors and ramps: Broom or belt finish.
         5) Exterior slabs, sidewalks, platforms, steps and landings, and ramps, not covered by
            other finish materials: Broom or belt finish.
         6) All slabs to receive a floated finish before final finishing.
   3. Scratched slab finish: After concrete has been placed, consolidated, struck off, and leveled
      to a Class B tolerance, roughen surface with stiff brushes or rakes before final set.
   4. Floated finish:
      a. After concrete has been placed, consolidated, struck off, and leveled, do no further
         work until ready for floating.
      b. Begin floating when water sheen has disappeared and surface has stiffened sufficiently
         to permit operations:
         1) Use wood or cork float.
      c. During or after first floating, check planeness of entire surface with a 10 FT
         straightedge applied at not less than two (2) different angles.
      d. Cut down all high spots and fill all low spots to produce a surface with Class B
         tolerance throughout.
e. Refloat slab immediately to a uniform texture.

5. Troweled finish:
   a. Float finish surface to true, even plane.
   b. Power trowel, and finally hand trowel.
   c. First troweling after power troweling shall produce a smooth surface which is relatively free of defects, but which may still show some trowel marks.
   d. Perform additional trowelings by hand after surface has hardened sufficiently.
   e. Final trowel when a ringing sound is produced as trowel is moved over surface.
   f. Thoroughly consolidate surface by hand troweling.
   g. Leave finished surface essentially free of trowel marks, uniform in texture and appearance and plane to a Class A tolerance.
   h. On surfaces intended to support floor coverings, remove any defects that would show through floor covering by grinding.

6. Broom or belt finish: Immediately after concrete has received a float finish as specified, give it a transverse scored texture by drawing a broom or burlap belt across surface.

7. Underside of concrete slab finish:
   a. Match finish as specified for adjacent vertical surfaces.
   b. If more than one (1) finish occurs immediately adjacent to underside of slab surface, provide surface with most stringent formed surface requirement.

3.3 FIELD QUALITY CONTROL

A. Horizontal slab finishes will be accepted provided:
   1. Applicable specification requirements are satisfied.
   2. Water does not pond in areas sloped to drain.
   3. Gap between a 10 FT straightedge placed anywhere and the finished surface does not exceed:
      a. Class A tolerance: 1/8 IN.
      b. Class B tolerance: 1/4 IN.
      c. Class C tolerance: 1/2 IN.
   4. Accumulated deviation from intended true plane of finished surface does not exceed 1/2 IN.
   5. Accuracy of floor finish does not adversely affect installation and operation of movable equipment, floor supported items, or items fitted to floor (doors, tracks, etc.).
   6. Finish work for exposed structures shall be Class B tolerance.
   7. Finish work for buried structures shall be Class B tolerance.
   8. Finish work for pipeline encasement shall be Class C tolerance.

B. Unacceptable finishes shall be replaced or, if approved in writing by Engineer, may be corrected provided strength and appearance are not adversely affected:
   1. High spots to be removed by grinding and/or low spots filled with a patching compound or other remedial measures to match adjacent surfaces.

END OF SECTION
SECTION 03350
TESTING

PART 1 - GENERAL

1.1 SUMMARY

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

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.
   3. Section 03208 - Reinforcement.
   4. Section 03308 - Concrete, Materials and Proportioning.

1.2 RESPONSIBILITY AND PAYMENT

A. Owner will collaborate with the Contractor to hire an independent Testing Agency/Service Provider to perform the following testing and inspection and provide test results to the Engineer and Contractor:
   1. Testing and inspection of concrete and grout produced for incorporation into the work during the construction of the Project for compliance with the Contract Documents.
   2. Additional testing or retesting of materials occasioned by their failure, by test or inspection, to meet requirements of the Contract Documents.
   3. Strength testing on concrete required by the Engineer or Special Inspector when the water-cement ratio exceeds the water-cement ratio of the typical test cylinders.
   4. In-place testing of concrete as may be required by Engineer when strength of structure is considered potentially deficient.
   5. Other testing services needed or required by Contractor such as field curing of test specimens and testing of additional specimens for determining when forms, form shoring or reshoring may re removed.
   6. Owner will pay for testing services as defined in Section 00805.

B. Contractor shall use the testing agency approved by the Owner to perform the following testing and provide test results to the Engineer:
   1. Testing of materials and mixes proposed by the Contractor for compliance with the Contract Documents and retesting in the event of changes.
   2. Additional testing and inspection required because of changes in materials or proportions requested by Contractor.
   3. Contractor shall pay for services defined in Paragraphs 1.2. B.

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

1.3 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Association of State Highway and Transportation Officials (AASHTO):
   2. American Concrete Institute (ACI):
      a. 318, Building Code Requirements for Structural Concrete.
      b. 350, Building Code Requirements for Environmental Engineering Concrete Structures
   3. ASTM International (ASTM):
      c. C42, Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
      d. C138, Standard Test Method for Density (Unit Weight), Yield, and Air Content Gravimetric) of Concrete.
      f. C172, Standard Practice for Sampling Freshly Mixed Concrete.
      g. C173, Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
      h. C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
      a. Cement and Concrete Reference Laboratory (CCRL).

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

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

1.4 DEFINITIONS

A. Testing Agency/Service Provider: An independent professional testing/inspection firm or service hired by Contractor or by Owner to perform testing, inspection or analysis services as directed, and as provided in the Contract Documents:
   1. The Special Inspector may at times be the same entity as owner’s testing agency.
   2. Testing agency employed by owner and contractor need not be same.

1.5 SUBMITTALS

A. Shop Drawings:
1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.

2. Product technical data including:
   a. Concrete materials and concrete mix designs proposed for use:
      1) Include results of all testing performed to qualify materials and to establish mix designs.
      2) Place no concrete until approval of mix designs has been received in writing.
      3) Submittal for each concrete mix design to include:
         a) Sieve analysis and source of fine and coarse aggregates.
         b) Test for aggregate organic impurities.
         c) Proportioning of all materials.
         d) Type of cement with mill certificate for the cement.
         e) Brand, quantity and class of fly ash proposed for use along with other submittal data as required for fly ash by Specification Section 03308.
         f) Slump.
         g) Brand, type and quantity of air entrainment and any other proposed admixtures.
         h) Shrinkage test results.
         i) Total chloride ion content per cubic yard of concrete determined in accordance with AASHTO T260.
         j) 28-day compression test results and any other data required by Specification Section 03308 to establish concrete mix design.

3. Certifications:
   a. Testing Agency qualifications.

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

PART 3 - EXECUTION

3.1 TESTING

A. The following concrete testing will be performed:

1. Concrete strength testing:
   a. Secure concrete samples in accordance with ASTM C172:
      1) Obtain each sample from a different batch of concrete on a random basis, avoiding selection of test batch other than by a number selected at random before commencement of concrete placement.
   b. For each strength test, mold and cure cylinders from each sample in accordance with ASTM C31:
      1) Record any deviations from requirements on test report.
      3) Quantity:
         a) 6 IN DIA by 12 IN high: Four (4) cylinders.
         b) 4 IN DIA by 8 IN high: Six (6) cylinders.
   c. Field cure one (1) cylinder for the seven (7) day test:
      1) Laboratory cure the remaining.
   d. Test cylinders in accordance with ASTM C39:
      1) 6 IN DIA cylinders:
         a) Test two (2) cylinders at 28 days for strength test result and one (1) at seven (7) days for information.
         b) Hold remaining cylinder in reserve.
      2) 4 IN DIA cylinders:
         a) Test three (3) cylinders at 28 days for strength test result and one (1) at seven (7) days for information.
b) Hold remaining cylinders in reserve.

e. Strength test result:
   1) Average of strengths of two (2) 6 IN DIA cylinders or three (3) 4 IN DIA cylinders from the same sample tested at 28 days.
   2) If one (1) cylinder in a test manifests evidence of improper sampling, molding, handling, curing, or testing, discard and test reserve cylinder; average strength of remaining cylinders shall be considered strength test result.
   3) Should all cylinders in a test show any of above defects, discard entire test.

f. Frequency of tests:
   1) Concrete sand cement grout: One (1) strength test for each 4 HR period of grout placement or fraction thereof.
   2) Precast concrete, concrete topping, concrete fill and lean concrete: One (1) strength test for each 10 CY of each type of concrete or fraction thereof placed.
   3) All other concrete:
      a) One (1) strength test consisting to be taken not less than once a day, nor less than once for each 60 CY or fraction thereof placed in any one (1) day.
      b) If total volume of concrete on Project is such that frequency of testing required in above paragraph will provide less than five (5) strength tests for each concrete mix, tests shall then be made from at least five (5) randomly selected batches or from each batch if fewer than five (5) batches are provided.

2. Slump testing:
   a. Determine slump of concrete sample for each strength test:
      1) Determine slump in accordance with ASTM C143.
   b. If consistency of concrete appears to vary, the Engineer shall be authorized to require a slump test for each concrete truck:
      1) This practice shall continue until the Engineer deems it no longer necessary.

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

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

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

3.2 SAMPLING ASSISTANCE AND NOTIFICATION FOR OWNER

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

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

3.3 ACCEPTANCE

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

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

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

D. Dimensional Tolerances:
1. Formed surfaces resulting in concrete outlines smaller than permitted by tolerances shall be considered potentially deficient in strength and subject to modifications required by Engineer.

2. Formed surfaces resulting in concrete outlines larger than permitted by tolerances may be rejected and excess material subject to removal:
   a. If removal of excess material is permitted, accomplish in such a manner as to maintain strength of section and to meet all other applicable requirements of function and appearance.

3. Concrete members cast in wrong location may be rejected if strength, appearance or function of structure is adversely affected or misplaced items interfere with other construction.

4. Inaccurately formed concrete surfaces exceeding limits of tolerances and which are exposed to view, may be rejected:
   a. Repair or remove and replace if required.

5. Finished slabs exceeding tolerances may be required to be repaired provided that strength or appearance is not adversely affected:
   a. High spots may be removed with a grinder, low spots filled with a patching compound, or other remedial measures performed as permitted or required.

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

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

G. Strength of Structure:
   1. Strength of structure in place will be considered potentially deficient if it fails to comply with any requirements which control strength of structure, including but not necessarily limited to following:
      a. Low concrete strength:
         1) Test results for standard molded and cured test cylinders to be evaluated separately for each mix design:
            a) Such evaluation shall be valid only if tests have been conducted in accordance with specified quality standards.
            b) For evaluation of potential strength and uniformity, each mix design shall be represented by at least three (3) strength tests.
            c) A strength test shall be the average of two (2) cylinders from the same sample tested at 28 days.
         2) Acceptance:
            a) Strength level of each specified compressive strength shall be considered satisfactory if both of the following requirements are met:
               (1) Average of all sets of three (3) consecutive strength tests equal or exceed the required specified 28 day compressive strength.
               (2) No individual strength test falls below the required specified 28 day compressive strength by more than 500 psi.
            b. Reinforcing steel size, configuration, quantity, strength, position, or arrangement at variance with requirements in Specification Section 03208 or requirements of the Contract Drawings or approved Shop Drawings.
            c. Concrete which differs from required dimensions or location in such a manner as to reduce strength.
            d. Curing time and procedure not meeting requirements of this Specification Section.
e. Inadequate protection of concrete from extremes of temperature during early stages of hardening and strength development.

f. Mechanical injury, construction fires, accidents or premature removal of formwork likely to result in deficient strength.

g. Concrete defects such as voids, honeycomb, cold joints, spalling, cracking, etc., likely to result in deficient strength or durability.

2. Structural analysis and/or additional testing may be required when strength of structure is considered potentially deficient.

3. In-place testing of concrete may be required when strength of concrete in place is considered potentially deficient:
   a. Testing by impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer to determine relative strengths at various locations in the structure or for selecting areas to be cored:
      1) Such tests shall not be used as a basis for acceptance or rejection.
   b. Core tests:
      1) Where required, test cores will be obtained in accordance with ASTM C42:
         a) If concrete in structure will be dry under service conditions, air dry cores (temperature 60 to 80 DegF, relative humidity less than 60 percent) for seven (7) days before test then test dry.
         b) If concrete in structure will be wet or subjected to high moisture atmosphere under service conditions, test cores after immersion in water for at least 40 HRS and test wet.
         c) Testing wet or dry to be determined by Engineer.
      2) Three (3) representative cores may be taken from each member or area of concrete in place that is considered potentially deficient:
         a) Location of cores shall be determined by Engineer so as least to impair strength of structure.
         b) If, before testing, one (1) or more of cores shows evidence of having been damaged subsequent to or during removal from structure, damaged core shall be replaced.
      3) Concrete in area represented by a core test will be considered adequate if average strength of three (3) cores is equal to at least 85 percent of specified strength and no single core is less than 75 percent of specified strength.
      4) Fill core holes with nonshrink grout and finish to match surrounding surface when exposed in a finished area.

4. If core tests are inconclusive or impractical to obtain or if structural analysis does not confirm safety of structure, load tests may be required and their results evaluated in accordance with ACI 318, Chapter 20.

5. Correct or replace concrete work judged inadequate by structural analysis or by results of core tests or load tests with additional construction, as directed by Engineer, at Contractor's expense.

6. Contractor to pay all costs incurred in providing additional testing and/or structural analysis required.

END OF SECTION
SECTION 05120
STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Structural steel, including the fabrication and erection of support and bracing members, including connections.
   2. Connection detail design as required.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 0 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 1 - General Requirements.
   3. Section 05505 - Metal Fabrications.
   4. Section 09905 - Painting and Protective Coatings.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Institute of Steel Construction (AISC):
      b. 360, Specifications for Structural Steel Buildings.
      c. Quality Certification Program for Fabricators.
   2. American Society of Civil Engineers (ASCE).
   3. American Society of Mechanical Engineers (ASME):
      a. B18.22.1, Plain Washers.
   4. ASTM International (ASTM):
      h. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
      k. A500, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
      m. A992, Standard Specification for Structural Steel Shapes.
q. F959, Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.
r. F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
5. American Welding Society (AWS):
h. A5.29, Specification for Low-Alloy Steel Electrodes for Flux Cored Arc Welding.
i. D1.1, Structural Welding Code – Steel:
   1) Steel stud connectors and their installation to comply with requirements of AWS D1.1.
7. Research Council on Structural Connections (RCSC):
8. Building code:
a. International Code Council (ICC):
B. Qualifications:
   1. Steel fabricator:
      a. Minimum of (10) years experience in fabrication of structural steel and participate in the AISC Certification program and is designated an AISC Certified Plant, Category STD at time of bid.
      b. Fabricator plant quality control and inspection program: Meet requirements of the Building Code and/or be approved by the project's governing authority to self perform the Building Code required Special Inspections.
      c. Use a professional engineer on fabrication staff.
   2. Steel erector:
      a. Minimum of (10) years of experience in erection of structural steel similar in the scope of this project.
      b. With an active and enforced quality assurance program in place, as described in the applicable Codes.
   3. Qualify welding procedures and welding operators in accordance with AWS.

1.3 DEFINITIONS

A. Code: AISC 303, Code of Standard Practice for Steel Buildings and Bridges
B. Owner: May mean the Owner's Designated Representative for Construction as defined by the AISC 303.
C. Galvanizing: Hot-dipped galvanizing per ASTM A153 and/or ASTM A123 with minimum coating of 2.0 OZ of zinc per square foot of metal (average of specimens) unless noted otherwise or dictated by aforementioned standards.

1.4 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Manufacturer's installation instructions.
      c. Detailed supplemental specification relating to load indicator washers or high-strength bolts:
         1) Alternate design for Engineer approval (submitted at Contractor's option if desired by Contractor for use).
      d. Source and certification of quality for high-strength bolts, nuts and washers.

   3. Fabrication and/or layout drawings:
      a. Prepare Shop Drawings under NISD Quality Procedures Program certification.
      b. Complete Shop Drawings for all of the work showing clearly all pieces, sizes, dimensions, details, connections materials and shop coatings:
         1) All Shop Drawings must be checked and signed "approved" before submittal.
         2) Show all cuts, copes, and holes.
         3) Indicate all shop and field bolts.
         4) Indicate all shop and field welds using AWS symbols.
         5) Be reviewed and sealed by a Professional Engineer retained by Contractor to verify conformance with design criteria stipulated in the Contract Documents.
      c. Prepare complete erection drawings showing the location and marks of all pieces:
         1) Copies of up-to-date erection drawings shall accompany the Shop Drawings.
         2) Use match marks on the erection drawings to indicate the sheet number on which each particular member is detailed.
      d. Correct any incorrect or unacceptable material or fabrication due to incorrect detailing, shop work, or erection, without additional charge.

   4. Certifications:
      a. Certificates of compliance with standards specified for all major components and fasteners incorporated into work.
      b. Copies of current welding certificates for each welder assigned to perform welding indicating compliance with testing specified by AWS.
      c. Welder qualification data and prequalified procedures.
      d. Special Inspections reports.

   5. Test reports:
      a. Certified copies of mill tests.
      b. Manufacturer's load test and temperature sensitivity data for post-installed anchor bolts.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Handle and store steel members above ground on skids or other supports:
   1. Keep free of dirt and other foreign material and protect against corrosion.
PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

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

1. High-strength bolts:
   b. Lewis Bolt & Nut Company.
   c. Nucor Fasteners.
   d. St. Louis Screw and Bolt Company.

2. Load indicator washers for high-strength bolts:
   b. Mid-South Bolt and Screw Co., Inc.
   c. J and M Turner, Inc.

3. Alternate design high-strength bolts:
   a. T. C. Bolt Corporation.
   b. Construction Fastener Systems Division of Bristol Machine Company.
   c. LeJuene Bolt Co.

4. Headed studs and deformed bar anchors:
   a. Nelson Stud Welding Division, TRW, Inc.
   b. Stud Welding Products, Inc.

5. Expansion anchor bolts:
   a. Kwik Bolts by Hilti, Inc.
   b. Trubolt by ITW Ramset/Red Head.
   c. Powerbolt by Powers Rawl.

6. Adhesive anchors bolts:
   a. HVA Adhesive Anchor System by Hilti.
   b. HIT HY 200 Max Adhesive Anchor by Hilti.
   c. HSE 2411 Epoxy Adhesive Anchor by Hilti.
   d. EPCON Ceramic 6 Epoxy by ITW Ramset/Red Head.
   e. Power Fast by Powers Rawl.

7. Anchor bolt sleeves:

2.2 MATERIALS

A. Steel, Structural Shapes and Plate (unless noted otherwise on Drawings):
   1. All W-shapes and WT-shapes: ASTM A992.
   2. All other plates, bars and rolled shapes: ASTM A36.

B. Pipe: ASTM A53, Grade B (Type E or S) (Fy=35).

C. Hollow Structural Sections (HSS):
   1. Round: ASTM A500/A500M, Grade B (Fy=42).
   2. Square or rectangular: ASTM A500/A500M, Grade B (Fy=46).

