



Washington
Department of
**FISH and
WILDLIFE**

SOOS CREEK HATCHERY SUPPLY PIPE REPLACEMENT

DIRECTOR:
KELLY SUSEWIND

PROGRAM DIRECTOR:
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CHIEF ENGINEER:
GLENN F. GERTH, P.E.



DATE:
JUNE 2022

PROJECT NO.
KG:H7:2022-1

PROJECT MANAGER:
GINA CARR, P.E.

WDFW Title VI Clause

It is the policy of Washington Department of Fish and Wildlife (WDFW) to provide equal access to its programs, services, activities, and facilities under Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act of 1990, the Age Discrimination Act of 1975, and the Architectural Barriers Act of 1968. WDFW is a recipient of state and federal financial assistance.

WDFW prohibits discrimination on the basis of race, color, religion, national origin, including language, sex, age, mental or physical disability, reprisal, sexual orientation, status as a parent, and genetic information.

If you believe you have been discriminated against, please contact the WDFW Title VI Manager, PO Box 43139, Olympia, WA 98504, or online at: <https://wdfw.wa.gov/accessibility/grievances> within 20 calendar days of the alleged incident to file a formal complaint, or you can file with the Washington State Human Rights Commission directly at: 1-800-233-3247, or you can write to: Chief, Public Civil Rights Division, Department of the Interior, 1849 C Street NW, Washington DC 20240.

Persons who need to receive this information in an alternative format, different language, or who need a reasonable accommodation to participate in WDFW sponsored public meetings, or other activities, may contact the Title VI Manager by phone at: (360) 902-2349, or TDD (711), or email Title6@dfw.wa.gov.

If you need further assistance or information, please contact the Olympia office of the Washington Department of Fish and Wildlife: (360) 902-2464, or Telecommunications Device for the Deaf, TDD (711).

**SOOS CREEK HATCHERY SUPPLY PIPE REPLACEMENT
TABLE OF CONTENTS**

**DIVISION 0 - BID DOCUMENTS, INFORMATION
& AND GENERAL CONDITIONS**

00030 Notice to Contractors
 Vicinity Map to Bid Opening Site

00100 Instructions to Bidders
 00110 Prebid Requirements
 00120 Required Bid Documents
 00130 Bid Format
 00135 Bid Opening
 00140 Bid Submittal Deadline
 00145 Reasonable Accommodations
 00150 Mandatory Responsibility Criteria
 00155 Basis of Award
 00160 Period of Acceptance
 00170 Payment and Performance Bonds
 00175 Builders Risk Insurance
 00180 Interpretations
 00190 Minority and Women's Business
 Enterprise (MWBE) Participation
 00195 Contract Responsiveness

00200 Contractor Checklist
 00230 Prior to Contract Execution
 00235 Prior to Notice to Proceed
 00240 Submit With Pay Request
 00250 During Progress of Contract
 00260 For Substantial Completion
 00270 For Final Completion
 00280 For Retainage to be Released

00300 Bid Form

00400 Supplements to Bid Form
 00420 Qualification Questionnaire
 00440 Supplemental Bidder
 Responsibility Criteria

00500 Agreement Form

00600 Bond and Certificates
 00620 Retainage in Lieu of Performance
 Bond Option on Contracts of
 \$150,000 or Less
 00630 Retainage Options
 00640 Certificate of Liability Insurance
 00650 Schedule of Values
 00660 Verification of Monthly Payments
 to MWBEs Form
 00670 Statement of Apprentice
 Journeyman Participation Form

00700 General Conditions
 00701 Definitions
 00702 Insurance and Bonds
 00703 Time and Schedule
 00704 Specifications, Drawings, and
 Other Documents
 00705 Performance
 00706 Payments and Completion
 00707 Changes
 00708 Claims and Dispute Resolution
 00709 Termination of the Work
 00710 Miscellaneous Provisions

00800 Supplemental Conditions
 00802 Builders Risk Insurance
 00810 Abbreviations of Administrative
 Organizations

DIVISION 1 – GENERAL REQUIREMENTS

01010 Summary of Work
01011 Owner Furnished Items
01012 Contract Time
01025 Unit Price Measurement & Payment
01030 Schedule of Values
01040 Coordination
01060 Regulatory Requirements
01100 Special Project Procedures
01200 Project Meetings
01300 Contractor Submittals
01510 Temporary Utilities
01730 Operations and Maintenance (O&M) Manual

ATTACHMENT 1 – PERMITS

- State Environmental Policy Act (SEPA) Mitigated
 Determination of Non-significance (MDNS)
- Shoreline Substantial Development Permit
 (SSDP) Extension
- Building Permit (Pending)

ATTACHMENT 2 – CULTURAL RESOURCES

- Inadvertent Discovery Plan (IDP)

DIVISION 2 – SITE WORK

02000 General Site Work Provisions
02010 Subsurface Investigation
02050 Demolition
02100 Site Preparation
02140 Dewatering
02200 Earthwork
02240 Construction Geotextile
02260 Temporary Erosion and Sediment Control
02510 Hot Mix Asphalt
02601 Manholes and Vaults

DIVISION 3 – CONCRETE

- 03000 General Concrete Provisions
- 03100 Concrete Formwork
- 03210 Reinforcing Steel
- 03300 Cast-in-Place Concrete
- 03310 Controlled Low Strength Material
- 03315 Grout
- 03370 Concrete Curing
- 03900 Concrete Repair and Rehabilitation

DIVISION 5 – METALS

- 05000 General Metal Provisions
- 05050 Fasteners
- 05100 Structural Metal Framing
- 05500 Miscellaneous Metals

DIVISION 9 – FINISHES

- 09800 Protective Coating
- 09870 Coating System for Buried Steel Piping

DIVISION 15 – MECHANICAL

- 15000 General Mechanical Requirements
- 15005 Piping Identification
- 15007 Pipe Couplings
- 15030 Ductile Iron Pipe
- 15062 Small Non Pressure PVC Piping
- 15070 Gravity Pipeline Testing
- 15200 Valves, General
- 15201 Valve and Gate Actuators
- 15202 Butterfly Valves
- 15203 Check Valves
- 15204 Ball Valves
- 15206 Gate Valves
- 15230 Miscellaneous Valves
- 15240 Flow Meters

DIVISION 0 – BID AND CONTRACT DOCUMENTS

**SECTION 00030
NOTICE TO CONTRACTORS**

Sealed bids for the following Public Works Project will be received until 2:00 p.m. on June 8, 2022 at 600 Capitol Way North, MS: 43158, Olympia, Washington, 98501-1091, and will be publicly opened and read.

Due to the safety and health of the public and employees WDFW CAMP is temporarily closing Bid Openings to public attendance. Bid opening results will be made public within 24 hours of opening. Please Note: The Public will not be able to attend this bid opening.

PROJECT:

Soos Creek Hatchery Supply Pipe Replacement

NUMBER:

KG:H7:2022-1

Provide all labor, material, equipment, and permits to construct raceway supply and D-Box 2 supply pipe replacement at the Department's Soos Creek Hatchery, located at 13030 SE Auburn-Black, Washington, in King County.

Engineer's Estimate: \$450,000

No pre-bid walkthrough is scheduled, **Contractors are strongly encouraged to independently visit the site.**

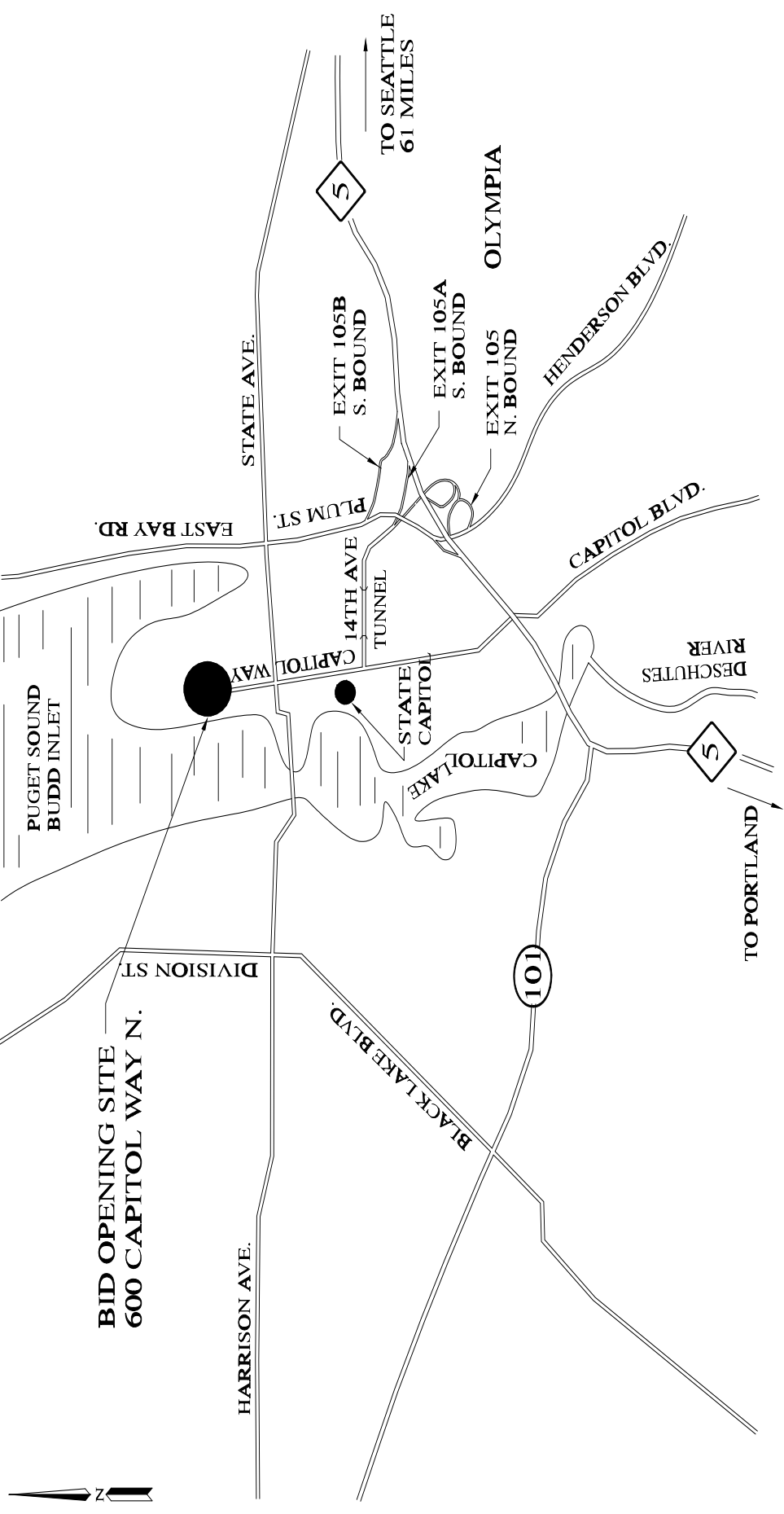
Visit the site between 8:00 am until 4:00 pm Monday through Friday. Do not interrupt hatchery staff or operations. Direct questions through CAMP.Bids.

For access to Drawings, Specifications, Addenda, plan holders list, and additional information for this project, please visit Builders Exchange of Washington, Inc. at <http://www.bxwa.com> – the official projects bidding affiliate for WA Department of Fish and Wildlife Public Works bidding projects. Click on “Posted Projects”; “Public Works”, “Washington State Department of Fish and Wildlife”, “Projects Bidding.”

For information or technical questions regarding this project, email CAMP.Bids@dfw.wa.gov with the project title and project number in subject line. This email may also be used to request copies of the project's posted documents (Drawings, Specifications, Addenda).

Minority and Women's Business Enterprises (MWBE) are encouraged to participate in the bidding as prime contractors, subcontractors, or suppliers.

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
Timothy Burns, Capital and Asset Management Program Director
By
Glenn F. Gerth, P.E., Chief Engineer
Capital and Asset Management Program



**BID OPENING SITE
600 CAPITOL WAY N.**

**BID OPENING SITE
600 CAPITOL WAY N.
OLYMPIA, WA 98501-1091**

**STATE OF WASHINGTON
DEPARTMENT OF FISH AND WILDLIFE**

DATE DRAWN: 04-10-95 SCALE: N.T.S.

DIVISION 0 – BID AND CONTRACT DOCUMENTS

SECTION 00100
INSTRUCTIONS TO BIDDER

00110 PREBID REQUIREMENTS

- A. Carefully examine all project documents.
- B. Be fully informed of all existing conditions and limitations, including any activities by City, County, State, Federal or private entities affecting access to the project.
- C. Include in the bid sufficient amount to cover all costs required by Bid Documents to complete the work, but not limited to applicable federal, state, and local taxes (except State Retail Sales Tax), insurance, bonding license(s), payment of prevailing wage rates, L&I filing fees, and all costs that may be necessary to complete the work.
- D. This project does not require Apprenticeship Participation.
- E. The project is not federally funded.

00120 REQUIRED BID DOCUMENTS

Failure to submit ALL PAGES of the following forms is sufficient cause to reject the bid.

- A. **Bid Form:** The ENTIRE current Bid Form Section 00300 must be signed. Check for addenda at Builders Exchange of Washington, Inc. (<http://www.bxwa.com>) before submitting bid.
- B. **Standard Questionnaire for Qualification of Contractors Form:** Submit the completed form with bid form.
- C. **Bid Bond:** For bids of \$35,000 or less, no bid guarantee is required. Bids greater than \$35,000 shall be accompanied by a certified check, cashier's check, or bid bond payable to the Treasurer of the State of Washington in an amount equal to at least five-percent of the bid as evidence of good faith and as a guarantee that, if awarded the Contract, the bidder will execute the Contract and give separate bond as required, see Section 00702.06.

00130 BID FORMAT

- A. Each bid must be submitted on the current Bid Form, Section 00300 contained in these Bid Documents. Place your required bid documents into an envelope clearly marked on the outside with "BID ENCLOSED", the project name, and project number. Envelope shall clearly identify your Company's name and address as shown below.