D. High-Strength Bolts, Nuts and Washers:
   1. ASTM A325 with ASTM A563 nuts galvanized.
   2. High-strength bolts:
      a. Provide two (2) ASTM F436 washers for all bolts galvanized.
      b. Provide beveled washers at connections of sloped/tapered sections.
   3. High-strength bolts with load indicating devices, ASTM F959, Type 325:
      a. Provide at Contractor's option and subject to approval of Engineer.
   4. Alternate high-strength design: Provide at Contractor's option and subject to approval of Engineer.
E. Bolts and Nuts, Non-high Strength: ASTM A307, Grade A or ASTM F1554, Grade 36.

F. Washers, Plain (for Non-high Strength Bolts): ASME B18.22.1, Type B.

G. Welding electrodes:
   1. Shielded metal arc: AWS A5.1 or AWS A5.5, E70XX or E801X-X.
   2. Submerged arc: AWS A5.17/A5.17M or AWS A5.23, F7XX-EXXX or F8XX-EXXX-XX.
   3. Gas metal arc: AWS A5.18, E70S-X or E70U-1 or AWS A5.28, ER80S-XX, E80C-XXX.
   4. Flux cored arc: AWS A5.20, E7XT-X (except 2, 3, 10, GS), AWS A5.29, E7XT-X or E8XTX-X.

H. Anchor Rods and Bolts:
   1. ASTM F593 Type 304 or 316 stainless steel with matching nut and washer.

I. Headed Studs and Deformed Bar Anchors:
   1. Headed studs:
      a. ASTM A108, complying with AWS D1., Section 7, Type B; minimum yield strength 50,000 psi, minimum tensile strength 60,000 psi.
      b. Uniform diameter.
      c. Heads: Concentric and normal to shaft.
      d. Weld end: Chamfered and solid flux.
   2. Deformed bar anchor:
      a. ASTM A1064, complying with AWS D1.1, Section 7, Type C.
      b. Minimum yield strength: 70,000 psi.
      c. Minimum tensile strength: 80,000 psi.
      d. Straight, unless indicated otherwise.
      e. Solid flux.
   3. After welding, remove ceramic ferrules and maintain free from any substance which would interfere with function, or prevent bonding to concrete.


K. Expansion Anchor Bolts and Adhesive Anchor Bolts for Fastening to Concrete:
   1. Use of expansion bolts requires approval by Engineer.
   2. Stainless steel, Type 304 or Type 316.
   3. Provide minimum edge distance cover as recommended by manufacturer or as indicated on Drawings.
   4. Submit manufacturer's data to verify at least the load test capacities and anchor bolt capacities at the following embedment depths:

<table>
<thead>
<tr>
<th>ANCHOR BOLT DIAMETER (IN)</th>
<th>EMBEDMENT (IN)</th>
<th>MINIMUM ULTIMATE TENSION CAPACITY (KIP)*, **</th>
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<tr>
<td>1-1/4</td>
<td>10</td>
<td>34.3</td>
</tr>
</tbody>
</table>

* Data must be based on actual tests performed in unreinforced mass concrete of not more than 4000 psi compressive strength.
** Capacity must be at a concrete temperature of at least 130 DegF.
2.3  FABRICATION

A. Comply with requirements of applicable Building Code and AISC 360 with modifications and additional requirements specified herein:
   1. Identify high-strength steel material in fabricated members in accordance with ASTM A6.

B. Minimize the amount of field welding:
   1. Shop assemble components into largest size possible commensurate with transportation and handling limitations.
   2. Shop connections: Bolted with high-strength bolts or welded.

C. Connection Details:
   1. Connections not fully detailed on Drawings shall be designed by a Professional Engineer registered in the State of Washington, retained by Contractor, based on requirements of Contract Documents.
   2. Provide as a minimum, two (2) 3/4 IN DIA, high-strength bolts for all bolted connections.
   3. Provide bearing type connections for all bolted connections, unless specified otherwise or required to be slip-critical by the RCSC Specification for Structural Joints Using High-Strength Bolts.
   4. One-sided or other types of eccentric connections not indicated will not be permitted without prior approval.
   5. Field Connections:
      a. Provide bolts for all field connections except where shown otherwise on the Drawings.
      b. Use high-strength bolts unless shown or specified otherwise.
      c. Use of high-strength bolts: Conform to RCSC Specification for Structural Joints Using High-Strength Bolts.
      d. Stainless steel bolts must be used for attaching stair treads to stringers.
      e. If structural steel details (field welds versus shop welds, etc.) shown on design Drawings are not compatible with selected erection procedures, submit proposed modifications for review.
      f. Connections to structural steel provided by others: Provide all connectors and coordinate location of bolt holes to match connection holes in steel provided by others.

D. Accurately mill column end bearing surfaces to true plane.

E. Fabricate and erect beams with non-specified camber in accordance with AISC 360, Chapter L1.

F. Cut, drill, or punch holes at right angles to surface of metal:
   1. Do not make or enlarge holes by burning.
   2. Make holes clean cut, without torn or ragged edges.
   3. Remove outside burrs resulting from drilling or reaming operations with tool making 1/16-IN bevel.
   4. Provide holes in members to permit connection of work of other trades or contractors.

G. Make allowance for draw in all cross bracing to provide small amount of initial tension in members.

H. Make splices only where indicated or where approved.

I. Cope at 45 degrees, corners of stiffener plates at junction of member flanges with webs.

J. Flame cut bevels for welds, provided such cutting is done automatically:
   1. Leave free of burrs and slag by grinding or planing the cut edges.

K. Grind smooth all rough welds and sharp steel edges shall be ground to approximately 1/8 IN radius.
L. Tolerances (unless noted otherwise on Drawings):
   1. When material received from the mill does not satisfy ASTM A6 tolerances for camber, profile, flatness or sweep, Contractor is permitted to perform corrective work by the use of controlled heating, and mechanical straightening, subject to the limitations of the AISC 360.
   2. Fabrication tolerance:
      a. Member length:
         1) Both ends finished for contact bearing: 1/32 IN.
         2) Framed members: 30 FT or less: 1/16 IN. Over 30 FT: 1/8 IN.
      b. Member straightness:
         1) Compression members: 1/1000 of axial length between points laterally supported.
         2) Non-compression members: ASTM A6 tolerance for wide flange shapes.
      c. Specified member camber (except compression members):
         1) 50 FT or less: -0/+1/2 IN.
         2) Over 50 FT: -0/+1/2 IN (plus 1/8 IN per 10 FT over 50 FT).
         3) Members received from mill with 75 percent of specified camber require no further cambering.
         4) Fabricate beams/trusses without specified camber so after erection, camber is upward.
         5) Measure camber in fabrication shop in unstressed condition.
      d. Use filler plates at bolted splices to take up depth deviation:
         1) At welded joints, adjust weld profile to conform to variation in depth.
         2) Slope weld surface per AWS requirements.
      e. Free finished members from twists, bends and open joints:
         1) Sharp kinks, bends and deviation from the above tolerances are cause for rejection of material.

2.4 WELDING

A. Comply with AWS D1.1, and other requirements indicated herein, for all welding, techniques of welding employed, appearance and quality of welds, and methods used to correct defective work:
   1. Qualify joint welding procedures or test in accordance with AWS qualification procedures.

B. Test and qualify welders, welding operators and tackers in compliance with AWS D1.1 for position and type of welding to which they will be assigned:
   1. Conduct tests in presence of approved testing agency.
   2. Certification within previous 12 months will be acceptable, provided samples of the welder's work are satisfactory.

C. Before Starting Welding:
   1. Carefully plumb and align members in compliance with specified requirements.
   2. Fully tighten all bolts.
   3. Comply with AWS D1.1, Section 5 for assembly and surface preparation.
   4. Preheat base metal to temperature stated in AWS D1.1:
      a. When no preheat temperature is given in AWS D1.1 and base metal is below 50 DegF, preheat base metal to at least 70 DegF.
      b. Maintain temperature during welding.
      c. Preheat surface of all base metal within distance from point of welding equal to thickness of thicker part being welded or 3 IN, whichever is greater, to specified preheat temperature.
      d. Maintain this temperature during welding.
   5. Mark welds with an identifying mark unique to each welder.

D. Make flange welds before making web welds.
E. Where groove welds have back-up plates, make first three (3) passes with 1/8 IN round electrodes:
   1. Use backup plates in accordance with AWS D1.1, extending minimum of 1 IN either side of joint.

F. Flame cut edges of stiffener plates at shop or field butt weld:
   1. Do not shear.

G. Grind flush web fillets at webs notched to receive backup plates for flange groove welds.

H. Low Hydrogen Electrodes: Dry and store electrodes in compliance with AWS D1.1.

I. Do not perform welding when ambient temperature is lower than 0 DegF or where surfaces are wet or exposed to rain, snow, or high wind, or when welders are exposed to inclement conditions.

J. Headed Studs and Deformed Bar Anchors:
   1. Automatically end welded in accordance with the AWS D1.1 and manufacturer's recommendations.
   2. Fillet welding of headed studs and deformed bar anchors is not allowed unless approved by Engineer.

K. Test in-place studs in accordance with requirements of AWS D1.1 to ensure satisfactory welding of studs to members:
   1. Replace studs failing this test.

L. When headed stud-type shear connectors are to be applied, clean top surface of members to receive studs in shop to remove oil, scale, rust, dirt, and other materials injurious to satisfactory welding:
   1. Do not shop paint or galvanize metal surfaces to receive field applied studs.

2.5 SHOP COATING

A. Refer to Specification Section 09905 and coordinate shop primer, surface preparation and coating with field applied primers and coatings where specified.

B. Provide suitable methods of handling and transporting painted steel to avoid damage to coating.

C. Do not coat following surfaces:
   1. Machined surfaces, surfaces adjacent to field welds, and surfaces fully embedded in concrete.
   2. All other members for which no coating is specified.
   3. Contact surfaces at bolted slip-critical connections, unless surface condition conforms to the RCSC Specification for Structural Joints Using High-Strength Bolts, Part 3.2.2.

D. Clean thoroughly all surfaces not coated before shipping:
   1. Remove loose mill scale, rust, dirt, oil and grease.
   2. Protect machined surfaces.

2.6 SOURCE QUALITY CONTROL

A. Testing Agency Responsibilities:
   1. Inspect shop and field welding in accordance with AWS D1.1, Section 6 including the following non-destructive testing:
      a. Visually inspect all welds.
      b. In addition to visual inspection, test 50 percent of full penetration welds and 20 percent of fillet welds with liquid dye penetrant.
      c. Test 20 percent of liquid dye penetrant tested full penetration welds with ultrasonic or radiographic testing.
2. Inspect high-strength bolting in accordance with the RCSC Specification for Structural Joints Using High-Strength Bolts, Section 9:
   b. Verify direct tension indicator gaps.
3. Inspect structural steel which has been erected.
4. Inspect stud welding in accordance with AWS D1.1, Section 7.8.
5. Prepare and submit inspection and test reports to Engineer:
   a. Assist Engineer to determine corrective measures necessary for defective work.

**PART 3 - EXECUTION**

### 3.1 GENERAL

A. Contractor is solely responsible for safety:
   1. Construction means and methods and sequencing of work is the prerogative of the Contractor.
   2. Take into consideration that full structural capacity of many structural members is not realized until structural assembly is complete; e.g., until slabs, decks, bracing or rigid connections are installed.
   3. Partially complete structural members shall not be loaded without an investigation by the Contractor.
   4. Until all elements of the permanent structure and lateral bracing system are complete, provide temporary bracing designed, furnished, and installed by the Contractor for the partially complete structure.

B. Adequate temporary bracing to provide safety, stability and to resist all loads to which the partially complete structure may be subjected, including wind, construction activities, and operation of equipment, is the responsibility of the Contractor:
   1. Use temporary guys, braces, shoring, connections, etc., necessary to maintain the structural framing plumb and in proper alignment until permanent connections are made, the succeeding work is in place, and temporary work is no longer necessary.
   2. Use temporary guys, bracing, shoring, and other work to prevent injury or damage to adjacent work or construction from stresses due to erection procedures and operation of erection equipment, construction loads, and wind.
   3. Design of the temporary bracing system and consideration of the sequence and schedule of placement of such elements and effects of loads imposed on the structural steel members by partially or completely installed work, including work of all other trades, is the Contractor's responsibility:
      a. If not obvious from experience or from the Drawings, the Contractor shall confer with the Engineer to identify those structural steel elements that must be complete before the temporary bracing system is removed.
   4. Remove and dispose of all temporary work and facilities off-site.

C. Examine work-in-place on which specified work is in any way dependent to ensure that conditions are satisfactory for the installation of the work:
   1. Report defects in work-in-place which may influence satisfactory completion of the work.
   2. Absence of such notification will be construed as acceptance of work-in-place.

D. Field Measurement:
   1. Take field measurements as necessary to verify or supplement dimensions indicated on the Drawings.
   2. Contractor is responsible for the accurate fit of the work.

E. Check the elevations of all finished footings or foundations and the location and alignment of all anchor bolts before starting erection:
   1. Notify Engineer of any errors or deviations found by such checking.
3.2 ERECTION

A. Framing member location tolerances after erection shall not exceed the frame tolerances listed in the FIELD QUALITY CONTROL Article in PART 3 of this Specification Section.

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

C. Use light drifting necessary to draw holes together:
   1. Drifting to match unfair holes is not allowed.

D. Welding:
   1. Conform to AWS D1.1 and requirements of this Specification Section.
   2. Join two (2) sections of steel of different ASTM designations using welding techniques in accordance with a qualified AWS D1.1 procedure.

E. Shore existing members when unbolting of common connections is required:
   1. Use new bolts for rebolting connections.

F. Clean stored material of all foreign matter accumulated during erection period.

G. Clean bearing and contact surfaces before assembly.

H. Set beam and column base and bearing plates accurately, as indicated, on nonshrink grout:
   1. Set and anchor each base plate to proper line and elevation.
   2. Use metal wedges, shims or setting nuts as required and tighten anchor bolts:
      a. Use same metal as base plate.
      b. Cut off protrusions of wedges and shims flush with edge of base plate.
   3. Fill sleeves around anchor bolts with nonshrink grout.
   4. Pack grout solidly between bottom of plate and bearing surface.
   5. Refer to Section 03308 for nonshrink grout requirements.

I. Anchor Bolts:
   1. Anchor bolt location tolerance per AISC 303, Section 7.5.
   2. Tie anchor bolts in position to embedded reinforcing steel using wire.
   3. Welding or tack welding is prohibited.
   4. Provide steel templates for locating anchor bolts.
   5. Coat bolt threads and nuts with heavy coat of clean grease.

J. Install high strength bolts with hardened washers:
   1. Install and tighten in accordance with the RCSC Specification for Structural Joints Using High-Strength Bolts, Section 8.
   2. Coordinate installation with inspection:
      a. Do not start installation until coordination with Testing Agency is complete.
   3. Bearing-type connections: High-strength bolts shall be tightened to snug-tight condition.
   4. Slip-critical connections:
      a. Perform calibration testing for all methods of installation of high-strength bolts in accordance with RCSC Specification for Structural Joints Using High-Strength Bolts, Section 8.2.
      b. Turn-of-nut tightening:
         1) Inspector shall observe the pre-installation verification testing.
         2) Subsequently, ensure by routine observation that the bolting crew properly rotates the turned element relative to the unturned element by the amount specified.
         3) Alternatively, when fastener assemblies are match-marked after the initial fitup of the joint but prior to pretensioning, visual inspection after pretensioning is permitted in lieu of routine observation.
      c. Calibrated wrench tightening: Calibrate on a daily basis.
      d. Direct tension indicator tightening: If previously approved by Engineer.
      e. Installation of alternate design bolts: If previously approved by Engineer.
   5. In the event any bolt in a connection is found to be defective, check and retighten all bolts in the connection.
K. Do not use gas cutting to correct fabrication errors:
   1. In case members do not fit or holes do not match, ream out the holes and insert the next larger size bolt:
      a. Drill new holes if the connections require new holes.
      b. Make no such corrections without prior approval of the Engineer.
   2. Burning of holes is not permitted.

L. Prior to making field connections to existing structural steel, remove completely all paint from existing steel which will be in contact with new steel and new welds.

M. Tighten and leave in place erection bolts used in welded construction.

N. Provide beveled washers to give full bearing to bolt head or nut where bolts are to be used on surfaces having slopes greater than 1 in 20 with a plane normal to bolt axis.

O. After bolts are tightened, upset threads of non-high strength bolts and anchor bolts to prevent nuts from backing off.

P. After Erection:
   1. Grind smooth all sharp surface irregularities resulting from field cutting or welding.
   2. Power tool clean welds, bolts, washers and abrasions to shop coat removing all rust and foreign matter.

Q. Expansion Anchor Bolts and Adhesive Anchor Bolts:
   1. Minimum embedment as recommended by manufacturer or specified herein, whichever is larger.
   2. Notify Engineer if required depth of embedment cannot be achieved at a particular bolt location.
   3. Follow manufacturer's recommendations for installation and torque.

3.3 FIELD QUALITY CONTROL

A. Testing Agency responsibilities are described in the SOURCE QUALITY CONTROL Article in PART 2 of this Specification Section.

B. Erected Frame Tolerance, unless noted otherwise on the Drawings:
   1. Do not exceed cumulative effect of rolling, fabrication and erection tolerance for overall finished dimensions.
   2. Erection tolerances are defined relative to member working points and working lines as follows:
      a. Actual centerline of top flange or surface at each end for horizontal members.
      b. Actual center of member at each end for all other members.
      c. Other points may be used, providing they are based on these definitions.
      d. Working line is straight line connecting member working points.
   3. Tolerances on position and alignment are as specified in the Code, unless otherwise modified:
      a. Provide "adjustable items" such as lintels, wall supports, curb angles, window mullions and similar members with adjustable connections to supporting structural frame.
   4. Certification by steel erector:
      a. Certify the location of erected structural steel is acceptable for plumbness, level and aligned within tolerances specified.
      b. Provide certification upon completion of any part of work.
      c. Provide certification prior to start of work by other trades that may be supported; attach to structural steel work.

C. Special Inspections: See drawings, specifications and statement of Special Inspections.

3.4 CLEANING AND REPAIR OF SHOP PRIMER PAINT

A. After erection, clean all steel of mud or other foreign materials, and repair any damage.
   1. Touchup coatings to comply with Specification Section 09905.
SECTION 05505
METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Custom fabricated metal items and certain manufactured units not otherwise indicated to be supplied under work of other Specification Sections.
   2. Design of all temporary bracing not indicated on Drawings.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.
   3. Division 03 - Concrete.
   4. Section 05120 - Structural Steel.
   5. Section 09905 - Painting and Protective Coatings.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Association of State Highway and Transportation Officials (AASHTO):
      a. HB, Standard Specifications for Highway Bridges.
   2. American Institute of Steel Construction (AISC):
      b. 360, Specifications for Structural Steel Buildings (referred to herein as AISC Specification).
   3. American National Standards Institute (ANSI):
   4. American Society of Civil Engineers (ASCE):
   5. ASTM International (ASTM):
      i. A193, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
      j. A194, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
n. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
r. A1064, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
s. A500, 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.
x. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
gg. F835, Standard Specification for Alloy Steel Socket Button and Flat Countersunk Head Cap Screws.
. F879, Standard Specification for Stainless Steel Socket Button and Flat Countersunk Head Cap Screws.
6. American Welding Society (AWS):
b. D1.1, Structural Welding Code - Steel.
7. National Association of Architectural Metal Manufacturers (NAAMM):
a. AMP 510, Metal Stairs Manual.
c. MBG 531, Metal Bar Grating Manual.
8. Occupational Safety and Health Administration (OSHA):
a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.
9. Building code:
a. International Code Council (ICC):
B. Qualifications:
   1. Qualify welding procedures and welding operators in accordance with AWS.
   2. Fabricator shall have minimum of 10 years experience in fabrication of metal items specified.
   3. Engineer for contractor-designed systems and components: Professional structural engineer licensed in the State of Washington.