Company Name Address City, State Zip	BID ENCLOSED PROJECT NAME PROJECT NUMBER BID OPENING
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- B. No oral, email, telephonic, faxed bids or modifications will be accepted or considered.

00135 BID OPENING

Bidders must submit their bid to the Washington Department of Fish and Wildlife, Capital and Asset Management Program, located at 600 Capitol Way North, MS: 43158, Olympia, Washington 98501-1091 before the bid submittal deadline for this solicitation. Sending your bid through the United States Postal Services (USPS) or United States Express Mail will not guarantee your bid will be received at the above location on time.

PLEASE NOTE: As a state agency, USPS mail is routed through the State’s Consolidated Mail Service with unpredictable delivery times. We encourage the following:

- Hand delivery;
- Courier service;
- Allow sufficient amount of time;
- Third party (i.e. Federal Express, United Parcel Service) for overnight delivery;
- Clearly label the outside of your envelope using the format in Section 00130.

00140 BID SUBMITTAL DEADLINE

- A. Sealed bids for this project will be received by an authorized representative within the Washington Department of Fish and Wildlife, Capital and Asset Management Program located at 600 Capitol Way North, MS: 43158, Olympia, Washington, 98501-1091 until the time and date indicated on the current Bid Form, Section 00300. **Due to the safety and health of the public and employees, WDFW CAMP has temporarily closed Bid Openings to public attendance. Bid opening results will be made public within 24-hours of opening.**
- B. Bids submitted after deadline will not be accepted.

00145 REASONABLE ACCOMMODATIONS

- A. Persons with disabilities who need reasonable accommodations to participate in the bid openings are invited to contact Capital and Asset Management Program at (360) 902-8300 or CAMP.Bids@dfw.wa.gov. Reasonable accommodation requests should be received at least three business days prior to the bid opening to ensure availability.
- B. **Bid Results:** After bid opening, bidders may obtain bid results from Builders Exchange of Washington, Inc. at <http://bxwa.com> the next business day.

00150 MANDATORY RESPONSIBILITY CRITERIA

Before award of a public works contract, a bidder must meet the following mandatory responsibility criteria under RCW 39.04.350 (1) to be considered a responsible bidder and qualified to be awarded a public works project. The bidder must:

- A. At time of bid submittal, have a certificate of registration in compliance with Chapter 18.27 RCW;
- B. Have a current state Unified Business Identifier (UBI) number;
- C. If applicable, have industrial insurance coverage for the bidder’s employees working in Washington as required in Title 51 RCW; an employment security department number as required in Title 50 RCW; and a state excise tax registration number as required in Title 82 RCW;

DIVISION 0 – BID AND CONTRACT DOCUMENTS

- D. Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065(3);
- E. If bidding on a public works project subject to the apprenticeship utilization requirements in RCW 39.04.320, not have been found out of compliance by the Washington State apprenticeship and training council for working apprentices out of ratio, without appropriate supervision, or outside their approved work processes as outlined in their standards of apprenticeship under Chapter 49.04 RCW for the one-year period immediately preceding the date of the bid solicitation;
- F. Have received training on the requirements related to public works and prevailing wage under this chapter and Chapter 39.12 RCW. The bidder must designate a person or persons to be trained on these requirements. The training must be provided by the Department of Labor and Industries or by a training provider whose curriculum is approved by the department. The department, in consultation with the prevailing wage advisory committee, must determine the length of the training. Bidders that have completed three or more public works projects and have had a valid business license in Washington for three or more years are exempt from this subsection. The Department of Labor and Industries must keep records of entities that have satisfied the training requirement or are exempt and make the records available on its web site. Responsible parties may rely on the records made available by the department regarding satisfaction of the training requirement or exemption; and

Labor and Industries (LNI) Training Information Link:

<https://www.lni.wa.gov/TradesLicensing/PrevWage/Contractors/Training.asp>

- G. Within the three-year period immediately preceding the date of the bid solicitation, not have been determined by a final and binding citation and notice of assessment issued by the Department of Labor and Industries or through a civil judgment entered by a court of limited or general jurisdiction to have willfully violated, as defined in RCW 49.48.082, and provision of Chapter 49.46, 49.48 or 49.52 RCW.
- H. Before award of a public works contract, a bidder shall submit to the contracting agency a signed statement in accordance with RCW 9A.72.085 verifying under penalty of perjury that the bidder is in compliance with the responsible bidder criteria requirement of subsection G above. A contracting agency may award a contract in reasonable reliance upon such a sworn statement.

00155 BASIS OF AWARD

The lowest responsive bid and responsible bidder is based upon the Base Bid. The Owner reserves the right to award the contract amount based on any or all of the bid items listed, to restrict the contract amount to the funds available, and to reject any or all bids for any reason whatsoever and waive informalities.

00160 PERIOD OF ACCEPTANCE

All bids may be held 45 calendar days from bid opening date. At the end of this period, the three lowest bids may be retained for 15 additional days, or as may be further extended by the Owner with the approval of the bidding companies.

00170 PAYMENT AND PERFORMANCE BONDS

- A. Base bids greater than \$150,000; Contractor shall provide separate Payment and Performance Bonds, each executed by Contractor and Contractor's Surety.

DIVISION 0 – BID AND CONTRACT DOCUMENTS

B. Base bids \$150,000 or less, Contractor shall provide separate Payment and Performance Bonds, each executed by Contractor and Contractor's Surety, unless the Contractor agrees Owner may, in lieu of the bond(s), retain 10 percent of the Contract Sum for the period allowed by RCW 39.08.010.

C. For additional information see Section 00702.04.

00175 BUILDERS RISK INSURANCE

Builders Risk Insurance is not required, see Section 00802.07.

00180 INTERPRETATIONS

For information or technical questions regarding this project email CAMP.Bids@dfw.wa.gov with the project title and project number in subject line and address questions to the Project Manager. Questions resulting in changes to the scope or nature of the drawings, specifications, or bid documents will be answered by addendum/addenda reflective of the Owner's process.

The Owner will **NOT** answer questions received after 2:00 p.m. on June 2, 2022. All addenda issued are part of the bid documents. The Owner will not be responsible for any oral interpretations.

00190 MINORITY AND WOMEN'S BUSINESS ENTERPRISE (MWBE) PARTICIPATION

Minority and Women's Business Enterprises (MWBE) are encouraged to participate in the bidding as prime contractors, subcontractors, or suppliers.

00195 CONTRACT RESPONSIVENESS

Contractor shall return all required contract documents and signed contract no later than 21 calendar days from date of Award Letter.

END OF SECTION 00100

DIVISION 0 – BID AND CONTRACT DOCUMENTS

SECTION 00200 CONTRACTOR CHECKLIST

00230 PRIOR TO CONTRACT EXECUTION

Submit the following to WDFW's Contract Administrator within 21 calendar days from the date of the Award Letter:

- A. Signed Public Works Contract Agreement.
- B. Performance and Payment Bonds Forms: Separate performance and payment bonds executed by Contractor and Contractor's Surety.
- C. Retainage in Lieu of Performance Bond Option on Contracts of \$150,000 or Less: If Contractor elects, Owner may retain ten percent of the Contract Sum in lieu of the Performance and Payment Bonds, see Section 00620.
- D. Retainage Options Form, see Section 00630.
- E. Certificate of Liability Insurance Form, see Section 00640.
- F. Statewide Payee Form, Form W-9, Request for Taxpayer ID Number and Certification: for General Contractors and Subcontractors.

00235 PRIOR TO NOTICE TO PROCEED

- A. Provide to the Project Manager:
 - 1. List of subcontractors and major suppliers of work and materials greater than \$2,500.
 - 2. Construction Schedule for approval, see Section 00703.2.
 - 3. Schedule of Values for approval, see Section 00650.
- B. Attend preconstruction conference.

00240 SUBMIT WITH PAY REQUEST

- A. First invoice: include Statement of Intent to Pay Prevailing Wage Rates for Contractor and all Subcontractors, filed and approved by the Department of Labor and Industries (L&I). Information regarding Prevailing Wages is found at the L&I website: <http://www.lni.wa.gov/TradesLicensing/PrevWage/IntentAffidavits/File/default.asp>.
- B. All invoices: include Verification of Monthly Payments to MWBEs, see Section 00660.
- C. For contract sums of \$1,000,000 or more include Statement of Apprentice/Journeyman Participation, see Section 00670.

00250 DURING PROGRESS OF CONTRACT

- A. Provide Submittals and Shop Drawings as required, see Section 01300.
- B. If work exceeds 30 calendar days, Contractor may request partial payment once per month. If work is 30 calendar days or less, Contractor requests payment when project is complete.

00260 FOR SUBSTANTIAL COMPLETION

- A. Owner/operator training completed.
- B. Submit Operation and Maintenance Manual draft to Owner, see Section 01730.
- C. Written Certificate of Occupancy received by Owner.
- D. Owner provides Contractor final punch list.
- E. Owner provides written Substantial Completion.

00270 FOR FINAL COMPLETION

- A. Contractor completes final punch list.
- B. Owner completes walkthrough and validates final punch list.
- C. Contractor submits final Operation and Maintenance Manuals to Owner, see Section 01730.
- D. Contractor submits Project Record to Owner if required in the contract.
- E. Contractor provides all signed permits to the Owner.
- F. Contractor provides all expressed warranties greater than one year to Owner.
- G. Owner issues Final Completion Letter to Contractor.
- H. Contractor submits final invoice after receipt of the Final Completion Certificate.
- I. Contractor submits Affidavit of Wages Paid to L&I.
- J. L&I approves the Affidavit of Wages Paid for Contractor and all Subcontractors working on the project.
- K. Owner submits a Notice of Completion Form to L&I, the Department of Revenue, and the Employment Security Department.
- L. Owner's Contract Administrator receives the notarized Contractor's Release of Claims Form.

00280 FOR RETAINAGE TO BE RELEASED

- A. Contract must not be in dispute.
- B. Owner processes final progress payment.
- C. Owner administers 60-day legal lien period.
- D. Owner's Contract Administrator receives releases from Department of Revenue, Employment Security Department, and Labor & Industries.

END OF SECTION 00200

**SECTION 00300
BID FORM**

**FAILURE TO SUBMIT ALL PAGES OF BID FORM SHALL BE
SUFFICIENT CAUSE TO REJECT THE BID.**

To: Washington Department of Fish & Wildlife
Chief Engineer
600 Capitol Way North, MS: 43158
Olympia, WA 98501-1091

Project Title: Soos Creek Hatchery Supply Pipe Replacement
Project No.: KG:H7:2022-1
Bid Opening: 2:00 p.m. June 8, 2022

00310 BID

Pursuant to and in compliance with the Bid Documents, the undersigned Bidder agrees to submit all bid form pages and perform the Work for the following Base Bid amount for the above referenced project:

Lump Sum Items	
Bid Item 1: Mobilization, TESC, D-Box 2 Supply and Raceway Supply Pipe Replacement	\$

Base Bid – Sum of bid items: 1. (Do not include Washington State Sales Tax)	\$
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TRENCH EXCAVATION SAFETY PROVISIONS

If the bid amounts contain any work in which trench excavation will exceed a depth of four feet, all costs for adequate trench safety systems amount shall be included in base bid in compliance with RCW 39.04.180. The Bidder agrees to comply with all the relevant trench safety requirements of Chapter 49.17 RCW and WAC 296-155-66411.

If trench excavation safety provisions do not pertain to this project, enter "N/A" for the dollar amount. Failure to complete this requirement shall be sufficient cause to reject the bid.

Trench Excavation Safety Provisions	\$
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00320 CONTRACT COMPLETION TIME

To accommodate hatchery production, Substantial Completion shall be November 18, 2022.

Final Completion shall be achieved by November 30, 2022.

00330 LIQUIDATED DAMAGES

The undersigned agrees to pay the Owner as liquidated damages the sum of \$520 for each consecutive calendar day that is in default after the Contract Time. Liquidated damages shall be deducted from the Contract by Change Order.

00340 MINORITY AND WOMEN’S BUSINESS ENTERPRISES (MWBE) UTILIZATION CERTIFICATION

The bidder certifies they have, in good faith, afforded maximum opportunities to MWBEs, and if they are the successful bidder on this project, the following MWBE firms or approved substitutes shall be utilized on the project and compensated in the amounts shown. **If the bidder does not expect to utilize MWBE firms, enter “N.A.” on line one below.**

Firm Name, Address and Federal I.D. #	Telephone Number	Type of Work	Certificate Number	MBE%	WBE%
1					
2					
TOTALS					

00350 IDENTIFICATION OF SUBCONTRACTORS FOR PROJECTS GREATER THAN \$1,000,000

Not Used.

00360 CONTRACT EXECUTION

- A. Contract Execution: If the Owner awards a contract based on this bid within 60 calendar days (unless otherwise negotiated) of the bid submission deadline, the Bidder agrees to execute a contract for the above work, for compensation computed from the above stated bid amounts, on the WDFW Public Works Contract Form.
- B. Bonds and Insurance: If Bidder fails to submit the documents listed in Section 00230, within 21 calendar days after date on the Award Letter, the Owner may revoke the award.
- C. Failure to Execute Contract: If the successful bidder, fails to submit the documents listed in Section 00230, the Owner may revoke the award. The bid guarantee may be retained by Owner as liquidated damages, not as penalty.

If a contract is not awarded within 60 calendar days (unless otherwise negotiated) after the bid submission deadline or Contractor fails to submit the documents listed in Section 00230, the certified or cashier’s check submitted as the bid guarantee shall be returned to the bidder, or the Bid Bond shall become void.

00370 DECLARATION

- A. Familiarity with Bid Document and Site: The undersigned Bidder hereby certifies to have personally and carefully examined the Bid Documents issued for the above referenced project, the site where the Work is to be performed and the conditions affecting the Work.
- B. Proposal to Perform Work: The Bidder hereby proposes to furnish all labor, materials, equipment, and services and to perform all work which may be required to complete the Work within the time fixed and in strict accordance with the Contract Documents for the above-referenced project for the Base Bid indicated above. The bid prices cover all expenses of the Bidder, including but not limited to, overhead, profit, insurance, and bonding, to perform the Work in accordance with the Contract Documents.