1.3 DEFINITIONS

A. Fasteners: As defined in ASTM F1789.

B. Galvanizing: Hot-dip galvanizing per ASTM A123/A123M or ASTM A153/A153M with minimum coating of 2.0 OZ of zinc per square foot of metal (average of specimens) unless noted otherwise or dictated by standard.

C. Hardware: As defined in ASTM A153/A153M.

D. Installer or Applicator:
   1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
   2. Installer and applicator are synonymous.

1.4 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Fabrication and/or layout drawings and details:
      a. Submit drawings for all fabrications and assemblies:
         1) Include erection drawings, plans, sections, details and connection details.
      b. Identify materials of construction, shop coatings and third party accessories.
   3. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Manufacturer's installation instructions.
      c. Provide manufacturer's standard allowable load tables for the following:
         1) Grating and checkered plate.
         2) Expansion anchor bolts.
         3) Adhesive anchor bolts.
         4) Castings, trench covers and accessories.
   4. Contractor designed systems and components, including but not limited to, stairs, landings and ladders:
      a. Certification that manufactured units meet all design loads specified.
      b. Shop Drawings and engineering design calculations:
         1) Indicate design live loads.
         2) Sealed by a professional structural engineer.
         3) Engineer will review for general compliance with Contract Documents.

B. Miscellaneous Submittals:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Certification of welders and welding processes:
      a. Indicate compliance with AWS.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver and handle fabrications to avoid damage.

B. Store above ground on skids or other supports to keep items free of dirt and other foreign debris and to protect against corrosion.
PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. Abrasive stair nosings (embedded in concrete stairs):
      a. American Safety Tread.
      b. Balco.
   2. Headed studs and deformed bar anchors:
      b. Stud Welding Products, Inc.
   3. Expansion anchor bolts:
      a. Hilti Inc.
      b. ITW Ramset/Red Head.
      c. Simpson Strong-Tie.
   4. Epoxy adhesive anchor bolts:
      a. Hilti Inc.
      b. ITW Ramset/Red Head.
      c. Simpson Strong-Tie.
   5. Castings, trench covers and accessories:
      a. Neenah Foundry Co.
      b. Deeter Foundry Co.
      c. Barry Craft Construction Casting Co.
      d. McKinley Iron Works.
   6. Galvanizing repair paint:
      a. Clearco Products Co., Inc.
      b. ZRC Products.

2.2 MATERIALS

A. Steel:
   1. Structural:
      a. W-shapes and WT-shapes: ASTM A992, Grade 50.
      b. All other plates and rolled sections: ASTM A36.
   2. Pipe: ASTM A53, Types E or S, Grade B or ASTM A501.
   3. Structural tubing:
      a. ASTM A500, Grade B (46 ksi minimum yield).
   4. Bolts, nuts and washers, high strength:
      a. ASTM A325.
      b. Provide two (2) washers with all bolts.
   5. Common Bolts and nuts:
      a. ASTM A307, Grade A.
   7. Steel forgings: ASTM A668.

B. Iron:
   1. Ductile iron: ASTM A536.
   2. Gray cast iron: ASTM A48 (minimum 30,000 psi tensile strength).

C. Stainless Steel:
   1. Minimum yield strength of 30,000 psi and minimum tensile strength of 75,000 psi:
      a. Bars, shapes: ASTM A276, Type 316.
      b. Tubing and pipe: ASTM A269, ASTM A312 or ASTM A554, Type 316.
      c. Strip, plate and flat bars: ASTM A666, Type 316, Grade A.
      d. Bolts and nuts: ASTM F593, Type 316.
2. Minimum yield strength of 25,000 psi and minimum tensile strength of 70,000 psi:
   a. Strip, plate and flat bar for welded connections, ASTM A666, Type 316L.
3. Welding electrodes: In accordance with AWS for metal alloy being welded.

D. Washers: Same material and alloy as found in accompanying bolts and nuts.

E. Embedded Anchor Bolts:
   1. Control Building anchor bolts:
      a. ASTM F1554, Grade 55 with weldability supplement S1 or ASTM A36 for threaded rods galvanized.
   2. All other anchor bolts: Type 304 or 316 stainless steel with matching nut and washer.

F. Expansion Anchor Bolts and Adhesive Anchor Bolts:
   1. Stainless steel, Type 304 or 316.
   2. Provide minimum edge distance cover and spacing as recommended by manufacturer, or as indicated on Drawings whichever is larger:
      a. Minimum embedment as recommended by manufacturer or eight (8) diameters of bolt, whichever is larger.
      b. Notify Engineer if required depth of embedment cannot be achieved at a particular anchor bolt location.
      c. Follow manufacturer's recommendations for installation and torque.

G. Headed Studs: ASTM A108 with a minimum yield strength of 50,000 psi and a minimum tensile strength of 60,000 psi.

H. Deformed Bar Anchors: ASTM A1064 with a minimum yield strength of 70,000 psi and a minimum tensile strength of 80,000 psi.

I. Iron and Steel Hardware: Galvanized in accordance with ASTM A153 when required to be galvanized.

J. Galvanizing Repair Paint:
   1. High zinc dust content paint for regalvanizing welds and abrasions.
   2. ASTM A780.
   3. Zinc content: Minimum 92 percent in dry film.
   4. ZRC "ZRC Cold Galvanizing" or Clearco "High Performance Zinc Spray."


2.3 MANUFACTURED UNITS

A. Ladders:
   1. General:
      a. Fully welded type:
         1) All welds to be full penetration welds.
      b. All ladders of a particular material shall have consistent construction and material shapes and sizes unless detailed otherwise on the Drawings.
      c. Design ladder in accordance with OSHA Standards, ANSI A14.3, ASCE 7 and applicable Building Codes.
      d. Ladders shall be designed to support a minimum concentrated live load of 300 LBS at any point to produce the maximum stress in the member being designed:
         1) Apply additional 300 LB loads for each section of ladder exceeding 10 FT.
      e. Maximum allowable stresses per AA ADM 1.
      f. Maximum lateral deflection: Side rail span/240 when lateral load of 100 LBS is applied at any location.
   2. Material:
      a. Polypropylene.
      b. Finish:
         1) Mill.
   3. Rails:
a. Round pipe or rectangular tubing:
   1) Round pipe:
      a) 1-1/2 IN nominal diameter.
      b) Schedule 80.
   2) Rectangular tubing:
      a) Cross-section: 3 by 2 IN maximum.
      b) Thickness: 0.125 IN minimum.

b. Spacing:
   1) Minimum clear distance between rails to be 18 IN.
   2) Step-through ladder extensions: 24 IN, centerline to centerline.

c. Provide cap at exposed top and bottom of side rails:
   1) Provide weep holes as necessary to prevent the accumulation of moisture within hollow members.

d. Extend side rails of step-through ladders a minimum of 42 IN above the landing.

4. Rungs:
   a. Minimum 1 IN DIA or 1 IN square solid bar:
      1) Integral non-slip finish on all sides:
         a) Non-slip finish: Coarse knurling or extruded serrations.
         b) Shop or field-applied grit tape and cap type non-slip finish is not acceptable.
   b. Rungs shall penetrate inside wall of side rails:
      1) Do not extend rungs beyond the outside face of the side rail.
      2) Provide full-penetration weld all around rung.
   c. Rung spacing:
      1) Uniform, 12 IN.
      2) Top rung shall be level with landing or platform:
         a) Where top of ladder terminates at grating cover, floor access door, roof hatch or similar condition; locate top rung as close as practicable to, but not more than 6 IN below, adjacent walking surface.
      3) Spacing of bottom rung from grade or platform may vary but shall not exceed 14 IN.

5. Brackets:
   a. Angle or bent plate brackets welded to side rails:
      1) 3/8 IN by 2-1/2 IN by length required.
      2) Provide punched holes for 3/4 IN bolts or anchors.
      3) Minimum distance from centerline of rung to wall or any obstruction: 7 IN.
      4) Maximum spacing: 4 FT OC.
   b. For floor supported ladders, provide 3/8 by 2-1/2 by 4 IN rectangular bracket or 3/8 by 6 by 6 IN square plate welded to rails with punched holes for 3/4 IN bolts:
      1) Provide wall brackets on floor supported units if vertical run is over 4 FT.

6. Provide ladder cage where shown on the Drawings:
   a. Cage construction shall meet all requirements of OSHA Standards and this Specification Section:
      1) Hoops: Minimum 1/4 by 2 IN bar at 48 IN OC spacing.
      2) Vertical bars: Minimum 1/4 by 1-1/2 IN bar.
      3) Weld all connections.
      4) Construct cage of same materials as the ladder on which it is mounted.
      5) Mount cage on ladder by welding.

7. Landings:
   a. Construct landing, railing and all supports of same material as the ladder.
   b. Design landing platform and supporting structure for not less than 100 psf plus a concentrated load of 300 LBS with a maximum deflection of 1/300 of span under a superimposed live load of 100 psi.
   c. Grating:
      1) Minimum 1-1/2 IN non-slip grating per this Specification Section.
      2) Attach grating using stainless steel clips and bolts at 24 IN OC maximum spacing.
d. Structural support: Channel or tubular sections with bracing, plates, angles, etc., to support guardrail and grating and to support landing off the side of the tank or building wall:
   1) Weld or bolt all connections using stainless steel bolts, nuts and washers.

e. Guardrails:
   1) Match ladder side rails:
      a) Space intermediate rails equally between top rail and top of kickplate.
   2) Provide 4 IN high x 3/8 IN thick toeboard each side of landing.

8. Ladder safety extension post:
   a. Telescoping tubular Polypropylene section that automatically locks into place when fully extended.
   b. Non-ferrous corrosion-resistant spring and hardware.
   c. Factory assembled with all hardware necessary for mounting to ladder.
   d. Bilco “LadderUp” safety post.

B. Steel Grating:
   1. NAAMM MBG 531.
   2. Bearing bars:
      a. Rectangular 1-1/2 by 3/16 IN unless shown otherwise on Drawings.
      b. Maximum 1-3/16 IN OC spacing.
   3. Cross bars:
      a. Welded, swaged or pressure locked to bearing bars.
      b. Maximum 4 IN OC spacing.
   4. Top edges of bars: Serrated or grooved.
   5. Removable grating sections: Not wider than 3 FT and not more than 100 LBS.
   6. Finish:
      a. Galvanized.
      b. Clips and bolts: Galvanized.
      c. Seat angles: Galvanized steel.
   7. Ends and perimeter edges: Banded.
   8. Openings through grating: Reinforced to provide required load carrying capacity and banded with 4 IN high toe plate.
   9. Provide joints at openings between individual grating sections.

C. Access Cover:
   1. Tank type manhole frame and solid lid: ASTM A48 or ASTM A536, cast iron.
   2. Unless shown otherwise, design of cover shall be such that top of frame extends several inches above slab to prevent surface water from entering tank.
   3. Equip lid with four (4) stainless steel screws to secure lid to frame.

2.4 FABRICATION

A. Verify field conditions and dimensions prior to fabrication.
B. Form materials to shapes indicated with straight lines, true angles, and smooth curves:
   1. Grind smooth all rough welds and sharp edges:
      a. Round all corners to approximately 1/32 - 1/16 IN nominal radius.
C. Provide drilled or punched holes with smooth edges:
   1. Punch or drill for field connections and for attachment of work by other trades.
D. Weld Permanent Shop Connections:
   1. Welds to be continuous fillet type unless indicated otherwise.
   2. Full penetration butt weld at bends in stair stringers and ladder side rails.
   3. Weld structural steel in accordance with AWS D1.1 using Series E70 electrodes conforming to AWS A5.1/A5.1M.
   4. All headed studs to be welded using automatically timed stud welding equipment.
   5. Grind smooth welds that will be exposed.
E. Conceal fastenings where practicable.

F. Fabricate work in shop in as large assemblies as is practicable.

G. Tolerances:
   1. Rolling:
      a. ASTM A6.
      b. When material received from the mill does not satisfy ASTM A6 tolerances for camber, profile, flatness, or sweep, the Contractor is permitted to perform corrective work by the use of controlled heating and mechanical straightening, subject to the limitations of the AISC Specification.
   2. Fabrication tolerance:
      a. Member length:
         1) Both ends finished for contact bearing: 1/32 IN.
         2) Framed members:
            a) 30 FT or less: 1/16 IN.
            b) Over 30 FT: 1/8 IN.
      b. Member straightness:
         1) Compression members: 1/1000 of axial length between points laterally supported.
         2) Non-compression members: ASTM A6 tolerance for wide flange shapes.
      c. Specified member camber (except compression members):
         1) 50 FT or less: Minus 0/plus 1/2 IN.
         2) Over 50 FT: Minus 0/plus 1/2 IN (plus 1/8 IN per 10 FT over 50 FT).
         3) Members received from mill with 75 percent of specified camber require no further cambering.
         4) Beams/trusses without specified camber shall be fabricated so after erection, camber is upward.
         5) Camber shall be measured in fabrication shop in unstressed condition.
      d. At bolted splices, depth deviation shall be taken up by filler plates:
         1) At welded joints, adjust weld profile to conform to variation in depth.
         2) Slope weld surface per AWS requirements.
      e. Finished members shall be free from twists, bends and open joints:
         1) Sharp kinks, bends and deviation from above tolerances are cause for rejection of material.
   H. Fabricate grating in accordance with NAAMM MBG 531:
      1. Maximum tolerance for difference in depth between grating depth and seat or support angle depth: 1/8 IN.
      2. Distance between edge of grating and face of embedded seat angle or face of wall or other structural member: 1/4 IN:
         a. Tolerance: NAAMM MBG 531.
      3. Removable sections: Not wider than 3 FT and not more than 100 LBS.
      4. Ends and perimeter edges: Banded:
         a. Provide full depth banding unless noted otherwise.
         b. Banding at trenches and sumps to be 1/4 IN less than grating depth to allow for drainage.
      5. Openings through grating: Reinforced to provide required load carrying capacity and banded with 4 IN high toe plate.
      6. Provide joints at openings between individual grating sections.
      7. Fabricate grating so that bearing bars and cross bars in adjacent sections are aligned.
   I. Fabricate checkered plate and miscellaneous metals in accordance with NAAMM AMP 555:
      1. Workmanship: Class 2 unless noted otherwise.
   J. See Specification Section 09905 for preparation and painting of ferrous metals and other surfaces.
2.5 SOURCE QUALITY CONTROL

A. Surface Preparation:
   1. Refer to Specification Section 09905 for surface preparation requirements.

B. Shop Applied Paint Coating Application:
   1. Refer to Specification Section 09905 for painting requirements.

C. Meet structural requirements of Specification Section 05120 for inspection and testing items of structural nature.

PART 3 - EXECUTION

3.1 PREPARATION

A. Provide items to be built into other construction in time to allow their installation:
   1. If such items are not provided in time for installation, cut in and install.

B. Prior to installation, inspect and verify condition of substrate.

C. Correct surface defects or conditions which may interfere with or prevent a satisfactory installation:
   1. Field welding aluminum is not permitted unless approved in writing by Engineer.

3.2 INSTALLATION

A. Set metal work level, true to line, plumb:
   1. Shim and grout as necessary.


C. Grind welds smooth where field welding is required.

D. Field cutting grating or checkered plate to correct fabrication errors is not acceptable:
   1. Replace entire section.

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

F. Unless noted or specified otherwise:
   1. Connect steel members to steel members with 3/4 IN DIA ASTM A325 high strength bolts.
   2. Connect aluminum to structural steel using 3/4 IN DIA stainless steel bolts:
      a. Provide dissimilar metals protection.
   3. Connect aluminum and steel members to concrete and masonry using stainless steel expansion anchor bolts or adhesive anchor bolts unless shown otherwise:
      a. Provide dissimilar materials protection.
   4. Provide washers for all bolted connections.
   5. Where exposed, bolts shall extend a maximum of 3/4 IN and a minimum of 1/2 IN above the top nut:
      a. If bolts are cut off to required maximum height, threads must be dressed to allow nuts to be removed without damage to the bolt or the nuts.

G. Install and tighten ASTM A325 high-strength bolts in accordance with the AISC 325, Allowable Stress Design (ASD):
   1. Provide hardened washers for all ASTM A325 bolts:
      a. Provide the hardened washer under the element (nut or bolt head) turned in tightening.

H. After bolts are tightened, upset threads of ASTM A307 unfinished bolts or anchor bolts to prevent nuts from backing off.

I. Secure metal to wood with lag screws of adequate size with appropriate washers.
J. Do not field splice fabricated items unless said items exceed standard shipping length or change of direction requires splicing:
   1. Provide full penetration welded splices where continuity is required.

K. Provide each fabricated item complete with attachment devices as indicated or required to install.

L. Anchor such that work will not be distorted nor fasteners overstressed from expansion and contraction.

M. Set beam and column base plates accurately on nonshrink grout as indicated on Drawings:
   1. See Division 03 Specification Sections for non-shrink grout.
   2. Set and anchor each base plate to proper line and elevation:
      a. Use metal wedges, shims, or setting nuts for leveling and plumbing columns and beams:
         1) Wedges, shims and setting nuts to be of same metal as base plate they support.
         2) Tighten nuts on anchor bolts.
      b. Fill space between bearing surface and bottom of base plate with nonshrink grout:
         1) Fill space until voids are completely filled and base plates are fully bedded on wedges, shims, and grout.
      c. Do not remove wedges or shims:
         1) Where they protrude, cut off flush with edge of base plate.
      d. Fill sleeves around anchor bolts solid with non-shrink grout.

N. Tie anchor bolts in position to embedded reinforcing steel using wire:
   1. Tack welding prohibited:
      a. Coat projecting bolt threads and nuts with heavy coat of clean grease.
   2. Anchor bolt location tolerance:
      a. 1/16 IN.
      b. Provide steel or durable wood templates for all column anchor bolts.

O. Provide abrasive stair nosings in each tread and landing of all concrete stairs and at each concrete stair landing having metal stair structure attaching to the concrete landing:
   1. Center stair nosings in stair width.
   2. Coordinate nosings with railing vertical posts:
      a. Maintain 2 IN clear between end of nosing and edge of railing base plate.

P. Accurately locate and place frames for openings before casting into floor slab so top of plate is flush with surface of finished floor:
   1. Keep screw holes clean and ready to receive screws.

Q. Attach grating to end and intermediate supports with grating saddle clips and bolts:
   1. Maximum spacing: 2 FT OC with minimum of two (2) per side.

R. Coat aluminum surfaces in contact with dissimilar materials in accordance with Specification Section 09905.

S. Repair damaged galvanized surfaces in accordance with ASTM A780:
   1. Prepare damaged surfaces by abrasive blasting or power sanding.
   2. Apply galvanizing repair paint to minimum 6 mils DFT in accordance with manufacturer's instructions.