DIVISION 0 – BID AND CONTRACT DOCUMENTS

- C. Non-Collusion: The Bidder affirms that the bid is a genuine and not a sham or collusive bid or made in the interest or on behalf of any person not therein named. The Bidder has not directly or indirectly induced or solicited any bidder on the work to put in a sham bid, or any other person or corporation to refrain from bidding, and that the Bidder has not in any manner sought by collusion to secure for itself an advantage over any other bidder or bidders. The Bidder has not entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free, competitive bidding in the preparation and submission of this bid to the Owner for the project described in the Bid Documents.
- D. Certification of Compliance with Wage Payment Statutes: The bidder hereby certifies that, within the 3 year period immediately preceding the bid solicitation date the bidder is not a “willful” violator, as defined in RCW 49.48.082, of any provision of Chapters 49.46, 49.48, or 49.52 RCW, as determined by a final and binding citation and notice of assessment issued by the Department of Labor and Industries or through a civil judgment entered by a court of limited or general jurisdiction.

00380 ACKNOWLEDGEMENT

I certify by signing the current Bid Form that all Addendum/Addenda, Contract Execution and Declarations have been acknowledged. Contractor shall review online bid documents at Builders Exchange of Washington, Inc. <http://www.bxwa.com> to ensure all information is considered in bid proposal.

Bidder's Business Name:		
Unified Business Number (UBI):	Contractor's License Number:	
Physical Business Street Address		
City:	State:	Zip Code:
Phone Number:		
Email Address:		
If the above address is not in Washington State, check ONE of the boxes below:		
<input type="checkbox"/> Physical office in WA: _____ <div style="display: flex; justify-content: space-around; width: 100%;"> Street Address City Zip Code </div>		
OR		
<input type="checkbox"/> State of incorporation or where business entity was formed, if not corporation: _____		

OFFICIAL AUTHORIZED TO SIGN FOR BIDDER:

"I certify (or declare) under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct":	
Signature of Authorized Official:	Date:
Print Name	Title

FAILURE TO SUBMIT ALL PAGES OF BID FORM SHALL BE SUFFICIENT CAUSE TO REJECT THE BID.

END OF SECTION 00300

**SECTION 00400
SUPPLEMENTS TO BID FORM**

00420 QUALIFICATION QUESTIONNAIRE

- A. Information and Instructions - Standard Questionnaire for Qualification of Contractors:
1. Any person, firm, or corporation bidding on this project shall execute and submit with their bid a Standard Questionnaire for Qualification of Contractors Form. Failure to submit the completed form may be sufficient cause to reject the bid.
 2. The Chief Engineer will make the sole determination as to the adequacy of the experience and responsibility of the bidder.
 3. All information furnished will be treated as confidential to the extent that such policy is compatible with the provisions of the general statutes affecting the conduct of public offices.
- B. Preparation of Standard Questionnaire for Qualification of Contractors Form:
1. Bidder shall submit the Standard Questionnaire for Qualification of Contractors Form only in the exact name under which the bid is submitted. Answers and entries shall be specific and complete in detail.
 2. Bidder shall verify that Representative or Project Manager Contact information is current and valid prior to submission.
- C. Joint Ventures: The bids of Joint Ventures will be accepted if qualification has been satisfactorily established by each of the firms bidding in the name of the Joint Venture.

**STANDARD QUESTIONNAIRE
FOR QUALIFICATION OF CONTRACTORS**

PROJECT NO. _____

Submitted by: _____
Name Title

Street Address City State Zip () Phone Number

Signature

QUESTIONNAIRE

A. How many years has your organization been in business under your present business name?

B. List three projects your organization has completed or has underway on this date reflecting the type of work for which you desire to qualify.

1.	Owner	Owner's Representative or PM	Representative or PM Phone Number
Project Name		Contract Amount	
Class of Work Performed			
2.	Owner	Owner's Representative or PM	Representative or PM Phone Number
Project Name		Contract Amount	
Class of Work Performed			
3.	Owner	Owner's Representative or PM	Representative or PM Phone Number
Project Name		Contract Amount	
Class of Work Performed			

C. Has your organization ever failed to complete a construction contract?

YES NO

If Yes, state reason why:

00440 SUPPLEMENTAL BIDDER RESPONSIBILITY CRITERIA

A. Criteria: In addition to the bidder responsibility criteria described in Section 00150, Bidder Responsibility, the bidder must also meet the following relevant supplemental bidder responsibility criteria applicable to the project:

Since 2005, shall have conducted at least 3 projects as the general contractor with a contract cost over \$200,000 which involved HDPE pipe fusing and concrete work.

B. Documentation: As evidence that the bidder meets the bidder responsibility criteria in paragraph A above, the apparent low bidder submitting a responsive bid must submit the following documentation to the Owner within two business days of being notified as successful low bidder. The Owner reserves the right to request such documentation from other bidders also. The Bidder shall submit a list of projects that meet the criterion listed in paragraph A. The information about each project shall include the following:

1. Owner’s name and contact information for the owner’s representative;
2. Awarded contract amount;
3. Final contract amount;
4. A description of the scope of the project and how the project is similar to this project;
5. The Bidder’s assessment of its performance of each project, including but not limited to the following:
 - a. Quality of project and quality control;
 - b. Management of safety and safety record;
 - c. Timeliness of performance;
 - d. Use of skilled personnel;
 - e. Management of subcontractors;
 - f. Availability of and use of appropriate equipment;
 - g. Compliance with contract documents;
 - h. Management of schedule, submittals process, and change orders, and close-out.

DIVISION 0 – BID AND CONTRACT DOCUMENTS

- C. Appeal: If the Owner determines the bidder does not meet the bidder responsibility criteria in paragraph A above and is therefore not a responsible bidder, the Owner shall notify the bidder in writing with the reasons for its determination. If the bidder disagrees with this determination, the bidder may appeal the determination within 24 hours of receipt of the Owner's determination by presenting additional information to the Owner. The Owner will consider the additional information before issuing its final determination. If the final determination affirms that the bidder is not responsible, the Owner will not execute a contract with any other bidder until two business days after the bidder determined to be not responsible has received the final determination.

END OF SECTION 00400



SECTION 00500

PUBLIC WORKS CONTRACT

TITLE: [REDACTED]

CONTRACT NUMBER: [REDACTED]

CONTRACTOR: [REDACTED]

ENGINEERING #: [REDACTED]

CONTRACT AMOUNT: [REDACTED]

MASTER INDEX: [REDACTED]

TYPE: Payable / Engineering / Public Works

PROJECT MANAGER: [REDACTED]

CONTRACT PERIOD: [REDACTED]

A. PARTIES TO THIS CONTRACT

This Contract is entered into under the authority of Chapter 39.04 of the Revised Code of Washington (RCW) between the Washington State Department of Fish and Wildlife (WDFW), 600 Capitol Way North, Olympia, WA 98501-1091; and (Contractor), Company Address, Company City, Company State, Company Postal Code; and shall be binding upon the agents and all persons acting by or through the parties.

B. PURPOSE OF CONTRACT

The Contractor shall provide those goods and /or services in accordance with and as described in the plans and drawings designated as "State of Washington Department of Fish & Wildlife Engineer Number XX:XX:XXXX together with the Contractor's bid opened at 2:00 P.M. Pacific Time on XX/XX/XXXX; and in full compliance with terms, conditions and stipulations of the General Conditions of the Contract, Release of Claims, the Special Conditions of the contract and material, Rights-of-Way and Easements (other than those provided by the State), licenses, permits, for this contract, now referred to and by this reference incorporated herein and made a part hereof as fully, for all purposes as if here set forth at length.

C. DESCRIPTION OF PROJECT

The Contractor shall perform the project as described in Attachments, which are incorporated herein by this reference:
Attachment "A" Specifications and Drawings (WDFW Engineer Number: XX/XXXX/XXXX)

D. PERIOD OF PERFORMANCE

The Contractor shall begin work as stated in the Notice to Proceed letter from WDFW; and shall complete all work under this contract not later than **DATE**. No expenditures made before or after this period are eligible for reimbursement unless incorporated by written amendment into this Contract. The Contract may be terminated or the performance period extended pursuant to terms set forth in Attachment "A."

WDFW may suspend the work of the Contractor due to weather or other needs of WDFW. The Contractor shall suspend all work on the contract upon the receipt of a Notice to Suspend from WDFW; and shall not re-commence work until a Notice to Resume Work is received from WDFW.

E. COMPENSATION / PAYMENT

WDFW hereby promises and agrees with the Contractor to employ, and does employ the Contractor to provide the materials and to do and cause to be done the above-described work, and to complete and finish the same according to the plans designated, and the attached specifications and the terms and conditions herein contained, and hereby contracts to pay for the same in the manner set out in the specifications the sum of **\$00.00** plus applicable Washington State sales tax at the time and upon the conditions provided for in this contract and every part thereof.

DIVISION 0 – BID AND CONTRACT DOCUMENTS

That WDFW further agrees to employ the Contractor to perform any alterations in or additions to the work covered by this contract and any force account work that may be ordered, if the construction or labor required by such changes or force work is to be executed during the period specified herein for the completion of the work under this contract, and to pay for the same under the terms of this contract. Except as otherwise provided in Section 00707 of Attachment "A" of the contract, no alteration or modification of any of the terms, conditions, price, quality, quantity or specifications of this contract will be effective if not in writing and signed by WDFW.

The Contractor is required to be registered in the Statewide Vendor Payment System prior to submitting a request for payment under this contract. The Washington State Office of Financial Management (OFM) maintains the Statewide Vendor Payment System; to obtain registration materials, forms are available on the OFM payee registration [website](#) or contact the Statewide Payee Help Desk at HereToHelp@ofm.wa.gov (360) 407.9100.

F. RIGHTS AND OBLIGATIONS

All rights and obligations of the parties of this Contract are subject to this Contract, including the Attachments, which are incorporated herein by this reference. By signing this Contract the Contractor acknowledges that they have read, fully understand, and agree to be bound by all terms and conditions set forth in this Contract.

G. ORDER OF PRECEDENCE

In the event of an inconsistency in this contract, unless otherwise provided herein, the inconsistency shall be resolved by giving precedence in the following order:

- Applicable Federal and State of Washington statutes and regulations;
- Special Terms and Conditions as contained in this basic contract instrument;
- Attachment "A" Specifications and Drawings (WDFW Engineer Number: XX/XXXX/XX); and
- Any other provision, term or material incorporated herein by reference or otherwise incorporated.

H. CONTRACT REPRESENTATIVES

The below named representatives for each of the parties shall be the contact people for all communications and billings regarding the performance of this Contract. All written communications regarding this Contract shall be sent to the designated representatives at the addresses below unless notified in writing of any change.

Contractor's Representative

Name:
Company Name:
Address:
Office Phone:
Email:

WDFW's Representative

Project Manager:
Capital and Asset Management Program
PO Box 43158
Olympia, WA 98504-3158
(360) 902-8300
Email:

I. ENTIRE CONTRACT

This Contract, along with all attachments and exhibits, constitutes the entire agreement of the parties. No other understandings, verbal or otherwise, regarding this Contract shall exist or bind any of the parties.

J. APPROVAL

This contract shall be subject to the written approval of WDFW'S authorized representative and shall not be binding until so approved. This Contract may be altered, amended, or waived only by a written amendment executed by both parties.

DIVISION 0 – BID AND CONTRACT DOCUMENTS

IN WITNESS WHERE, WDFW and the Contractor have signed this contract.

CONTRACTOR NAME

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE

Signature and Date

Signature and Date

Printed Name and Title

Timothy W. Burns, PE
Program Director
Capital and Asset Management Program

APPROVED AS TO FORM BY THE OFFICE OF THE ATTORNEY GENERAL 12/19/2014

DIVISION 0 – BID AND CONTRACT DOCUMENTS

SECTION 00600

00620 RETAINAGE IN LIEU OF PERFORMANCE BOND OPTION ON CONTRACTS
OF \$150,000 OR LESS



Contract No. _____

Project Name: _____

Agency: DEPARTMENT OF FISH AND WILDLIFE _____

Contractor: _____

Pursuant to *RCW 39.08.010* you are permitted to exercise your option, IN WRITING, on whether to provide a performance bond, or in lieu of bond to have retention increased to 10 percent. You are therefore requested to complete and return this form prior to receiving the *Notice to Proceed*.

OPTION 1:

Provide a performance bond in accordance with *SECTION 00702.04* of the *GENERAL CONDITIONS*.

I request Option #1 _____

OPTION 2:

Retain 10 percent of the contract payments in lieu of providing a performance bond in accordance with *SECTION 00702.04* of the *GENERAL CONDITIONS*.

I request Option #2 _____

Signature

Title

Date

00630 RETAINAGE OPTIONS



Contract No.: _____ Project: _____

Chapter 60.28 RCW requires in part that all contracts for public improvements or work by a public body must provide for retention from the amounts earned by the Contractor. Such monies are to be retained in accordance with the provision of the law for the protection and payment of any person supplying labor or material for such work and the State for taxes due from the Contractor.

The monies reserved from amounts due a Contractor at his/her option shall be: (Contractor mark choice):

- _____ A. Retained in a fund by the public body until 60 days following the final acceptance of said improvement or work as completed; or
- _____ B. Deposited by the public body in an interest bearing account in a bank, mutual savings bank, or savings and loan association, not subject to withdrawal until 60 days after the final acceptance of said improvement or work as completed, or until agreed to by both parties: Provided, that interest on such account shall be paid to the Contractor.
- _____ C. Placed in escrow with a bank or trust company until 60 days following final acceptance of said work or improvement as completed.
- _____ D. Contractor will submit a retainage bond for all or any portion of funds to be retained by Washington State Department of Fish and Wildlife.

The warrant or check representing monies to be placed in escrow shall be made payable jointly to the bank or trust company and the Contractor. Such monies must be converted into bonds and securities and held in escrow. The bonds and securities are to be chosen by the Contractor and approved by the State. When interest on such investments accrues and is paid, it must be forwarded to the Contractor.