T. Anchor ladder to concrete structure with minimum 3/4 IN stainless steel anchor bolts with minimum 6 IN embedment.

U. Anchor ladder to masonry structure with minimum 3/4 IN stainless steel anchor bolts with minimum 6 IN embedment:
   1. When anchoring into masonry, fill masonry cores with grout at anchor locations and each masonry core within 8 IN of anchor
   2. When anchoring into cavity wall construction, provide minimum 6 IN embedment into concrete or masonry back-up wall:
a. At each anchor location, provide sleeve between back face of veneer and cavity face of concrete or masonry back-up wall.

b. Cut cavity insulation as required and seal around sleeve:
   1) Sleeve to be 1 IN DIA schedule 40 stainless steel tubing, TP-304L, ASTM A269:
      a) Minimum wall thickness to be .065 IN.
   2) Continuously weld 4 by 4 by 1/4 IN Type 304 stainless steel, ASTM A666 flange onto each end of pipe:
      a) Drill 1 IN hole in flange to match pipe.
      b) Attach sleeve to concrete or masonry back-up with 1/4 IN self-tapping concrete anchors.
   3) Grout solid, area around bolt where bolt penetrates veneer.
   4) Accurately locate sleeves to align with bolt locations on ladder.

3.3 CLEANING

   A. After erection, installation or application, clean all miscellaneous metal fabrication surfaces of all dirt, weld slag and other foreign matter.

   B. Provide surface acceptable to receive field applied paint coatings specified in Specification Section 09905.

END OF SECTION
DIVISION 09
FINISHES
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. High performance industrial coatings (HPIC).
   2. Any other coating, thinner, accelerator, inhibitor, etc., specified or required as part of a complete System specified in this Specification Section.
   3. Minimum surface preparation requirements.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.
   3. Section 03348 - Concrete Finishing and Repair of Surface Defects.
   4. Section 05505 - Metal Fabrications.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. National Bureau of Standards (NBS):
      a. Certified Coating Thickness Calibration Standards.
   2. NSF International (NSF).
   3. The Society for Protective Coatings (SSPC):
      a. PA 2, Measurement of Dry Coating Thickness with Magnetic Gages.
      b. SP 1, Solvent Cleaning.
      c. SP 2, Hand Tool Cleaning.
      d. SP 3, Power Tool Cleaning.
      e. SP 16, Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals.
   4. The Society for Protective Coatings/NACE International (SSPC/NACE):
      a. SP 5/NACE No. 1, White Metal Blast Cleaning.
      b. SP 6/NACE No. 3, Commercial Blast Cleaning.
      c. SP 7/NACE No. 4, Brush-off Blast Cleaning.
      d. SP 10/NACE No. 2, Near-White Blast Cleaning.
      e. SP 12/NACE No. 5, Surface Preparation and Cleaning of Steel and Other Hard Materials by High and Ultrahigh Pressure Water Jetting Prior to Recoating.
      f. SP 13/NACE No. 6, Surface Preparation of Concrete.

B. Qualifications:
   1. Coating manufacturer's authorized representative shall provide written statement attesting that applicator has been instructed on proper preparation, mixing and application procedures for coatings specified.
   2. Applicators shall have minimum of 10 years experience in application of similar products on similar project.
      a. Provide references for minimum of three (3) different projects completed in last five (5) years with similar scope of work.
      b. Include name and address of project, size of project in value (painting) and contact person.

C. Miscellaneous:
   1. Furnish paint through one (1) manufacturer unless noted otherwise.
D. Deviation from specified mil thickness or product type is not allowed without written authorization of Engineer.

E. Material shall not be thinned unless approved, in writing, by paint manufacturer's authorized representative.

1.3 DEFINITIONS

A. Installer or Applicator:
   1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
   2. Installer and applicator are synonymous.

B. Approved Factory Finish: Finish on a product in compliance with the finish specified in the Specification Section where the product is specified.

C. Corrosive Environment: Immersion in, or not more than 6 IN above, or subject to condensation, spillage or splash of water.

D. Exposed Exterior Surface:
   1. Surface which is exposed to weather but not necessarily exposed to view as well as surface exposed to view.

E. Immersion Surface:
   1. Any surface immersed in water or some other liquid.
   2. Surface of any pipe, valve, or any other component of the piping system subject to condensation including the pipe support system.

F. Paint includes the following:
   1. High performance industrial coatings (HPIC) include: Epoxies, urethanes, vinyl ester, waterborne vinyl acrylic emulsions, acrylates, silicones, alkyds, acrylic emulsions and any other coating listed as a HPIC.

G. HPIC: High performance industrial coatings.

H. SC: Special coatings.

I. Water level for purposes of painting: See Drawings.

1.4 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Applicator experience qualifications.
      a. No submittal information will be reviewed until Engineer has received and approved applicator qualifications.
   3. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Manufacturer's application instructions.
      c. Manufacturer's surface preparation instructions.
      d. If products being used are manufactured by Company other than listed, provide complete individual data sheet comparison of proposed products with specified products including application procedure, coverage rates and verification that product is designed for intended use.
      e. Contractor's written plan of action for containing airborne particles created by blasting operation and location of disposal of spent contaminated blasting media if field blasting is required.
      f. Coating manufacturer's recommendation on abrasive blasting.
      g. Manufacturer's recommendation for universal barrier coat.
h. Manufacturer's recommendation for providing temporary or supplemental heat or dehumidification or other environmental control measures.
4. Manufacturer's statement regarding applicator instruction on product use.
5. Certification that Coating Systems proposed for use have been reviewed and approved by Senior Corrosion Specification Specialist employed by the coating manufacturer.

B. Samples:
1. Manufacturer's full line of colors for Engineer's preliminary color selection.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver in original containers, labeled as follows:
1. Name or type number of material.
2. Manufacturer's name and item stock number.
3. Contents, by volume, of major constituents.
4. Warning labels.
5. VOC content.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, only the following manufacturers are acceptable:
1. High performance industrial coatings:
   a. Tnemec.
   b. ICI Devoe.
   c. Carboline Protective Coatings.
   d. Sherwin Williams.
   e. Dampney Company, Inc.
   f. PPG Industries/Amercoat.
   g. Valspar Corp.
   h. Select Products Co.
   i. Sika Corp.
   j. Frazee
2. Product VOC content will be an important factor when determining acceptability of substitution.

2.2 MATERIALS

A. All materials used must contain not more than 2.8 LBS/GAL VOC.
B. For unspecified materials such as thinner, provide manufacturer's recommended products.
C. Paint Systems - General:
1. P = prime coat.
2. F1, F2 . . . Fn = first finish coat, second finish coat . . . nth finish coat, color as selected by Engineer.
3. If two (2) finish coats of same material are required, Contractor may, at his option and by written approval from paint manufacturer, apply one (1) coat equal to mil thickness of two (2) coats specified.
D. HPIC products listed in the MATERIALS Article, Paint Systems paragraph are manufactured by Tnemec.
1. Products of other listed manufacturers are acceptable for use providing the product is of the same generic resin, requires comparable surface preparation, has comparable application requirements, meets the same VOC levels or better, provides the same finish and color options and will withstand the atmospheric conditions of the location where it is to be applied.

E. Paint Systems (Systems not shown are not used):
1. HPIC SYSTEM #1 - Polyamidoamine Epoxy Primer with Polyamidoamine Epoxy or Waterborne Acrylic Polyurethane Finish Coat(s).
   a. Prime coat:
      1) P1 = 1 coat, 3 mils, Series L69 Epoxoline (Polyamidoamine Epoxy).
   b. Finish coat(s):
      1) Interior:
         a) F1 = 1 coat, 3 mils, Series L69 Epoxoline (Polyamidoamine Epoxy).
         b) F2 = 1 coat, 3 mils, Series L69 Epoxoline (Polyamidoamine Epoxy).
      2) Exterior:
         a) F1 = 1 coat, 3 mils, Series L69 Epoxoline (Polyamidoamine Epoxy).
         b) F2 = 1 coat, 2.5 mils, Series 1080 Endura-Shield. W.B.(Waterborne Acrylic Polyurethane).
2. HPIC SYSTEM #3 - Polyamidoamine Epoxy Primer with Polyamidoamine Epoxy or Waterborne Acrylic Polyurethane Top Coat(s).
   a. Prime coat:
      1) P1 = 1 coat, 5 mils, Series L69 Epoxoline (Polyamidoamine Epoxy).
   b. Finish coat(s):
      1) Interior:
         a) F1 = 1 coat, 5 mils, Series L69 Epoxoline (Polyamidoamine Epoxy).
      2) Exterior:
         a) F1 = 1 coat, 2.5 mils, Series 1080 Endura-Shield W.B. (Waterborne Acrylic Polyurethane).
3. HPIC SYSTEM #23 - Polyamidoamine Epoxy Potable Water Approved Primer with Polyamidoamine Epoxy Potable Water Approved Top Coats.
   a. Prime coat:
      1) P1 = 1 coat, 3 mils DFT, Series N140 Pota-Pox Plus (Polyamidoamine Epoxy).
   b. Finish coat(s):
      1) Interior:
         a) F1 = 1 coat, 6 mils DFT, Series N140 Pota-Pox Plus (Polyamidoamine Epoxy).
      2) Exterior:
         a) F1 = 1 coat, 2.5 mils DFT, Series N140 Pota-Pox Plus (Polyamidoamine Epoxy).
4. HPIC SYSTEM #43 - Polyamidoamine Epoxy Primer with Polyamidoamine Epoxy Top Coat.
   a. Prime coat:
      1) P1 = 1 coat, 2.5 mils, Series L69 Epoxoline (Polyamidoamine Epoxy).
   b. Finish coat:
      1) Interior:
         a) F1 = 1 coat, 3 mils, Series L69 Epoxoline (Polyamidoamine Epoxy).

PART 3 - EXECUTION

3.1 ITEMS TO BE PAINTED

A. Exposed Exterior Surfaces including:
   1. Piping, valves, fittings, and hydrants and pipe supports.
   2. Steel pipe bollards.
   3. Structural steel that is not protected by galvanization or other means.

B. Surfaces in Areas Not Considered Finished:
   1. Paint following surfaces in areas not considered as finished area:
      a. Piping, valves, fittings, and hydrants and supports.
b. Miscellaneous ferrous metal surfaces.

3.2 ITEMS NOT TO BE PAINTED

A. General: Do not paint items listed in this Article unless specifically noted in the Contract Documents to be painted.

B. Items with Approved Factory Finish: These items may require repair of damaged painted areas or painting of welded connections.

C. Other Items:
   1. Stainless steel surfaces except:
      a. Piping where specifically noted to be painted.
      b. Banding as required to identify piping.
   2. Galvanized steel items, unless specifically noted to be painted.

3.3 SCHEDULE OF ITEMS TO BE PAINTED AND PAINTING SYSTEMS

A. Steel:
   1. All ferrous metal items subject to immersion with irrigation water and/or requiring NSF approval: SYSTEM #23.
      a. Includes all ferrous metal surfaces subject to splash, spillage, vapor, condensation or other chronic irrigation water exposure.
   B. Non-ferrous metals (except galvanized): SYSTEM #3.
      1. Includes copper, brass, aluminum and aluminum flashing specifically indicated on the Drawings to be painted.
   C. Pipe, Valves, and Fittings:
      1. Pipe bollards: SYSTEM #3.
      2. Steel, cast-iron, and uncoated ductile iron not in immersion service: SYSTEM #1.
   D. Field painting of fusion bonded epoxy coated piping, valves, couplings, etc.: SYSTEM #43.

3.4 PREPARATION

A. General:
   1. Verify that atmosphere in area where painting is to take place is within paint manufacturer's acceptable temperature, humidity and sun exposure limits.
      a. Provide temporary heating, shade and/or dehumidification as required to bring area within acceptable limits.
         1) Provide temporary dehumidification equipment properly sized to maintain humidity levels required by paint manufacturer.
         2) Provide clean heat with heat exchanger type equipment sufficient in size to maintain temperature on a 24 HR basis.
            a) Vent exhaust gases to exterior environment.
            b) No exhaust gases shall be allowed to vent into the space being painted or any adjacent space.
   2. Prepare surfaces to be painted in accordance with coating manufacturer's instructions and this Specification Section unless noted otherwise in this Specification Section.
      a. Where discrepancy between coating manufacturer's instructions and this Specification Section exists, the more stringent preparation shall be provided unless approved otherwise, in writing, by the Engineer.
   3. Remove all dust, grease, oil, compounds, dirt and other foreign matter which would prevent bonding of coating to surface.
   4. Adhere to manufacturer's recoat time surface preparation requirements.
      a. Surfaces that have exceeded coating manufacturer's published recoat time and/or have exhibited surface chalking shall be prepared prior to additional coating in accordance with manufacturer's published recommendations.
1) Minimum SSPC SP 7/NACE No. 4 unless otherwise approved by Engineer.

B. Protection:
1. Protect surrounding surfaces not to be coated.
2. Remove and protect hardware, accessories, plates, fixtures, finished work, and similar items; or provide ample in-place protection.

C. Prepare and paint before assembly all surfaces which are inaccessible after assembly.

D. Ferrous Metal:
1. Prepare ductile iron pipe in accordance with pipe manufacturer's recommendations and NAPF.
   a. All piping, pumps, valves, fittings and any other component used in any water piping system that requires preparation for painting shall be prepared in accordance with requirements for immersion service.
      1) Pipe: NAPF 500-03-04.
      2) Fittings: NAPF 500-03-05
   b. Prepare all areas requiring patch painting in accordance with recommendations of manufacturer and NAPF.
2. Complete fabrication, welding or burning before beginning surface preparation.
   a. Chip or grind off flux, spatter, slag or other laminations left from welding.
   b. Remove mill scale.
   c. Grind smooth rough welds and other sharp projections.
3. Solvent clean in accordance with SSPC SP 1 and low-pressure water clean in accordance with SSPC SP 12/NACE No. 5 all surfaces scheduled to receive additional SSPC surface preparation.
4. Surfaces subject to corrosive or highly corrosive environment and all surfaces subject to immersion service:
   a. Near-white blast clean in accordance with SSPC SP 10/NACE No. 2.
5. Restore surface of field welds and adjacent areas to original surface preparation.
6. Black iron piping: Remove surface varnish by solvent or waterjet and detergent cleaning or brush-off blast cleaning in accordance with SSPC SP 7/NACE No. 4.

E. Galvanized Steel and Non-ferrous Metals:
1. Solvent clean in accordance with SSPC SP 1 followed by brush-off blast clean in accordance with SSPC SP 16 to remove zinc oxide and other foreign contaminants.
   a. Provide uniform 1 mil profile surface.

F. Preparation by Abrasive Blasting:
1. All abrasive-blasted ferrous metal surfaces shall be inspected immediately prior to application of paint coatings.
   a. Inspection shall be performed to determine cleanliness and profile depth of blasted surfaces and to certify that surface has been prepared in accordance with these Specifications.
2. Schedule the abrasive blasting operation so blasted surfaces will not be wet after blasting and before painting.
3. Perform additional blasting and cleaning as required to achieve surface preparation required.
   a. Prior to painting, reblast surfaces allowed to set overnight and surfaces that show rust bloom.
   b. Surfaces allowed to set overnight or surfaces which show rust bloom prior to painting shall be reinspected prior to paint application.
4. Profile depth of blasted surface: Not less than 1 mil or greater than 2 mils unless required otherwise by coating manufacturer.
5. Provide compressed air for blasting that is free of water and oil.
   a. Provide accessible separators and traps.
6. Confine blast abrasives to area being blasted.
   a. Provide shields of polyethylene sheeting or other such barriers to confine blast material.
b. Plug pipes, holes, or openings before blasting and keep plugged until blast operation is complete and residue is removed.

7. Protect nameplates, valve stems, rotating equipment, motors and other items that may be damaged from blasting.

8. Reblast surfaces not meeting requirements of these Specifications.

9. Abrasive blasting media may be recovered, cleaned and reused providing Contractor submits, for Engineer's review, a comprehensive recovery plan outlining all procedures and equipment proposed in reclamation process.

10. Properly dispose of blasting material contaminated with debris from blasting operation not scheduled to be reused.

3.5 APPLICATION

A. General:

1. Thin, mix and apply coatings by brush, roller, or spray in accordance with manufacturer's installation instructions.
   a. Application equipment must be inspected and approved in writing by coating manufacturer.
   b. Hollow metal shall be spray applied only.

2. Temperature and weather conditions:
   a. Do not paint surfaces when surface temperature is below 50 DegF unless product has been formulated specifically for low temperature application and application is approved in writing by Engineer and paint manufacturer's authorized representative.
   b. Avoid painting surfaces exposed to hot sun.
   c. Do not paint on damp surfaces.

3. Immediately after surface has been inspected, apply structural steel and miscellaneous steel prime coat in the factory.
   a. Finish coats shall be applied in the factory.
   b. Prime coat referred to here is prime coat as indicated in this Specification.
      1) Structural steel and miscellaneous steel prime coating applied in factory (shop) as part of Fabricator's standard rust inhibiting and protection coating is not acceptable as replacement for specified prime coating.

4. Provide complete coverage to mil thickness specified.
   a. Thickness specified is dry mil thickness.
   b. All paint systems are "to cover."
      1) In situations of discrepancy between manufacturer's square footage coverage rates and mil thickness, mil thickness requirements govern.
   c. When color or undercoats show through, apply additional coats until paint film is of uniform finish and color.

5. If so directed by Engineer, do not apply consecutive coats until Engineer has had an opportunity to observe and approve previous coats.

6. Apply materials under adequate illumination.

7. Evenly spread to provide full, smooth coverage.

8. Work each application of material into corners, crevices, joints, and other difficult to work areas.

9. Avoid degradation and contamination of blasted surfaces and avoid intercoat contamination.
   a. Clean contaminated surfaces before applying next coat.

10. Smooth out runs or sags immediately, or remove and recoat entire surface.

11. Allow preceding coats to dry before recoating.
   a. Recoat within time limits specified by coating manufacturer.
   b. If recoat time limits have expired re-prepare surface in accordance with coating manufacturer's printed recommendations.

12. Allow coated surfaces to cure prior to allowing traffic or other work to proceed.

13. Coat all aluminum in contact with dissimilar materials.

14. When coating rough surfaces which cannot be backrolled sufficiently, hand brush coating to work into all recesses.
15. Backroll concrete and masonry surfaces with a roller if paint coatings are spray applied.

B. Prime Coat Application:
   1. Prime all surfaces indicated to be painted.
      a. Apply prime coat in accordance with coating manufacturer's written instructions and as written in this Specification Section.
   2. Ensure field-applied coatings are compatible with factory-applied coatings.
      a. Employ services of coating manufacturer's qualified technical representative.
         1) Certify through material data sheets.
         2) Perform test patch.
      b. If field-applied coating is found to be not compatible, require the coating manufacturer's technical representative to recommend, in writing, product to be used as barrier coat, thickness to be applied, surface preparation and method of application.
      c. At Contractor's option, coatings may be removed, surface re-prepared, and new coating applied using appropriate paint system listed in the MATERIALS Article, Paint Systems paragraph of this Specification Section.
         1) All damage to surface as result of coating removal shall be repaired to original condition or better by Contractor at no additional cost to Owner.
   3. Prime ferrous metals embedded in concrete to minimum of 1 IN below exposed surfaces.
   4. Back prime all wood scheduled to be painted, prior to installation.
   5. After application of primer to gypsum board surfaces, inspect surface and repair in accordance with the PREPARATION Article of this Specification Section.
      a. Re-prime repaired surfaces to uniform finish before application of finish coat(s).
   6. Apply zinc-rich primers while under continuous agitation.
   7. Ensure abrasive blasting operation does not result in embedment of abrasive particles in paint film.
   8. Brush or spray bolts, welds, edges and difficult access areas with primer prior to primer application over entire surface.
   9. Touch up damaged primer coats prior to applying finish coats.
      a. Restore primed surface equal to surface before damage.
   10. All surfaces of steel lintels and steel components of concrete lintels used in wall construction shall be completely painted with both prime and finish coats prior to placing in wall.

C. Finish Coat Application:
   1. Apply finish coats in accordance with coating manufacturer's written instructions and in accordance with this Specification Section; manufacturer instructions take precedent over these Specifications.
   2. Touch up damaged finish coats using same application method and same material specified for finish coat.
      a. Prepare damaged area in accordance with the PREPARATION Article of this Specification Section.

3.6 FIELD QUALITY CONTROL

A. Contractor to provide protection for surfaces painted with epoxy coatings to prevent chalking.
   1. Surfaces showing chalking will not be accepted regardless of condition of paint film.

B. Maintain Daily Records:
   1. Record the following information during application of each coat of paint applied:
      a. Date, starting time, end time, and all breaks taken by painters.
      b. For exterior painting:
         1) Sky condition.
         2) Wind speed and direction.
      c. Air temperature.
      d. Relative humidity.
      e. Moisture content and surface temperature of substrate prior to each coat.
f. Provisions utilized to maintain work area within manufacturer's recommended application parameters including temporary heating, ventilation, cooling, dehumidification and provisions utilized to mitigate wind blown dust and debris from contaminating the wet paint film.
g. Record environmental conditions, substrate moisture content and surface temperature information not less than once every four (4) hours during application.
1) Record hourly when temperatures are below 50 DegF or above 100 DegF.

2. Record the following information daily for the paint manufacturer's recommended curing period:
   a. Date and start time of cure period for each item or area.
   b. For exterior painting:
      1) Sky conditions.
      2) Wind speed and direction.
   c. Record environmental conditions not less than once every 12 hours.
      1) Record once every four (4) hours when ambient temperature is below 35 DegF.
   d. Provisions utilized to protect each item or area and to maintain areas within manufacturer's recommended curing parameters.

3. Format for daily record to be computer generated.

C. Measure wet coating with wet film thickness gages.

D. Measure coating dry film thickness in accordance with SSPC PA 2 using Mikrotest gage calibrated against NBS "Certified Coating Thickness Calibration Standards."
1. Engineer may measure coating thickness at any time during project to assure conformance with these Specifications.

E. Measure surface temperature of items to be painted with surface temperature gage specifically designed for such.

F. Measure substrate humidity with humidity gage specifically designed for such.

G. Provide wet paint signs.

3.7 CLEANING

A. Clean paint spattered surfaces.
   1. Use care not to damage finished surfaces.

B. Upon completion of painting, replace hardware, accessories, plates, fixtures, and similar items.

C. Remove surplus materials, scaffolding, and debris.

END OF SECTION
SECTION 10400
IDENTIFICATION DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Warning tape, locate wire, and pipe markers for piping.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Society of Mechanical Engineers (ASME):
   2. Instrumentation, Systems, and Automation Society (ISA).
      a. 70, National Electrical Code (NEC).
   5. Occupational Safety and Health Administration (OSHA):

1.3 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. Product technical data including:
      a. Catalog information for all identification systems.
      b. Acknowledgement that products submitted meet requirements of standards referenced.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. W.H. Brady Co.
   2. Panduit.
   5. Carlton Industries, Inc.

2.2 MANUFACTURED UNITS

A. Type F - Underground Warning Tape:
2. Size:
   a. 6 IN wide (minimum).
   b. Thickness: 3.5 mils.
3. Fabrication:
   a. Legend: Preprinted and permanently imbedded.
   b. Message continuous printed.
   c. Tensile strength: 1750 psi.

B. Underground Tracer Wire:
1. Materials:
   a. Wire:
      1) 12 GA AWG.
      2) Solid.
   b. Wire nuts: Waterproof type.
   c. Split bolts: Brass.
   d. Color: Purple.

C. Pipe Markers
1. Materials:
   a. Posts: 60” Fiberglass thinline post or rigid outdoor grade vinyl (mounted on t-post).
   b. Labels: UV resistant vinyl.
   c. Writing: Irrigation.
   d. Color: Purple.

2.3 ACCESSORIES

A. Fasteners:
   1. Bead chain: #6 brass, aluminum or stainless steel.
   2. Plastic strap: Nylon, urethane or polypropylene.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

A. Locate Tape:
   1. Tag type: Type F - Underground Warning Tape
   2. Location: 1 FT above piping.
   4. Irrigation water piping:
      a. Color: Purple with black letters.
      b. Legend:
         1) First line: “CAUTION CAUTION CAUTION”
         2) Second line: “IRRIGATION” or “BURIED IRRIGATION RECLAIMED WATER LINE:

B. Tracer Wire:
   1. Attach to pipe at a maximum of 10 FT intervals with tape or tie-wraps or other means approved by the Engineer.
   2. Continuous pass between valve boxes or ends of pipe runs.
   3. Coil enough wire at each valve box to extend wire a foot above the ground surface.
   4. 1,000 FT maximum spacing between valve boxes.
   5. If split bolts are used for splicing, wrap with electrical tape.
6. If wire nuts are used for splicing, knot wire at each splice point leaving 6 IN of wire for splicing.
7. Use continuous strand of wire between valve boxes where possible.
   a. Continuous length shall be no shorter than 100 FT.

C. Pipe Markers
   1. Tracer wire to come to surface with loop and back to piping at all pipe markers.
   2. Coil enough wire at each pipe marker to extend wire a foot above the ground surface.
   3. Pipe markers to be located at all air vents, drains, and services at centerline of pipeline.
      1,000 FT maximum spacing between pipe markers.

END OF SECTION
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SECTION 15060
PIPE AND PIPE FITTINGS: BASIC REQUIREMENTS (IN PROGRESS)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Conveyance piping systems.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.
   4. Section 09905 - Painting and Protective Coatings.
   5. Section 10400 - Identification Devices.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Iron and Steel Institute (AISI).
   2. American Society of Mechanical Engineers (ASME):
      d. B36.19, Stainless Steel Pipe.
   3. ASTM International (ASTM):
   4. American Water Works Association (AWWA):
      a. C200, Standard for Steel Water Pipe - 6 IN and Larger.
      b. C207, Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 IN through 144 IN.
      d. C606, Standard for Grooved and Shouldered Joints.
      e. C800, Standard for Underground Service Line Valves and Fittings.

B. Coordinate flange dimensions and drillings between piping, valves, and equipment.
1.3 SYSTEM DESCRIPTION

A. Piping Systems Organization and Definition:
   1. Piping services are grouped into designated systems according to the chemical and physical
      properties of the fluid conveyed, system pressure, piping size and system materials of construction.
   2. Table A below defines each service classification, its symbol, and the designated system
      classification number of each service.

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>SERVICE</th>
<th>SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-S</td>
<td>Services – Steel Structure Penetration</td>
<td>2</td>
</tr>
<tr>
<td>S-P</td>
<td>Services &amp; Drain – PVC Extension</td>
<td>3</td>
</tr>
<tr>
<td>C-F</td>
<td>Storm Drain - HDPE</td>
<td>4</td>
</tr>
<tr>
<td>C-F</td>
<td>Canal Piping - FRPM</td>
<td>5</td>
</tr>
</tbody>
</table>

3. Refer to drawings to locate the connection point between fabricated steel and HDPE piping.
4. See PIPING SPECIFICATION SCHEDULES in PART 3.

1.4 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the
      submittal process.
   2. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Copies of manufacturer's written directions regarding material handling, delivery, storage and
         installation.
      c. Separate schedule sheet for each piping system scheduled in this Specification Section showing
         compliance of all system components.
         1) Attach technical product data on gaskets, pipe, fittings, and other components.
   3. Fabrication and/or layout drawings:
      a. Exterior yard piping drawings (minimum scale 1 IN equals 10 FT) with information including:
         1) Dimensions of piping lengths.
         2) Acknowledgement of bury depth requirements.
         3) Details of fittings, tapping locations, thrust blocks, restrained joint segments, harnessed joint
            segments, and related appurtenances.
         4) Line slopes and vents.
      b. Schedule of interconnections to existing piping and method of connection.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect pipe coating during handling using methods recommended by manufacturer.
   1. Use of bare cables, chains, hooks, metal bars or narrow skids in contact with coated pipe is not
      permitted.

B. Prevent damage to pipe during transit.
   1. Repair abrasions, scars, and blemishes.
   2. If repair of satisfactory quality cannot be achieved, replace damaged material immediately.

PART 2 - PRODUCTS

2.1 PIPING SPECIFICATION SCHEDULES

A. Piping system materials, fittings and appurtenances are subject to requirements of specific piping
   specification schedules located at the end of PART 3 of this Specification Section.
2.2 COMPONENTS AND ACCESSORIES

A. Reducers:
   1. Furnish appropriate size reducers and reducing fittings to mate pipe to equipment connections.
   2. Connection size requirements may change from those shown on Drawings depending on equipment furnished.

B. Protective Coating and Lining:
   1. Include pipe, fittings, and appurtenances where coatings, linings, paint, tests and other items are specified.
   2. Field paint pipe in accordance with Specification Section 09905.

C. Underground Warning Tape, Tracer Wire, and Marker Posts:
   1. See Specification Section 10400.

D. Valves:
   1. See Specification Section 15100.

PART 3 - EXECUTION

3.1 EXTERIOR BURIED PIPING INSTALLATION

A. Unless otherwise shown on the Drawings, provide a minimum of 4 FT earth cover over exterior buried piping systems and appurtenances conveying water, fluids, or solutions subject to freezing.

B. Laying Pipe In Trench:
   1. Excavate and backfill trench in accordance with Specification Section 02221.
   2. Clean each pipe length thoroughly and inspect for compliance to specifications.
   3. Grade trench bottom and excavate for pipe bell and lay pipe on trench bottom.
   4. Install gasket or joint material according to manufacturer's directions after joints have been thoroughly cleaned and examined.
   5. Except for first two (2) joints, before making final connections of joints, install two (2) full sections of pipe with earth tamped along side of pipe or final with bedding material placed.
   6. Lay pipe in only suitable weather with good trench conditions.
      a. Never lay pipe in water except where approved by Engineer.
   7. Seal open end of line with watertight plug if pipe laying stopped.

C. Anchorage and Blocking:
   1. Provide reaction blocking, anchors, joint harnesses, or other acceptable means for preventing movement of piping caused by forces in or on buried piping tees, wye branches, plugs, or bends.
   2. Place concrete blocking so that it extends from fitting into solid undisturbed earth wall.
      a. Concrete blocks shall not cover pipe joints.
   3. Provide bearing area of concrete in accordance with drawing detail.

D. Install underground hazard warning tape and tracer wire per Specification Section 10400.

E. Install insulating components where dissimilar metals are joined together.

3.2 FIELD QUALITY CONTROL

A. Pipe Testing - General:
   1. Test piping systems as follows:
      a. Test exposed, non-insulated piping systems upon completion of system.
      b. Test exposed, insulated piping systems upon completion of system but prior to application of insulation.
      c. Test concealed interior piping systems prior to concealment and, if system is insulated, prior to application of insulation.
d. Test buried piping (insulated and non-insulated) prior to backfilling and, if insulated, prior to application of insulation.

2. Utilize pressures, media and pressure test durations as specified in the PIPING SPECIFICATION SCHEDULES.

3. Isolate equipment which may be damaged by the specified pressure test conditions.

4. Perform pressure test using calibrated pressure gages and calibrated volumetric measuring equipment to determine leakage rates.
   a. Select each gage so that the specified test pressure falls within the upper half of the gage's range.
   b. Notify the Engineer 24 HRS prior to each test.

5. Completely assemble and test new piping systems prior to connection to existing pipe systems.

6. Acknowledge satisfactory performance of tests and inspections in writing to Engineer prior to final acceptance.

7. Bear the cost of all testing and inspecting, locating and remedying of leaks and any necessary retesting and re-examination.

B. Pressure Testing:

1. Testing medium: Unless otherwise specified in the PIPING SPECIFICATION SCHEDULES, utilize the following test media.
   a. Liquid systems:

<table>
<thead>
<tr>
<th>PIPE LINE SIZE (DIA)</th>
<th>GRAVITY OR PUMPED</th>
<th>SPECIFIED TEST PRESSURE</th>
<th>TESTING MEDIUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Sizes</td>
<td>Gravity</td>
<td>Gravity Fill</td>
<td>Water</td>
</tr>
</tbody>
</table>

2. Allowable leakage rates:
   a. All pressure piping systems which are hydrostatically pressure tested shall have zero leakage at the specified test pressure throughout the duration of the test.
   b. Hydrostatic exfiltration and infiltration for drain line (groundwater level is below the top of pipe):
      1) Leakage rate: 200 GAL per inch diameter per mile of pipe per day at average head on test section of 3 FT.
      2) Average head is defined from groundwater elevation to average pipe crown.
      3) Acceptable test head leakage rate for heads greater than 3 FT: Acceptable leakage rate (gallons per inch diameter per mile per day) equals 115 by (actual test head to the 1/2 power).

3. Hydrostatic pressure testing methodology:
   a. General:
      1) All joints, including welds, are to be left exposed for examination during the test.
      2) Provide additional temporary supports for piping systems designed for vapor or gas to support the weight of the test water.
      3) Provide temporary restraints for expansion joints for additional pressure load under test.
      4) Isolate equipment in piping system with rated pressure lower than pipe test pressure.
      5) Do not paint or insulate exposed piping until successful performance of pressure test.
   b. Soil, waste, drain and vent systems:
      1) Test at completion of installation of each stack or section of piping by filling system with water and checking joints and fittings for leaks.
      2) Eliminate leaks before proceeding with work or concealing piping.
      3) Minimum test heights shall be 10 FT above highest stack inlet.
   c. Larger diameter (above 36 IN) gravity piping:
      1) Plug downstream end of segment to be tested.
         a) Provide bracing as required.
      2) Fill segment and upstream structure to normal operating level as per hydraulic profile.
      3) Allow 24 HRS for absorption losses.
         a) Refill to original level.
      4) Provide reservoir to maintain constant head over duration of test.
3.3 CLEANING, DISINFECTION AND PURGING

A. Cleaning:
   1. Clean interior of piping systems thoroughly before installing.
   2. Maintain pipe in clean condition during installation.
   3. Before jointing piping, thoroughly clean and wipe joint contact surfaces and then properly dress and make joint.
   4. Immediately prior to pressure testing, clean and remove grease, metal cuttings, dirt, or other foreign materials which may have entered the system.
   5. At completion of work and prior to Final Acceptance, thoroughly clean work installed under these Specifications.
      a. Clean equipment, fixtures, pipe, valves, and fittings of grease, metal cuttings, and sludge which may have accumulated by operation of system, from testing, or from other causes.
      b. Repair any stoppage or discoloration or other damage to parts of building, its finish, or furnishings, due to failure to properly clean piping system, without cost to Owner.

3.4 LOCATION OF BURIED OBSTACLES

A. Furnish exact location and description of buried utilities encountered and thrust block placement.
B. Include such information as location, elevation, coverage, and additional pertinent information.
C. Incorporate information on "As-Recorded" Drawings.

3.5 SCHEDULES

A. SPECIFICATION SCHEDULE - SYSTEM 1
   1. General:
      a. Piping symbol and service:
         1) 8-S (8 FT diameter spool)
      b. Test requirements:
         1) Test medium: Water.
         2) Pressure: gravity fill.
         3) Duration: 4 HRS.
      c. Gaskets:
         1) Butt Welded.
   2. System components:
      a. Pipe size 96 IN (dig and verify before ordering):
         1) Buried service:
            a) Materials: Steel fabricated pipe.
            b) Reference: ASTM A53.
            c) Lining: Epoxy per AWWA C210.
            e) Fittings: None.

B. SPECIFICATION SCHEDULE - SYSTEM 2
   1. General:
      a. Piping symbol and service:
         1) S-S (Services, pipe penetrations through concrete)
      b. Test requirements:
         1) Test medium: Water.
         2) Pressure: gravity fill.
         3) Duration: 4 HRS.
      c. Gaskets and O-rings:
         1) Fillet welded.
   2. System components:
a. Pipe size up to 12 IN:
   1) Buried service:
      a) Materials: Steel, Schedule 40, galvanized.
      b) Reference: ASTM A53.
      c) Linings: Galvanized.
      d) Coatings: Galvanized.
      e) Fittings: AWWA C208.
      f) Joints: Fillet welded.

C. SPECIFICATION SCHEDULE - SYSTEM 3
1. General:
   a. Piping symbol and service:
      1) S-P (Service extensions from steel)
   b. Test requirements:
      1) Test medium: Water.
      2) Pressure: gravity fill.
      3) Duration: 4 HRS.
   c. Gaskets:
      1) Rubber.
2. System components:
   a. Pipe size through 12 IN:
      1) Buried service:
         a) Material: Class 200 PVC pipe.
         b) Reference: ASTM A53.
         c) Lining: None.
         d) Coating: None.
         e) Fittings: ASTM F477.
         f) Joints: Slip Type.

D. SPECIFICATION SCHEDULE - SYSTEM 4
1. General:
   a. Piping symbol and service:
      1) S-H (Storm Drain)
   b. Test requirements:
      1) Test medium: Water.
      2) Pressure: gravity fill.
      3) Duration: 4 HRS.
   c. Gaskets:
      1) Rubber.
2. System components:
   a. Pipe size through 24 IN:
      1) Buried service:
         a) Material: HDPE single wall pipe.
         b) Reference: ASTM D3350, SDR 32.5 minimum.
         c) Lining: None.
         d) Coating: None.
         e) Fittings: ASTM D3212.
         f) Joints: Slip Type.

E. SPECIFICATION SCHEDULE - SYSTEM 5
1. General:
   a. Piping symbol and service:
      1) C-F (Canal Piping)
   b. Test requirements:
      1) Test medium: Water.
      2) Pressure: gravity fill.
3) Duration: 4 HRS.

c. Gaskets:
   1) Elastomeric Membrane.

2. System components:
   a. Pipe size 8 FT and 10 FT:
      1) Buried service:
         a) Material: Centrifugally cast, fiberglass reinforced, polymer mortar pipe.
         b) Class: PN25/SN36.
         c) Reference: ASTM D3262.
         d) Lining: None.
         e) Coating: None.
         f) Fittings: ASTM D4161.
         g) Joints: FWC Couplings.
SECTION 15061
PIPE: STEEL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Steel pipe, fittings, and appurtenances.