The escrow agreement, in the form prescribed by WAC Chapter 82-32 and in addition to other requirements, must also provide for payment of all escrow costs and fees by the Contractor. A copy of the completed escrow agreement shall be provided by the escrow agent, the Contractor and the state agency prior to the time the first progress payment is made.

This completed option must be returned with the signed Contract Documents. No progress payment shall be made until the Contractor has exercised this option in writing.

Contractor Signature Date



00640

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
	PHONE (A/C, No. Ext):	FAX (A/C, No):
	E-MAIL ADDRESS:	
	INSURER(S) AFFORDING COVERAGE	NAIC #
INSURED	INSURER A :	
	INSURER B :	
	INSURER C :	
	INSURER D :	
	INSURER E :	
	INSURER F :	

COVERAGES**CERTIFICATE NUMBER:****REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
	COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:						EACH OCCURRENCE \$ DAMAGE TO RENTED PREMISES (Ea occurrence) \$ MED EXP (Any one person) \$ PERSONAL & ADV INJURY \$ GENERAL AGGREGATE \$ PRODUCTS - COMP/OP AGG \$ \$
	AUTOMOBILE LIABILITY <input type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> NON-OWNED AUTOS						COMBINED SINGLE LIMIT (Ea accident) \$ BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
	UMBRELLA LIAB <input type="checkbox"/> OCCUR EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE DED RETENTION \$						EACH OCCURRENCE \$ AGGREGATE \$ \$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N	N/A				<input type="checkbox"/> PER STATUTE <input type="checkbox"/> OTH-ER E.L. EACH ACCIDENT \$ E.L. DISEASE - EA EMPLOYEE \$ E.L. DISEASE - POLICY LIMIT \$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER**CANCELLATION**

	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.
	AUTHORIZED REPRESENTATIVE

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**STATE OF WASHINGTON
00650 SCHEDULE OF VALUES**

CERTIFICATE FOR PAYMENT. For period from: date to date
 Contract for: **project title** Date: 01/00/00
 Location: **project location** Certificate No.: _____
 Contractor: _____ Contract No.: _____

Original Contract Amount: \$0.00
 Net change in Contract Amount to Date: \$0.00
 Adjusted Contract amount \$0.00

ITEM NO.	SCHEDULE OF VALUES DETAIL	ESTIMATED VALUE	AMOUNT EARNED	%	PREVIOUSLY CLAIMED	THIS INVOICE
1		\$0.00	\$0.00	#####	\$0.00	\$0.00
2		\$0.00	\$0.00	#####	\$0.00	\$0.00
3		\$0.00	\$0.00	#####	\$0.00	\$0.00
4		\$0.00	\$0.00	#####	\$0.00	\$0.00
5		\$0.00	\$0.00	#####	\$0.00	\$0.00
6		\$0.00	\$0.00	#####	\$0.00	\$0.00
7		\$0.00	\$0.00	#####	\$0.00	\$0.00
8		\$0.00	\$0.00	#####	\$0.00	\$0.00
9		\$0.00	\$0.00	#####	\$0.00	\$0.00
10		\$0.00	\$0.00	#####	\$0.00	\$0.00
11		\$0.00	\$0.00	#####	\$0.00	\$0.00
12		\$0.00	\$0.00	#####	\$0.00	\$0.00
13		\$0.00	\$0.00	#####	\$0.00	\$0.00
14		\$0.00	\$0.00	#####	\$0.00	\$0.00
15		\$0.00	\$0.00	#####	\$0.00	\$0.00
16		\$0.00	\$0.00	#####	\$0.00	\$0.00
17		\$0.00	\$0.00	#####	\$0.00	\$0.00
18		\$0.00	\$0.00	#####	\$0.00	\$0.00
19	Change Orders:					
20	1.	\$0.00	\$0.00	#####	\$0.00	\$0.00
21	2.	\$0.00	\$0.00	#####	\$0.00	\$0.00
22	3.	\$0.00	\$0.00	#####	\$0.00	\$0.00
23	4.	\$0.00	\$0.00	#####	\$0.00	\$0.00
24	5.	\$0.00	\$0.00	#####	\$0.00	\$0.00
25	6.	\$0.00	\$0.00	#####	\$0.00	\$0.00
26	7.	\$0.00	\$0.00	#####	\$0.00	\$0.00
27	8.	\$0.00	\$0.00	#####	\$0.00	\$0.00
28	6.	\$0.00	\$0.00	#####	\$0.00	\$0.00
SUBTOTAL		\$0.00	\$0.00	#####	\$0.00	\$0.00
TAX 0.00%	SALES TAX	\$0.00	\$0.00		\$0.00	\$0.00
TOTAL		\$0.00	\$0.00		\$0.00	\$0.00
Less Retainage.. 5%			\$0.00		\$0.00	\$0.00
NET			\$0.00		\$0.00	\$0.00
Less Previous Payments...			\$0.00			
Additional Tax 0.00%		\$0.00			\$0.00	
AMOUNT DUE THIS ESTIMATE			\$0.00			\$0.00

check
\$0.00
\$0.00
\$0.00
\$0.00
\$0.00

This is to certify that the contractor, having complied with the terms and conditions of the above mentioned contract, is due and payable from the State of Washington, the amount set after "AMOUNT DUE THIS ESTIMATE."

0

 (Contracting Firm) (Architect or Engineer)

By _____ By _____
 SIGN IN INK SIGN AND DATE



00660 VERIFICATION OF MONTHLY PAYMENTS TO MWBES

State of Washington Department of Fish and Wildlife, 600 Capitol Way North, Olympia, Washington, 98501-1091, (360) 902-8300

Project No _____ Project Title _____ Sheet _____ of _____

Contractor _____ Payment # _____

Federal Tax Identification #	Contractor/Supplier	WBE or MBE	Nature of Work or Type of Supplies	Bid Total Utilization Dollars	Amount Paid This Month	Amount Paid to Date

CONTRACTOR: _____
 Authorized Signature

DATE: _____

Washington Department of Fish and Wildlife

STATEMENT OF APPRENTICE/JOURNEYMAN PARTICIPATION

Firm Name, Address, City, State & ZIP+4	Project Name (Title)		Contract No.
	Contract Award Amount: \$		Notice to Proceed Date
Reporting Period from: _____ to _____			Required Apprenticeship Percentage: 15%

APPRENTICE SUMMARY

Apprentice Name	Craft or Trade	Apprentice Registration Number	Name of Contractor or Sub-Contractor	Apprentice	
				Total Number	Hours Worked

JOURNEYMEN SUMMARY

Journeymen Name	Craft or Trade	Journeymen Registration Number	Name of Contractor or Sub-Contractor	Journeymen	
				Total Number	Hours Worked

Apprentice total hours worked this period:			0
Journeymen total hours worked this period:			0
	Previous Total	New Total	Percentage
Cumulative Apprentice hour Total brought forward from last reporting period:	previous total		
Cumulative Journeymen hour Total brought forward from last reporting period:	previous total		

I, the undersigned, do hereby certify under penalty of perjury that the items listed herein represent the proper hourly totals for Apprenticeship/Journeyman participation during this reporting period.