B. Related Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.
   3. Section 09905 - Painting and Protective Coatings.
   4. Section 15060 - Pipe and Pipe Fittings: Basic Requirements.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Society of Mechanical Engineers (ASME):
      c. B16.11, Forged Steel Fittings, Socket Welding and Threaded.
      d. B16.47, Large Diameter Steel Flanges.
      e. Section IX, Qualifications Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators.
   2. ASTM International (ASTM):
   3. American Water Works Association (AWWA):
      a. C200, Standard for Steel Water Pipe - 6 IN and Larger.
      b. C206, Standard for Field Welding of Steel Water Pipe.
      c. C207, Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 IN through 144 IN.
      e. C210, Standard for Liquid-Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines.

B. Qualifications:
   1. Application of epoxy lining and coating materials including preparation of surfaces, priming, and lining and coating of pipe, fittings, and specials, in shop, repairs of any damage to lining or coating occurring during shipment or any other time, and field lining and coating of ends where linings or coatings have been held back for welded field joints, shall be done by established and recognized pipe company acceptable to Engineer.
   2. Use only certified welders meeting procedures and performance outlined in ASME Section IX, AWWA C200 Section 3.3.3 and other codes and requirements per local building and utility requirements.
C. Inspection: All pipe, linings, welds, coatings, and related work shall be subject to inspection at the place of manufacture and the place the Work is performed in accordance with the provisions of ANSI/AWWA C200, C206, C210, and C214, as applicable, as supplemented by the requirements herein. Notify the Owner in writing not less than 14 calendar days prior to the start of any phase of the pipe manufacture, welding, lining, coating, testing, or field operations.

D. Tests: Except as modified herein, all materials used in the manufacture of the pipe shall be tested in accordance with the requirements of ANSI/AWWA C200, and C210, as applicable.
1. After the joint configuration is completed and prior to lining with epoxy, if applicable, each length of pipe of each diameter and pressure class shall be shop tested and certified to a pressure of at least 80 percent of the yield strength of the pipe steel. Test pressure shall be maintained for a minimum of 5 minutes. Any leaks shall be repaired and the pipe retested.
2. Production weld tests as required in ANSI/AWWA C200, except at least one set of tests per operator per work shift shall be performed.

E. Perform material tests at no additional cost to the Owner. The Owner shall have the right to witness all testing conducted by the Contractor; provided, that the Contractor's schedule is not delayed for the convenience of the Owner.

F. In addition to those tests specifically required, the Owner may request additional samples of any material including mixed concrete and lining and coating samples for testing by the Owner. The additional samples shall be furnished at no additional cost to the Owner.

G. Welding Procedure Specifications: All welding procedures used to fabricate and install pipe shall be in accordance with the ASME Boiler and Pressure Vessel Code (BPVC) for shop welds and ANSI/AWS D1.1 for field welds. Written welding procedures shall be required for all welds, both shop and field. Welds qualified per the ASME BPVC shall include welding filler metals capable of producing impact values of 20ft/lbs at 0-degrees F.

H. Shop Nondestructive Testing: Nondestructive testing shall be performed for various weld categories as specified below. Testing shall include submitting written documentation of procedures per Section V, and acceptance criteria shall be in accordance with Section VIII of the ASME Boiler and Pressure Vessel Code.
1. Butt Joint Welds: Spot radiographically examine pipe in accordance with Paragraph UW-52 of the ASME Boiler and Pressure Vessel Code Section VIII, Division 1. If, in the opinion of the Owner, the welds cannot readily be radiographed, they shall be 100-percent ultrasonically examined.
2. Fillet Welds: 100-percent examine all fillet welds using the magnetic particle inspection method.
3. Groove Welds: 100-percent ultrasonically examine all groove welds that cannot be readily radiographically spot examined.
4. All Welds: Contractor's certified welding inspector shall 100-percent visually examine all welds as a minimum.

I. Pipe Manufacturer/Fabricator: The manufacturer or fabricator of the pipe shall be experienced in fabricating pipe of similar diameters and wall thicknesses required for this Work and shall have the manufacturing capability to meet the schedule requirements of this project. This experience requirement shall apply to the fabrication plant facility and responsible personnel, not to the firm which owns the facility or employs the personnel.

1.3 SUBMITTALS

A. Shop Drawings:
1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
2. See Section 15060.
3. Factory test reports.
5. Welders certificates.
6. Fabrication Information:
a. Pipe/fitting wall construction details which indicate the type and thickness of cylinder; the position, type, size, and area of reinforcement, manufacturing tolerances; maximum angular joint deflection limitations; and all other pertinent information required for the manufacture and installation of the product.

b. Welded joint details shall be submitted for all joint types, including beveled ends for alignment conformance and deep bell or butt strap joints required for control of temperature stresses.

c. Pipe Fabricator's Credentials: Submit the credentials of the pipe manufacturer/fabricator. Credentials shall include reference names, telephone numbers, and descriptions of projects for pipe conforming to AWWA C200 that is of similar diameter, length, and wall thickness to the pipe in this project. Project description shall include length, diameter, wall thickness, steel metallurgy, location of facility where pipe was manufactured/fabricated, and names of key plant personnel responsible for the manufacturing process. Submit names and qualifications of current plant personnel to be responsible for manufacture of the pipe in this project. To demonstrate ability to meet the schedule requirements of this project, submit project descriptions and manufacturing/fabrication schedules for other currently contracted pipe projects at the Fabricator's plant.

d. Manufacturer's written Quality Assurance/Control Program.

7. Materials: Material lists and steel reinforcement schedules, which include and describe all materials to be utilized. Metallurgical test reports for steel proposed for use on the project. Submit chemical and physical test reports from each heat of steel that indicate the steel conforms to the Specifications.

8. Line Layout Information:
   a. Line layout and marking diagrams compatible with the requirements of AWWA Manual 11 (M-11) and which indicate the specific number of each pipe piece and fitting and the location of each pipe piece and the direction of each fitting in the completed line. In addition, the line layouts shall include: the pipe station and invert elevation at all changes in grade or horizontal alignment; the station and invert elevation to which the bell end of each pipe piece will be laid; all elements of curves and bends, both in horizontal and vertical alignment. The location of all metered pipe sections, beveled ends for alignment conformance, and deep bell or butt strap joints for temperature stress control shall be clearly indicated on the diagrams.
   b. Dimensional drawings of all valves, fittings, and appurtenances as specified in Divisions 2 and 15.
   c. Drawings showing the location and details of bulkheads for hydrostatic testing of the pipeline, and details for removal of test bulkheads and repair of the lining.
   d. Details and locations of closures for length adjustment, temporary access manways, vents, and weld lead pass holes as indicated and as required for construction convenience.

9. Welding Information:
   a. Information regarding location, type, size, and extent of all welds with reference called out for Welding Procedure Specifications (WPS) numbers shall be shown on the shop drawings. The shop drawings shall distinguish between shop and field welds. Shop drawings shall indicate by welding symbols or sketches the details of the welded joints, and the preparation of parent metal required to make them.
   b. Written welding procedures for shop and field welds, including Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs).
   c. Written nondestructive testing procedure specifications, and nondestructive testing personnel qualifications for shop and field welds.
   d. Current welder performance qualifications (WPQs) shall be submitted for each welder used prior to its performing any Work either in the shop or field. Qualification testing shall be as specified in Article 1.2 - Quality Assurance, Paragraph G, in this Section.
   e. Submit all nondestructive testing (NDT) data for each shop-welded and field-welded joint. This data shall include all testing on each weld joint, including re-examination of repaired welds, using radiographic, magnetic particle, dye penetrant examination, ultrasonic, or air test examination methods specified. Test data shall be reviewed and signed by the welding inspector(s).
   f. Submit a welder log for field and shop welding. Log shall list all welders to be used for the Work and the types of welds each welder is qualified to perform.
   g. Submit a welding map showing the sequence of welds for all field welds.
h. Submit a written weld repair procedure for each type of shop and field weld proposed for use on
the Project.

i. Submit a written rod control procedure for shop and field operations demonstrating how the
Contractor intends to maintain rods in good condition throughout the Work. The rod control
procedure shall also demonstrate how the Contractor intends to ensure that the proper rods are
used for each weld.

10. Handling and Support Information: Detail drawings indicating the type, number and other pertinent
details of the slings, strutting and other methods proposed for pipe support and handling during
manufacturing, transport, and installation. Calculations supporting the handling and support system
design shall be submitted. Drawings and calculations shall be sealed by a registered professional
engineer in the State of Washington or Oregon.

11. Control of Temperature Stresses:
   a. Submit proposed sequencing of events to control temperature stresses in the pipe wall during
      installation prior to starting of any field welding.
   b. Submit the proposed sequencing of events or special techniques to minimize distortion of the
      steel as may result from shop welding procedures.

12. Submit plan for monitoring pipeline temperatures.

B. Certifications: Furnish a certified affidavit of compliance for all pipe and other products, materials, or
related work provided under this Section, as specified in ANSI/AWWA C200, and C210, respectively,
and the following supplemental requirements:
   1. Compliance with the additional requirements included in these Contract Documents.
   2. Physical and chemical properties of all steel.
   3. Hydrostatic test reports.
   4. Results of production weld tests.
   5. All epoxy lining were performed in conformance AWWA 210.
   6. All materials are NSF approved for use with potable water.
   7. All welds were performed in conformance with these documents.
   8. Report full results of the following test reports showing compliance with referenced standard prior to
      shipment of pipe material:
         a. Steel test reports.

C. All expenses incurred in making samples or collecting data for certification of tests shall be borne by the
Contractor at no increased cost to the Owner.

PART 2 - PRODUCTS

2.1 GENERAL

   A. Steel pipe, and linings shall conform to ANSI/AWWA C200, and C210, as applicable, subject to the
   following supplemental requirements. The pipe shall be of the diameter and wall thickness shown, shall
   be furnished complete with welded joints/flanged joints, as indicated in the Contract Documents.

   B. Markings: Legibly mark all pipes and specials in accordance with the laying schedule and marking
diagram. Each pipe shall be numbered in sequence and said number shall appear on the laying schedule
and marking diagram in its proper location for installation. All special pipe sections and fittings shall be
marked at each end with top field centerline. The word "top" shall be painted or marked on the outside
top spigot of each pipe section.
C. Handling and Storage: The pipe shall be handled by use of wide slings, padded cradles, or other devices, designed and constructed to prevent damage to the pipe coating/exterior. The use of chains, hooks, or other equipment which might injure the pipe coating/exterior will not be permitted. Stockpiled pipe shall be suitably supported and shall be secured to prevent accidental rolling and to avoid contact with mud, water, or other deleterious materials. Stockpiled pipe shall be supported on sand or earth berms free of rock exceeding 3 inches in diameter. The ends of all pipe shall be securely bulkheaded or otherwise sealed during transport to the jobsite. All pipe handling equipment and methods shall be acceptable to the Owner.

D. Pay the cost of replacement or repair of pipe damaged at no increased cost to the Owner.

E. Strutting: Adequate strutting shall be provided on all specials, fittings, and straight pipe so as to avoid damage or distortion to the pipe and fittings during handling, storage, hauling, and installation. The following requirements shall apply:
   1. The strutting materials, size and spacing shall be the responsibility of the Contractor.
   2. Any pipe damaged during handling, hauling, storage, or installation due to improper strutting shall be repaired or replaced.
   3. Strut shall not damage any pipe coatings or linings.

F. Laying Lengths: Maximum pipe laying lengths shall not be limited unless specifically required by the Drawings. Contractor shall select lengths to accommodate the Contractor’s operation.

G. Lining: The pipe lining shall have smooth homogenous interior surfaces and shall be free from any defects.

### 2.2 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. Steel Pipe:
      a. Northwest Pipe.
      b. Ameron.
      c. Or Approved Equal.
   2. Flanged adaptors:
      a. Rockwell (Style 913 (steel)).
      b. Dresser (Style 128 (steel)).
   3. Insulating couplings:
      a. Rockwell (Style 416).
      b. Dresser (Style 39).
   4. Reducing couplings:
      a. Rockwell (Style 415).
      b. Dresser (Style 62).
   5. Transition coupling:
      a. Rockwell (Style 413).
      b. Dresser (Style 62).
   6. Compression sleeve coupling:
      a. Rockwell (Style 411 (steel)).
      b. Dresser (Style 38 (steel)).
   7. Mechanical couplings and fittings:
      a. Victaulic (Style 07 or 77).
      b. S.P. Fittings.
   8. Equipment Connection Fittings:
      a. Romac (Style ECF 400).
      b. Or, Approved Equal.
   9. Factory-applied plastic or epoxy coatings:
      a. "Encoat" Division of Energy Coating Company.
      b. "Scotchkote" Division of 3M Company.
2.3 MATERIALS

A. All materials used in steel piping systems defined in Section 15060 shall meet or exceed pressure test requirements specified for each respective system.

B. Steel Pipe (Fabricated Type): Per AWWA C200:
   1. Steel Pipe and Specials: Minimum yield point of steel shall be 36,000 psi and steel shall be as specified below.
      a. Steel coils shall be made from the continuous cast process or continuous cast slabs, fully killed, fine-grain practice conforming to the physical and chemical characteristics of ASTM A 1011/1018. For sheet steel, the maximum allowable thickness variation shall have a zero (0) negative thickness tolerance from nominal calculated, specified, or shown.
      b. Steel plate shall be fully killed, conform to ASTM A 516 70, and be manufactured to fine-grain practice conforming to the physical and chemical characteristics of ASTM A 570 Grade 36 (when tmin < 0.299") or ASTM A907 Grade 36 (when tmin > 0.299"). For plate steel, the maximum allowable thickness variation shall have a zero (0) negative thickness tolerance from nominal calculated, specified, or shown.
   2. Pipe shall be manufactured as fabricated pipe per AWWA C200 as modified herein. ASTM pipe manufacturing standards referenced in AWWA C200 shall not be used. Pipe sections shall be fabricated by either of the following methods:
      1. Pipe sections may be spirally welded or fabricated from short cylindrical courses joined circumferentially by complete penetration butt joint welds with not more than two longitudinal seams per course. Longitudinal seams shall be staggered on both sides of the pipe.
      2. Pipe sections may be rolled or pressed from no more than three sheets the full length of the pipe and welded with no more than three longitudinal seams. Patching inserts, overlays, or pounding out of dents will not be permitted. Repair of notches or laminations on second ends will not be permitted. Damaged ends shall be removed as a cylinder and the section end properly prepared. Distorted or flattened lengths shall be rejected. A buckled section shall be replaced as a cylinder.

C. Charpy Tests:
   1. General. Steel used in production manufacturing of pipe and specials shall be tested for notch toughness using Charpy V-Notch tests per ASTM A 370. The test acceptance for full size specimens (10 mm by 10 mm size) shall be 25 foot-pounds at a test temperature of 30 degrees F; tests shall include three impact specimens and shall be conducted in the direction transverse to the final direction of rolling. Specimens taken from steel less than 7/16-inch thickness shall be tested for acceptance at reduced values per Table 6 of ASTM A 370.
   2. Plate. Charpy tests shall be conducted on each plate as required in ASTM A 20.
   3. Coils. Charpy tests shall be conducted on the first 500 tons of steel by testing each coil as follows:
      a. Tests shall include representative sampling of all steel thicknesses required for the Work.
      b. Each coil shall be tested by taking coupons from the outer, middle, and inner wrap of the coil. Middle coil coupons may be taken from the ends of full-length pipes that are closest to the middle of the coil.
      c. Coils that do not meet the above Charpy acceptance criteria shall not be used in production of pipe.

D. Fittings (For Fabricated Pipe): AWWA C208.

E. Flanges:
   1. ASME B16.5.
   2. Flat faced.

F. Nuts and Bolts:
   1. Buried: Cadmium-plated meeting SAE AMS-QQ-P-416, Type 1, Class 2 (Cor-Ten) for buried application.
   2. Exposed: Mechanical galvanized ASTM B695, Class 40; Type 316 SST.
   3. Heads and dimensions per ASME B1.1.
   5. Project ends 1/4 to 1/2 IN beyond nuts.
H. Gaskets: See individual piping systems in Section 15060.

2.4 MANUFACTURED UNITS

A. Couplings:
   1. Flanged adaptors:
      a. Steel or carbon steel body sleeve, flange, followers and Grade 30 rubber gaskets.
      b. Provide units specified in Article 2.1.
      c. Flanges meeting standards of adjoining flanges.
      d. Entire assembly to be rated for test pressure specified on Piping Schedule for each respective application.
   2. Compression sleeve coupling:
      a. Steel sleeve, followers Grade 30 and rubber gaskets.
      b. Provide units specified in Article 2.1.
      c. Flanges meeting standards of adjoining flanges.
      d. Entire assembly to be rated for test pressure specified on Piping Schedule for each respective application.
      e. Provide field coating for buried couplings per AWWA C203.
   3. Mechanical coupling joint:
      a. Use of mechanical grooved (AWWA C606) type couplings and fittings in lieu of flanged joints is acceptable where specifically specified in Section 15060.
      b. Utilize units defined in Article 2.1.

2.5 FABRICATION

A. Welded Steel Pipe (WSP):
   1. Provide piping consisting of a welded steel cylinder with steel joint rings welded to its ends, formed and tested in accordance with prescribed methods.
   2. Pipe design: Furnish all welded steel pipe in full accordance with design parameters specified below.
   3. The pipe shall be designed for the maximum stress in the pipe wall possible, whether it is due to traffic loading, external load, internal pressure or any combination.
   4. The pipe shall be designed in accordance with the recommended procedures in AWWA Manual M11. For external loads, design covers shown on the plans. The following parameters shall be used:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Pressure</td>
<td>See Schedule in Section 15060</td>
</tr>
<tr>
<td>Transient Pressure (operating pressure and surge)</td>
<td>See Schedule in Section 15060</td>
</tr>
<tr>
<td>Modulus of Soil reaction (E’)</td>
<td>1000 psi</td>
</tr>
<tr>
<td>Bedding Constant (K)</td>
<td>0.1</td>
</tr>
<tr>
<td>Deflection Lag Factor</td>
<td>1.5</td>
</tr>
<tr>
<td>Weight of earth</td>
<td>130 lbs./cu ft</td>
</tr>
<tr>
<td>Live Load</td>
<td>AASHTO H-20 for two trucks passing</td>
</tr>
<tr>
<td>Pipeline Trench Condition</td>
<td>Transition Width</td>
</tr>
<tr>
<td>Steel Design Stress</td>
<td>½ Yield Stress, not to exceed 18,000 psi</td>
</tr>
<tr>
<td>Minimum Steel Cylinder Thickness</td>
<td>Existing Pipe Thickness (dig and verify)</td>
</tr>
</tbody>
</table>

B. Joint Shop Coating: All holdback areas for welded joints and all butt straps shall be thoroughly cleaned and given a shop coat of rust-inhibitive primer. The surface preparation and primer shall be compatible with the intended finish coating as specified in Section 09905.

A. Fabricated Fittings:
   1. AWWA C208.
   2. Assure ratio of radius of bend to diameter of pipe equal to or greater than 1.0.

2.6 SOURCE QUALITY CONTROL

A. Testing:
   1. Shop hydrostatic test fabricated steel pipe and fittings.
   2. Field hydrostatic test all pipe as specified in Section 15060.
PART 3 - EXECUTION

3.1 INSTALLATION

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

B. Handling and Storage: All pipe, fittings, and specials shall be carefully handled and protected against damage to lining and coating/interior and exterior surfaces, impact shocks, and free fall. All pipe handling equipment shall be acceptable to the Owner. Pipe shall not be placed directly on rough ground but shall be supported in a manner which will protect the pipe against injury whenever stored at the trench site or elsewhere. Pipe shall be handled and stored at the trench site in accordance with the requirements stated below. No pipe shall be installed when the lining or coating/interior or exterior surfaces show cracks or other damage that may be harmful as determined by the Owner. Such damaged lining and coating/interior and exterior surfaces, shall be repaired or a new undamaged pipe shall be furnished.

C. All pipe damaged prior to Substantial Completion shall be repaired or replaced by the Contractor at no additional cost to the Owner.

D. Inspect each pipe and fitting to insure that there are no damaged portions of the pipe. Remove or smooth out any burrs, gouges, weld splatter or other small defects prior to laying the pipe.

E. Before placement of pipe in the trench, each pipe or fitting shall be thoroughly cleaned of any foreign substance, which may have collected thereon and shall be kept clean at all times thereafter. For this purpose, the openings of all pipes and fittings in the trench shall be closed during any interruption to the Work.

F. Lifting points shall be no closer than the 1/3 and 2/3 points along the length of the Section. Contractor shall be responsible for selecting lifting points that when used, do not result in damage to the pipe.

G. Where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the Owner may change the alignment and/or the pipe grades. Such change shall be made by the deflection of joints, by the use of beveled joint rings, or by the use of additional fittings. However, in no case shall the deflection in the joint exceed 75-percent of the maximum deflection recommended by the pipe manufacturer or the amount that results in more than a 1/8–inch gap at the weld location, whichever is less. No joint shall be misfit any amount which will be detrimental to the strength and watertightness of the finished joint.

H. Except for short runs which may be permitted by the Owner, pipes shall be laid uphill on grades exceeding 10-percent. Pipe which is laid on a downhill grade shall be blocked and held in place until sufficient support is furnished by the following pipe to prevent movement.

I. Pipe struts shall be left in place until backfilling operations have been completed for pipe 36-inches and larger. Struts in pipes smaller than 36-inches may be removed immediately after laying, provided, that the deflection of the pipe during and after backfilling does not exceed that specified. After backfill has been placed, the struts shall be removed by the Contractor and shall remain the property of the Contractor. Struts shall not be removed with a torch or any other method that may damage the pipe, piping lining or pipe coating. The parent pipe material shall not be nicked, gouged, or damaged during strut removal. All repairs of gouges and nicks in the parent material shall be made using 3/32-inch maximum diameter E-6010 welding electrodes with a maximum heat input of 5.6kj per inch. Tack welds, stall metal, weld splatter, slag, and burrs that remain attached to the parent metal surface after cutting shall be ground to within 1/32-inch of the parent metal. Grinding shall not penetrate the parent metal. The Contractor shall notify the Owner prior to grinding. Following grinding, all pipe surfaces at the tack weld shall be visually inspected for defects. All defects deeper than 1/16-inch shall be repaired by welding in accordance with ANSI/AWSD 1.1 and AWWA/ANSI C206. All inspection work shall be by a certified welder. All defects or damages on lining or coating shall be repaired per Section 2.5.C of this Specification section.

J. Joining Methods - Flanges:
   1. Facing method:
      a. Insert slip-on flange on pipe.
b. Assure maximum tolerances for flange faces from normal with respect to axis of pipe is 0.005 IN per foot of flange diameter.
c. Test flanges after welding to pipe for true to face condition and reface, if necessary, to bring to specified tolerance.

2. Joining method:
   a. Leave 1/8 to 3/8 IN of flange bolts projecting beyond face of nut after tightening.
   b. Coordinate dimensions and drillings of flanges with flanges for valves, pumps, equipment, tank, and other interconnecting piping systems.
   c. When bolting flange joints, exercise extreme care to assure that there is no restraint on opposite end of pipe or fitting which would prevent uniform gasket compression or cause unnecessary stress, bending or torsional strains being applied to cast flanges or flanged fittings.
      1) Allow one (1) flange free movement in any direction while bolts are being tightened.
   d. Do not assemble adjoining flexible coupled, mechanical coupled or welded joints until flanged joints in piping system have been tightened.
   e. Gradually tighten flange bolts uniformly to permit even gasket compression.
   f. Do not overstress bolts to compensate for poor installation.

K. Joining Method - Welded Joints:
   1. Perform welding in accordance with AWWA C206 and this Section.
   2. For flange attachment perform in accordance with AWWA C207.
   3. Have each welding operator affix an assigned symbol to all his welds.
      a. Mark each longitudinal joint at the extent of each operator's welding.
      b. Mark each circumferential joint, nozzle, or other weld into places 180 degrees apart.
   4. Welding for all process piping shall conform with ASME B31.3.
      a. Welding of utility piping 125 psi and less shall be welded per ASME B31.9.
      b. Utility piping above 125 psi shall conform to ASME B31.1.
   5. Provide caps, tees, elbows, reducers, etc., manufactured for welded applications.
   6. Wedlolets may be used for 5 IN and larger pipe provided all slag is removed from inside the pipe.
   7. Weld-in nozzles may be used for branch connections to mains and where approved by Engineer.
   8. Use all long radius welding elbows for expansion loops and bends.
   9. Use long radius reducing welding elbows 90 degree bends and size changes are required.
   10. Manufacturer to supply adequate coating and lining materials for field application following welding and preparation.
   11. Manufacturer to supply instructions for surface preparation following welding and field application of lining and coatings. Contractor to adhere to instructions as supplied by manufacturer.

L. Joining Method - Couplings:
   1. Compression sleeve:
      a. Install coupling to allow space of not less than 1/4 IN but not more than 1 IN.
      b. Provide harnessed joint.
         1) Use joint harness arrangements detailed in AWWA M11.
      c. Design harness assembly with adequate number of tie rods for test pressures indicated in Section 15060 and allow for expansion of pipe.
      d. Provide ends to be joined or fitted with compression sleeve couplings of the plain end type.
      e. Grind smooth welds the length of one (1) coupling on either side of joint to be fitted with any coupling.
      f. Assure that outside diameter and out-of-round tolerances are within limits required by coupling manufacturer.
   2. Mechanical coupling:
      a. Arrange piping so that pipe ends are in full contact.
      b. Groove and shouldered ends of piping in accordance with manufacturer's recommendations.
      c. Provide coupling and grooving technique assuring a connection which passes pressure testing requirements.

M. Support exposed piping in accordance with Section 15060.

N. Install buried piping per Section 15060.
O. Pipe Cleanup: As pipe laying progresses, keep the pipe interior free of all debris. Completely clean the interior of the pipe of all sand, dirt, mortar splatter and any other debris following completion of pipe laying and any necessary interior repairs prior to testing and disinfecting the completed pipeline.

P. Installation Tolerances: Each section of pipe shall be laid in the order and position shown on the laying diagram and the following requirements:

1. Each section of pipe having a nominal diameter less than 48 inches shall be laid to line and grade, within plus or minus 2 inches horizontal deviation and plus or minus 1 inch vertical deviation.

2. Each section of pipe having nominal diameter 48 inches and larger shall be laid to line and grade, within plus or minus 5 percent of diameter horizontal deviation and plus or minus 2.5 percent of diameter vertical deviation.

3. In addition to the horizontal and vertical tolerances above, lay the pipe so that no high or low points other than those on the laying diagram are introduced.

4. Pipe deflection, after backfill but prior to installation of field-applied cement mortar lining, if applied, shall not exceed 2.25 percent for flexible coated pipe and 1.5 percent for cement mortar coated pipe. Deflection shall be measured by the difference in vertical inside diameter in the installed pipe and the manufactured pipe.

5. Pipe not conforming to these criteria or which otherwise impact the ability to complete the Work shall be removed and reinstalled in full conformance with the Contract Documents at no additional cost to the Owner.

6. Pipe Installation. For each section of pipe, the Contractor shall record the invert elevation and incorporate into the As-Built Drawings.

Q. Protection of Pipe: At locations where the Contractor proposes to cross the installed pipeline with heavy equipment, precautions as approved by the Owner shall be taken to protect the pipe from damage. Acceptable precautions include: backfilling the pipe trench as necessary to protect the pipe, concrete encasing the pipe, and placing steel plating over the pipe. Any damage to the pipe caused by the Contractor's operation or his equipment shall be repaired at no additional cost to the Owner.

3.2 INSTALLATION OF PIPE APPURTEYNANCES

A. Installation of Valves: All valves shall be handled in a manner to prevent any injury or damage to any part of the valve. All joints shall be thoroughly cleaned and prepared prior to installation. Adjust all stem packing and operate each valve prior to installation to insure proper operation. Valves (body and seat) shall not be subjected to test pressures greater than manufacturer's recommendation. In some cases this may require an increase in the valve pressure class.

B. All buried valves shall be coated and protected in accordance with Section 09905.

C. All valves shall be installed so that the valve stems are plumb and in the location indicated.

D. Installation of Flanged Joints: Before the joint is assembled, the flange faces shall be thoroughly cleaned of all foreign material with a power wire brush. The gasket shall be centered and the connecting flanges drawn up watertight without unnecessarily stressing the flanges. All bolts shall be tightened in a progressive diametrically opposite sequence and torqued with a suitable, approved and calibrated torque wrench. All clamping torque shall be applied to the nuts only.

E. All buried flanges shall be coated and protected in accordance with Section 09905.

F. Flexible Coupled Joints: When installing flexible couplings, care shall be taken that the connecting pipe ends, couplings and gaskets are clean and free of all dirt and foreign matter with special attention being given to the contact surfaces of the pipe, gaskets and couplings. The couplings shall be assembled and installed in conformity with the recommendation and instruction of the coupling manufacturer.
G. Wrenches used in bolting couplings shall be of a type and size recommended by the coupling manufacturer. Coupling bolts shall be tightened so as to secure a uniform annular space between the follower rings and the body of the pipe with all bolts tightened approximately the same amount. Diametrically opposite bolts shall be tightened progressively and evenly. Final tightening shall be done with a suitable, approved and calibrated torque wrench set for the torque recommended by the coupling manufacturer. All clamping torque shall be applied to the nut only. Contractor shall submit certification of equipment calibration of torque wrenches.

H. Insulated Joints: Insulated joints and appurtenant features shall be made by the Contractor as indicated. Exercise special care when installing these joints to prevent electrical conductivity across the joint. After the insulated joint is completed, an electrical resistance test will be performed by the Owner as applicable. Should the resistance test indicate a short circuit, remove the insulating units to inspect for damages, replace all damaged portions, and reassemble the insulating joint. The insulated joint shall then be retested to assure proper insulation.

3.3 FIELD QUALITY CONTROL

A. Test piping systems in accordance with Section 15060.

END OF SECTION
SECTION 15064
PIPE: PLASTIC

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Plastic pipe.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.
   3. Section 15060 - Pipe and Pipe Fittings: Basic Requirements.

1.2 QUALITY ASSURANCE

A. See Specification Section 15060.

B. Referenced Standards:
   1. ASTM International (ASTM):
      a. PVC (polyvinyl chloride) materials:
         2) D1785, Standard Specification for Poly(Vinyl Chloride) PVC Plastic Pipe, Schedules 40, 80 and 120.
         4) D3034, Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
         9) F794, Standard Specification for Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.
      b. Installation:
   2. American Water Works Association (AWWA):
      a. PVC (polyvinyl chloride) materials:
         1) C900, Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 IN Through 12 IN, for Water Distribution.
         2) C905, Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 IN through 48 IN, for Water Transmission and Distribution.
      b. Polyethylene (PE) materials:
         1) C901, Standard for Polyethylene (PE) Pressure Pipe and Tubing, 1/2 IN through 3 IN, for Water Service.
   3. NSF International (NSF).
1.3 SUBMITTALS
   A. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   B. See Specification Section 15060.

PART 2 - PRODUCTS

2.1 BURIED PIPING
   A. Materials: Furnish materials in full compliance with following requirements:
      1. Up to 12 IN: AWWA C901 PE with Pressure Class of 200 psi per Table A3, AWWA C901.
      2. Joints for PVC pipe shall be the elastomeric-gasket type with a pressure rating not less than pipe pressure rating meeting performance requirements of ASTM D3139.
   B. Installation:
      1. Perform installation procedures, handling, thrust blocking, connections, and other appurtenant operations in full compliance to the manufacturer's printed recommendations and in full observance to plan details when more stringent.

PART 3 - EXECUTION

3.1 IDENTIFICATION
   A. Identify each length of pipe clearly at intervals of 5 FT or less.
      1. Include manufacturer's name and trademark.
      2. Nominal size of pipe, appurtenant information regarding polymer cell classification and critical identifications regarding performance specifications and NSF approvals when applicable.

3.2 BURIED PIPING
   A. Installation:
      1. Perform installation procedures, handling, thrust blocking, connections, and other appurtenant operations in full compliance to the manufacturer's printed recommendations and in full observance to plan details and Section 02221 when more stringent.

END OF SECTION
SECTION 15076
FIBERGLASS REINFORCED POLYMER MORTAR PIPE

PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Fiberglass reinforced polymer mortar pipe (FRPM) and fittings, and appurtenances.
   B. Related Sections include but are not necessarily limited to:
      1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
      2. Division 01 - General Requirements.
      3. Section 15060 - Pipe and Pipe Fittings: Basic Requirements.

1.2 QUALITY ASSURANCE
   A. Referenced Standards:
      1. ASTM International (ASTM):
      2. American Water Works Association (AWWA):
         a. AWWA M45 Fiberglass Design Manual

1.3 SUBMITTALS
   A. Shop Drawings:
      1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
      2. See Specification Section 15060.
      3. Contractor shall submit the following supplemental requirements as applicable. Design calculations shall be submitted to the Engineer for review prior to manufacture of pipe and fittings.
         a. Product data, including details and size, thickness, length of pipe, fittings with angles, flanges, elbows, reducers, tees, wyes, laterals and other fittings, and joints.
         b. Material properties and strength of pipe and gaskets.
         c. Manufacturer's certification that the proposed piping system is appropriate for the intended service.
         d. Manufacturer's written instructions for handling, transporting, storage, and installation of pipe.
         e. Test Reports: Submit reports from tests in accordance with ASTM D2412.
         f. Shop drawings of all tee-bases and fittings.
         g. Product data verifying suitability of pipe and joint materials for use in conditions with soil and ground water contamination that exist at the site, which the detailed composition of contaminants are provided with the bid documents.
         h. The Contractor shall submit to the Engineer the pipe and fitting warranty provisions, an affidavit from the manufacturer that the pipe, specials, fittings, and other products of material furnished under this Contract is in compliance with all the applicable provisions of ASTM D3262 standards and this specification.
i. The Manufacturer shall have ISO 9001 and ISO 14001 certificate of compliance issued by a third party independent auditor that all the ASTM D3262 and AWWA C950 requirements have been met.

j. The manufacturer shall submit a list of 10 projects with 104 IN and larger pipes supplied in the United States from the production facility where the proposed pipe will be manufactured. The reference list shall be complete with full contact information for the owner, engineer and contractor of each project.

k. The manufacturer shall submit a list of all open-trench projects installed in the United States for all 60 IN and larger projects.

l. The Manufacturer’s certified affidavit that it currently has the necessary equipment and tooling, production capability and capacity to manufacture 96 IN and 120 IN pipes without delay.

1.4 WARRANTY

A. Pipe and fitting suppliers shall provide a one-year warranty covering defects in product material and workmanship. A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the supplier of warranty responsibility for the full warranty term.

1.5 DELIVERY, STORAGE, AND HANDLING

A. All piping shall be bundled or packaged for transportation by commercial carrier to the site.

B. Before off-loading, pipe shall be inspected for damage. Any pipe damaged in shipment shall be assessed and either accepted or rejected as directed by the Engineer, and the pipe supplier shall be notified of rejected pipe within 7 days of delivery at the site. Rejected pipe shall be quarantined for disposition. Each pipe shipment shall be checked for quantity and proper pipe size, color and type.

C. Pipe shall be off-loaded and handled in accordance with the pipe manufacturer’s instructions.

D. Handling and Storage: All pipe handling and storage shall be strictly in accordance with the pipe manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. HOBAS Pipe USA – Houston, Texas / (949) 795-5800.
   2. Or Engineer approved equal.

2.2 MATERIALS

A. Resin Systems: The manufacturer shall use only polyester resin systems with a proven history of performance in this particular application. The historical data shall have been acquired from a composite material of similar construction and composition as the proposed product.

B. Glass Reinforcements: The reinforcing glass fibers used to manufacture the components shall be of highest quality commercial grade E-glass filaments with binder and sizing compatible with impregnating resins.

C. Silica Sand: Sand shall be minimum 98% silica with a maximum moisture content of 0.2%.

D. Additives: Curing agents, pigments, dyes, fillers, thixotropic agents, and other resin additives such as micron scale powdered calcium carbonate shall not detrimentally affect the performance of the product.
E. Elastomeric Gaskets: Gaskets shall meet ASTM F477 and be supplied by qualified gasket manufacturers with 25 years of EPDM gasket compounding history and be suitable for the service intended.

F. The manufacturer of pipe materials must demonstrate a 10-year recent history of successful installations with over 8 million lineal feet in the United States for sanitary sewer service.

2.3 PRODUCTS

A. Pipe

1. Pipes: All pipes shall be designed and furnished under the requirements of ASTM D3262. Pipe shall be manufactured by the centrifugal casting process to result in a dense, nonporous, corrosion-resistant, consistent composite structure. The interior surface of the pipes shall be manufactured using a nominal 40-mil (0.040”) premium made non-reinforced flexibilized polyester resin with a 25-50% elongation when tested in accordance with ASTM D638 and capable of handling flow velocities of 18 ft/sec for flows without solids present. The interior surface or liner shall provide crack resistance and abrasion resistance. The exterior surface of the pipes shall be comprised of 10 mil (0.010”) compressed and smooth sand and resin layer which provides UV, impact, and abrasion protection to the exterior. If exterior of pipe is made with fiberglass and resin only, the exterior sacrificial layer shall be a minimum of 5/8” thick.

2. Inside Diameter: See Drawings. The nominal ID and tolerances for open-cut pipes shall be per dimensions as published in Table 1 of ASTM D3262 in US customary units.


4. The pipe and fittings shall be homogenous throughout and free from visible cracks, holes, foreign inclusions or other injurious defects. The pipe and fittings shall also be as uniform as commercially practical in color opacity, density and other physical properties.

5. The Pipe Manufacturer shall provide written confirmation to the Engineer that the pipe and fittings supplied under the terms of this specification meet or exceed these specifications herein.

B. Joints

1. Unless otherwise specified, the coupling shall be structural filament wound sleeve overwrapped and mechanically locked to an internal full-face elastomeric membrane. The joints must meet the performance requirements of ASTM D4161.

2. Fittings, Flanges, elbows, reducers, tees, wyes, laterals and other fittings shall be capable of withstanding all operating conditions when installed. They may be contact molded or manufactured from mitered sections of pipe joined by glass-fiber-reinforced overlays.

3. Lengths: Pipe shall be supplied in nominal lengths of 20 feet. Actual laying length shall be nominal ± 2 inches. At least 90% of the total footage of each size and class of pipe, excluding special order lengths, shall be furnished in nominal length sections.

4. Inside Diameter: See Drawings

5. Stiffness: Joints to match the appropriate pipe stiffness, which varies in accordance with the construction plans.

6. Roundness: Pipe shall be round within 0.1% of the outside diameter.

7. Wall Thickness: The minimum wall thickness shall be the stated design thickness.

8. End Squareness: Pipe ends shall be square to the pipe axis within ±1/8”.

9. Joints shall be FWC Couplings

2.4 SOURCE QUALITY CONTROL

A. The Contractor shall be responsible for all costs associated with inspection and testing of materials, products, or equipment at the place of manufacture as required under this Section.

B. All pipe shall be subject to inspection at the place of manufacture. The Contractor shall notify the Engineer in writing of the manufacturing start date not less than 14 days prior to start of manufacture.
C. Testing: Manufacturer shall furnish results from qualification tests performed by QA/QC staff with a minimum of 10 years of direct fiberglass pipe experience of the following:
1. Pipes shall be manufactured and tested in accordance with ASTM D3262 and other applicable standard.
2. Joints shall meet the requirements of ASTM D4161.
3. Minimum pipe stiffness when tested in accordance with ASTM D2412 shall normally be 36 psi. The inner liner and outer UV shell thickness are excluded from stiffness as required by AWWA M45 load calculation parameters.
5. Strain corrosion for gravity pipe: The extrapolated 50-year strain corrosion value shall not be less than 0.9% as determined in accordance with ASTM D3681 and ASTM D3262. A safety factor of 1.25 shall be applied to the allowable minimum strain level \((t/D)\) values in Table 4 of the ASTM D3262. Pipe shall be certified for a minimum expected life of 100 years under 9% long-term diametrical deflection per ASTM D3262.

PART 3 - EXECUTION

3.1 INSTALLATION
A. Installation of the pipe and fittings shall be in accordance with the drawings and specifications, and pipe manufacturer recommendations.
B. For pipe handling, use textile slings, forklift, or other suitable materials as approved by the Engineer. The use of chains or cables is prohibited.
C. Jointing:
1. Clean ends of pipe and joint components.
2. Apply joint lubricant to pipe ends and elastomeric seals of coupling. Use only lubricants approved by the pipe manufacturer.
3. Use suitable equipment and end protection to push or pull the pipes together.
4. Do not exceed forces recommended by the manufacturer for joining or pushing pipe.
5. Join pipes in straight alignment then deflect to required angle. Do not allow the deflection angle to exceed 75% of the manufacturer’s recommended deflection.
6. Provide dewatering system to draw down groundwater level below bottom of the pipe trench. See Section 205.
7. Any pipe damage during handling and storage or by transport shall be repaired according to the manufacturer's recommendation or removed from the site and replaced at the Engineer's option, at no additional cost to the Owner. The Engineer's decision regarding rejection shall be final. Rejected pipe shall be clearly and indelibly marked to prevent confusion with pipe in subsequent shipments.
8. If a defective pipe is discovered after it has been installed, it shall be removed and replaced with a sound pipe in a satisfactory manner at no additional cost to the Owner. All pipe and fittings shall be thoroughly cleaned before installation, shall be kept clean until they are used in the Work. Minor pipe damages may be repaired under the supervision of a factory trained technician.
9. Precautions shall be taken to prevent floatation of the pipe in the trench. Remove and relay any pipe which has floated. Contractor is responsible to prevent the floatation of the pipe during construction. Contractor to submit installation plan to Engineer for review prior to construction.
10. Contractor to concrete encase the pipe as shown on the Plans.
11. All areas disturbed by installation of the pipeline shall be restored in accordance with the specification and drawings.
12. Pipe system shall be field-trim capable without the use of special pipe make up joints. No specially made make-up joints are allowed.

3.2 PIPELINE TESTING
A. See DCSWCS for additional pipe testing requirements.
B. Pipeline testing shall be conducted per pipe manufacturer’s recommendations. All pipe joints shall be tested.

C. Low Pressure Air Test: Each joint shall be tested with air pressure (max 25 psi) using an approved wheel type joint tester. Contractor shall assure joint tester can make it around bends adequately.

D. Leak Testing: Installed pipe shall be examined for leaks by exfiltration where the groundwater is below the top of pipe or by infiltration where the groundwater is above the top of pipe.

E. Infiltration Testing: The groundwater table around the pipe must be at least 1 foot above the highest elevation of the top of pipe for the section being examined. The joints may be examined visually for leaks. No leaks should be observed. If a leak is observed, it will be necessary to lower the water table below the area of the leak, and to completely dry and clean the area prior to undertaking a repair weld.

F. Exfiltration Testing: The groundwater table around the pipe must be less than 1 foot above the highest elevation of the top of pipe of the section being examined.

G. Pipe Deflection: After completion of backfilling, removal of stulls, and before acceptance of the Work, all pipes shall be tested for excessive deflection by pulling a mandrel through the pipe, or by other methods acceptable to the Engineer. Pipe with diametrical deflection exceeding five percent (5%) of the nominal inside diameter shall be uncovered and the bedding and backfill replaced as required to prevent excessive deflection. After replacing bedding and backfill, the pipe shall be retested.

H. Contractor shall at his own expense locate and repair the cause of leakage and retest the line, and all leakage shall be repaired.

3.3 FIELD QUALITY CONTROL

A. Test piping systems in accordance with Section 15060.

B. Interior of pipeline shall be kept clean and dry during construction. If dirt or debris enters the pipe, the interior of the pipe shall be cleaned by mechanical means.

C. Hydrostatic Tests: Pipe may be tested in accordance with the requirements as recommended by pipe manufacturer to insure zero leakage.

D. Allowable Leakage: No leakage allowed.

E. A pipe manufacturer representative shall be present at the beginning of the pipe installation and shall verify, in writing, that proper procedures are being used by the Contractor to install the pipes.

END OF SECTION
SECTION 15100
VALVES: BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Valving, actuators, and valving appurtenances.
B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.
   3. Section 09905 - Painting and Protective Coatings.
   4. Section 15060 - Pipe and Pipe Fittings: Basic Requirements.
   5. Section 15101 – Gate Valves
   6. Section 15103 - Butterfly Valves

1.2 QUALITY ASSURANCE
A. Referenced Standards:
   1. American Society of Mechanical Engineers (ASME):
      a. B1.20.1, Pipe Threads, General Purpose.
      c. B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
   2. ASTM International (ASTM):
   3. American Water Works Association (AWWA):
      a. C207, Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 IN through 144 IN.
      c. C507, Standard for Ball Valves, 6 IN through 48 IN (150 MM through 1200 MM).
      e. C606, Standard for Grooved and Shouldered Joints.
   4. National Electrical Manufacturers Association (NEMA):
      a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
      b. MG 1, Motors and Generators.

1.3 DEFINITIONS
A. The following are definitions of abbreviations used in this Specification Section or one (1) of the individual valve sections:
   1. CWP: Cold water working pressure.
   2. WOG: Water, oil, gas working pressure.
   3. WWP: Water working pressure.
1.4 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of
      the submittal process.
   2. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Manufacturer's installation instructions.
      c. Valve pressure and temperature rating.
      d. Valve material of construction.
      e. Special linings.
      f. Valve dimensions and weight.
      g. Valve flow coefficient.
      h. Assure valves can fully open and close without pipe interference.
   3. Test reports.

B. Operation and Maintenance Manuals:
   1. See Specification Section 01340 for requirements for:
      a. The mechanics and administration of the submittal process.
      b. The content of Operation and Maintenance Manuals.

C. Miscellaneous Submittals:
   1. Verification from valve actuator manufacturer that actuators have been installed properly,
      that all limit switches and position potentiometers have been properly adjusted, and that the
      valve actuator responds correctly to the valve position command.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, refer to individual valve Specification
   Sections for acceptable manufacturers.

2.2 MATERIALS

A. Refer to individual valve Specification Sections.

2.3 VALVE ACTUATORS

A. Valve Actuators - General:
   1. Provide actuators as shown on Drawings or specified.
   2. Counter clockwise opening as viewed from the top.
   3. Direction of opening and the word OPEN to be cast in handwheel or valve bonnet.
   4. Size actuator to produce required torque with a maximum pull of 80 LB at the maximum
      pressure rating of the valve provided and withstand without damage a pull of 200 LB on
      handwheel or chainwheel or 300 foot-pounds torque on the operating nut.
   5. Unless otherwise specified, actuators for valves to be buried, submerged or installed in
      vaults or manholes shall be sealed to withstand at least 20 FT of submergence.
   6. Extension stem:
      a. Install where shown or specified.
      b. Solid steel with actuator key and nut, diameter not less than stem of valve actuator
         shaft.
      c. Pin all stem connections.
      d. Center in valve box or grating opening band with guide bushing.

B. Buried Valve Actuators:
   1. Provide screw or slide type adjustable cast iron valve box, 5 IN minimum diameter, 3/16 IN
      minimum thickness, and identifying cast iron cover rated for traffic load.
2. Box base to enclose buried valve gear box or bonnet.
3. Provide 2 IN standard actuator nuts complying with AWWA C500, Section 3.16.
4. Provide at least two (2) tee handle keys for actuator nuts, with 5 FT extension between key and handle.
5. Extension stem:
   a. Provide for buried valves greater than 4 FT below finish grade.
   b. Extend to within 6 IN of finish grade.
6. Provide concrete pad encasement of valve box as shown for all buried valves unless shown otherwise.

C. Exposed Valve Manual Actuators:
1. Provide for all exposed valves not having electric or cylinder actuators.
2. Provide handwheels for gate and globe valves.
   a. Size handwheels for valves in accordance with AWWA C500.
3. Provide lever actuators for plug valves, butterfly valves and ball valves 3 IN DIA and smaller.
   a. Lever actuators for butterfly valves shall have a minimum of 5 intermediate lock positions between full open and full close.
   b. Provide at least two (2) levers for each type and size of valve furnished.
4. Gear actuators required for plug valves, butterfly valves, and ball valves 4 IN DIA and larger.
5. Provide gearing for gate valves 20 IN and larger in accordance with AWWA C500.
6. Gear actuators to be totally enclosed, permanently lubricated and with sealed bearings.
7. Provide chain actuators for valves 6 FT or higher from finish floor to valve centerline.
   a. Cadmium-plated chain looped to within 3 FT of finish floor.
   b. Equip chain wheels with chain guides to permit rapid operation with reasonable side pull without "gaging" the wheel.
8. Provide cast iron floor stands where shown on Drawings.
   a. Stands to be furnished by valve manufacturer with actuator.
   b. Stands or actuator to include thrust bearings for valve operation and weight of accessories.

2.4 FABRICATION

A. End Connections:
1. Provide the type of end connections for valves as required in the Piping Schedules presented in Specification Section 15060 or as shown on the Drawings.
2. Comply with the following standards:
   b. Flanged: ASME B16.1, Class 125 unless otherwise noted or AWWA C207.
   c. Bell and spigot or mechanical (gland) type: AWWA/ANSI C111/A21.11.
   e. Grooved: Rigid joints per Table 5 of AWWA C606.

B. Refer to individual valve Specification Sections for specifications of each type of valve used on Project.

C. Nuts, Bolts, and Washers:
1. Wetted or internal to be bronze or stainless steel.
   a. Exposed to be zinc or cadmium plated.

D. On Insulated Piping: Provide valves with extended stems to permit proper insulation application without interference from handle.

E. Polyamidoamine Epoxy Interior Coating:
1. Provide two-part polyamidoamine epoxy interior coating for all ferrous surfaces in accordance with AWWA C550.
2. Dry film thickness 8 mil, number of coats shall conform to paint manufacturer’s recommendations.
3. VOC Content: Max. 2.5 lbs/gal; minimum surface preparation: SSPC-SP-10.
4. Tnemec Series N140F (pota-pox) plus epoxy; NSF 61 Standards; or approved equal.

F. Fusion Bonded Powder Epoxy Interior Coating:
   1. Provide fusion bonded powder epoxy interior coating for all ferrous surfaces in accordance with AWWA C550.
   2. Dry film thickness 8 mil, number of coats shall conform to paint manufacturer’s recommendations.

G. Exterior Coating for buried valves:
   1. Provide fusion bonded powder epoxy exterior coating for all ferrous surfaces in accordance with AWWA C550.
   2. Dry film thickness 8 mil, number of coats shall conform to paint manufacturer’s recommendations.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.
B. Painting Requirements: Comply with Specification Section 09905 for painting and protective coatings.
C. Setting Buried Valves:
   1. Locate valves installed in pipe trenches where buried pipe indicated on Drawings.
   2. Set valves and valve boxes plumb.
   3. Place valve boxes directly over valves with top of box being brought to surface of finished grade.
   4. Install in closed position.
   5. Place valve on firm footing in trench to prevent settling and excessive strain on connection to pipe.
   6. After installation, backfill up to top of box for a minimum distance of 4 FT on each side of box.
   7. Install concrete collar around valve box per the Project Drawings.
D. Support exposed valves and piping adjacent to valves independently to eliminate pipe loads being transferred to valve and valve loads being transferred to the piping.
E. For grooved coupling valves, install rigid type.
F. Install electric or cylinder actuators above or horizontally adjacent to valve and gear box to optimize access to controls and external handwheel.
G. For threaded valves, provide union on one (1) side within 2 FT of valve to allow valve removal.
H. Install valves accessible for operation, inspection, and maintenance.

END OF SECTION
SECTION 15101
GATE VALVES

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Gate valves.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.
   3. Section 15100 - Valves: Basic Requirements.

1.2 QUALITY ASSURANCE
A. Referenced Standards:
   1. ASTM International (ASTM):
   2. American Water Works Association (AWWA):
   3. Manufacturers Standardization Society of the Valve and Fittings Industry Inc. (MSS):
      a. SP-9, Spot Facing for Bronze, Iron and Steel Flanges.
      b. SP-70, Cast Iron Gate Valves, Flanged and Threaded Ends.
      c. SP-80, Bronze Gate, Globe, Angle and Check Valves.

1.3 DEFINITIONS
A. OS&Y: Outside Screw and Yoke.
B. NRS: Non-rising Stem.
C. RS: Rising Stem.

1.4 SUBMITTALS
A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. See Specification Section 15100.

B. Operation and Maintenance Manuals:
   1. See Specification Section 01340 for requirements for:
      a. The mechanics and administration of the submittal process.
      b. The content of Operation and Maintenance Manuals.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS
A. Subject to compliance with the Contract Documents, the manufacturers listed in the applicable Articles below are acceptable.
2.2 VALVES: WATER

A. Resilient Wedge Gate Valves, 2 to 48 IN (Water Application):
   1. Comply with AWWA C509.
   2. Materials:
      a. Stem and stem nut: Bronze.
         1) Wetted bronze parts in low zinc bronze.
         2) Aluminum bronze components: Heat treated per AWWA C504.
      b. Body, gate: Ductile iron.
      c. Resilient wedge: Fully encapsulated rubber wedge.
   3. Design requirements:
      a. Minimum 200 psi working pressure.
      b. Buried: NRS, O-ring stem seal, 2 IN square operating nut.
      c. Exposed: OS&Y, stuffing box stem seal, handwheel.
      d. Counter clockwise open rotation.
      e. Fusion bonded epoxy coating interior and exterior except stainless steel and bearing surfaces.
         1) Comply with AWWA C550.
         2) Wetted bronze parts in low zinc bronze.
         3) Aluminum bronze components: Heat treated per AWWA C504.
   4. Acceptable manufacturers:
      a. Clow.
      b. Mueller.
      c. American Flow Control.
      d. M & H.
      e. Approved equal

2.3 ACCESSORIES

A. Furnish handwheel.

2.4 FABRICATION

A. General:
   1. Provide valves with clear waterways the full diameter of the valve.
   2. Spot valves in accordance with MSS SP-9.

PART 3 - EXECUTION

3.1 INSTALLATION

A. See Specification Section 15100.
   B. Do not install gate valves inverted or with the stems sloped more than 45 degrees from the upright unless the valve was ordered and manufactured specifically for this orientation.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Butterfly valves.

B. Related Sections include but are not necessarily limited to:
   1. Division 00 - Bidding Requirements, Contract Forms, and Conditions of the Contract.
   2. Division 01 - General Requirements.
   3. Section 15060 - Pipe and Pipe Fittings: Basic Requirements.
   4. Section 15100 - Valves: Basic Requirements.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Society of Mechanical Engineers (ASME):
   2. ASTM International (ASTM):
   3. American Water Works Association (AWWA):
   4. Manufacturers Standardization Society of the Valve and Fittings Industry Inc. (MSS):
      a. SP-67, Butterfly Valves.

1.3 SUBMITTALS

A. Shop Drawings:
   1. See Specification Section 01340 for requirements for the mechanics and administration of the submittal process.
   2. See Section 15100.
   3. For valves 8 IN and larger, furnish "Affidavit of Compliance" with Owner in accordance with AWWA C504.

B. Operation and Maintenance Manuals:
   1. See Specification Section 01340 for requirements for:
      a. The mechanics and administration of the submittal process.
      b. The content of Operation and Maintenance Manuals.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. DeZurik.
2. Clow.
4. Pratt.

2.2 BUTTERFLY VALVES (AWWA C504)

A. Comply with AWWA C504.

B. Materials:
   1. Valve bodies:
      a. ASTM A536 Grade 65-45-12 ductile iron.
   2. Valve shafts:
      a. Stainless steel, 18-8, Type 316.
   3. Valve discs:
      a. Potable and nonpotable water:
         1) ASTM A536, Grade 65-45-12 ductile iron.
      b. Valves 30 IN and larger: ASTM A276, 18-8, stainless steel.
   4. Valve seats:
      a. Potable and nonpotable water and air below 180 DegF:
         1) Buna-N.
   5. Mating surfaces:
      a. Valves less than 30 IN: ASTM A276, 18-8, stainless steel or bronze.
      b. Valves 30 IN and larger: ASTM A276, 18-8, stainless steel.

C. Design Requirements:
   1. Seat type:
      a. Resilient.
      b. Comply with AWWA C504.
   2. Exposed and submerged valves 3 through 20 IN.
      a. Body type: Short body flange (laying length may vary from AWWA C504).
   3. Direct buried valves:
      a. All valves: Working pressure rated for 150 psi (Class 150B per AWWA C504).
   4. Assure valves can fully open and close without pipe interference.

2.3 ACCESSORIES

A. Refer to Drawings and/or valve schedule for type of actuators.
   1. Furnish actuator integral with valve.

B. Refer to Section 15100 for actuator requirements. Provide couplers/extension if required for clearance.

PART 3 - EXECUTION

3.1 INSTALLATION

A. See Section 15100.

END OF SECTION