Printed Name:	Signature:	Date:	Title:
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DES Labor Form 100412

END OF SECTION 00600

**SECTION 00700
TABLE OF CONTENTS**

00701	Definitions			00705.12	Layout of Work
	00701.01	Definitions		00705.13	Material and Equipment
	00701.02	Order of Precedence		00705.14	Availability and Use of Utility Services
	00701.03	Execution and Intent			
00702	Insurance and Bonds			00705.15	Tests and Inspection
	00702.01	Contractor's Liability Insurance		00705.16	Correction of Nonconforming Work
	00702.02	Coverage Limits			
	00702.03	Insurance Coverage Certificates		00705.17	Cleanup
	00702.04	Payment and Performance Bonds		00705.18	Access to Work
	00702.05	Additional Bond Security		00705.19	Other Contracts
	00702.06	Bid Bond or Proposal Guarantee		00705.20	Subcontractors and Suppliers
	00702.07	Builder's Risk		00705.21	Warranty of Construction
00703	Time and Schedule			00705.22	Indemnification
	00703.01	Progress and Completion		00705.23	Required Payroll Documents
	00703.02	Construction Schedule		00705.24	Statement of Apprentice/Journeyman Participation
	00703.03	Owner's Right to Suspend the Work for Convenience			
	00703.04	Owner's Right to Stop the Work for Cause		00705.25	Federally Funded Contract Conditions
	00703.05	Delay	00706	Payments and Completion	
	00703.06	Notice to Owner of Labor Disputes		00706.01	Contract Sum
	00703.07	Damages for Failure to Achieve Timely Completion		00706.02	Schedule of Values
00704	Specifications, Drawings, and Other Documents			00706.03	Application for Payment
	00704.01	Discrepancies and Contract Document Review		00706.04	Progress Payments
	00704.02	Project Record		00706.05	Payments Withheld
	00704.03	Shop Drawings		00706.06	Retainage and Bond Claim Rights
	00704.04	Organization of Specifications	00707	Changes	
	00704.05	Ownership and Use of Drawings, Specifications, and Other Documents		00707.01	Changes in the Work
00705	Performance			00707.02	Change in the Contract Sum
	00705.01	Contractor Control and Supervision		00707.03	Change in the Contract Time
	00705.02	Permits, Fees, and Notices	00708	Claims and Dispute Resolution	
	00705.03	Patents and Royalties		00708.01	Claims Procedure
	00705.04	Prevailing Wages	00709	Termination of the Work	
	00705.05	Hours of Labor		00709.01	Termination by Owner for Cause
	00705.06	Nondiscrimination		00709.02	Termination by Owner for Convenience
	00705.07	Safety Precautions	00710	Miscellaneous Provisions	
	00705.08	Operations, Material Handling, and Storage Areas		00710.01	Governing Law
	00705.09	Prior Notice of Excavation		00710.02	Successors and Assigns
	00705.10	Unforeseen Physical Conditions		00710.03	Abbreviations of Administrative Organizations
	00705.11	Protection of Existing Structures, Equipment, Vegetation, Utilities, and Improvements		00710.04	Rights and Remedies
				00710.05	Contractor Registration
				00710.06	Time Computations

DIVISION 0 – GENERAL CONDITIONS

- 00710.07 Records Retention
- 00710.08 Third-Party Agreements
- 00710.09 Antitrust Assignment
- 00710.10 Identification of Subcontractor
for Projects Greater than
\$1,000,000

PART 1 - 00701.00 DEFINITIONS

00701.01 DEFINITIONS

- A. Application for Payment: A written request submitted by Contractor to A/E for payment of Work completed, in accordance with the Contract Documents and approved Schedule of Values, supported by such substantiating data as Owner or A/E may require.
- B. Architect, Owner, or A/E: A person or entity lawfully entitled to practice architecture or engineering, representing Owner within the limits of its delegated authority.
- C. Change Order: A written instrument signed by Owner and Contractor stating their agreement upon all of the following: (1) a change in the Work; (2) the amount of the adjustment in the Contract Sum, if any; and (3) the extent of the adjustment in the Contract Time, if any.
- D. Claim: Contractor's exclusive remedy for resolving disputes with Owner regarding the terms of a Change Order or a request for equitable adjustment, as more fully set forth in *SECTION 00708 - CLAIMS AND DISPUTE RESOLUTION*.
- E. Contract Documents: The Advertisement for Bids, Instructions to Bidders, completed Form of Proposal, *GENERAL CONDITIONS*, Modifications to the *GENERAL CONDITIONS*, *SUPPLEMENTAL CONDITIONS*, Public Works Contract, other Special Forms, Drawings and Specifications, and all addenda and modifications thereof.
- F. Contract Sum: The total amount payable by Owner to Contractor for performance of the Work in accordance with the Contract Documents.
- G. Contract Time: The number of calendar days allotted in the Contract Documents for achieving Substantial Completion of the Work.
- H. Contractor: The person or entity who has agreed with Owner to perform the Work in accordance with the Contract Documents.
- I. Drawings: The graphic and pictorial portions of the Contract Documents showing the design, location, and dimensions of the Work, and may include plans, elevations, sections, details, schedules, and diagrams.
- J. Final Acceptance: The written acceptance issued to Contractor by Owner after Contractor has completed the requirements of the Contract Documents.
- K. Final Completion: The Work is fully and finally completed in accordance with the Contract Documents.

DIVISION 0 – GENERAL CONDITIONS

- L. Force Majeure: Those acts entitling Contractor to request an equitable adjustment in the Contract Time, as more fully set forth in *SECTION 00703.05A*.
- M. Notice: A written notice that has been delivered in person to the individual or a member of the firm or entity, or to an officer of the corporation for which it was intended, or, if delivered or sent by registered or certified mail, to the last business address known to the party giving notice.
- N. Notice to Proceed: A notice from Owner to Contractor that defines the date on which the Contract Time begins to run.
- O. Owner: The state agency, institution, or its authorized representative with the authority to enter into, administer, and/or terminate the Work in accordance with the Contract Documents and make related determinations and findings.
- P. Person: A corporation, partnership, business association of any kind, trust, company, or individual.
- Q. Prior Occupancy: Owner's use of all or parts of the Project before Substantial Completion.
- R. Construction Schedule: A schedule of the Work, in a form satisfactory to Owner, as further set forth in *SECTION 00703.02*.
- S. Project: The total construction of which the Work performed in accordance with the Contract Documents may be the whole or a part and which may include construction by Owner or by separate contractors.
- T. Project Manual: The volume usually assembled for the Work, which may include documents such as the bidding requirements, sample forms, and other Contract Documents.
- U. Project Record: The separate set of Drawings and Specifications as further set forth in *SECTION 00704.02A*
- V. Schedule of Values: A written breakdown allocating the total Contract Sum to each principle category of Work, in such detail as requested by Owner.
- W. Specifications: That portion of the Contract Documents consisting of the written requirements for materials, equipment, construction systems, standards, and workmanship for the Work, and performance of related services.
- X. Subcontract: A contract entered between the Contractor and a Subcontractor for the purpose of obtaining supplies, materials, equipment, or services of any kind for, or in connection with, the Work.
- Y. Subcontractor: Any person other than the Contractor who agrees to furnish or furnishes any supplies, materials, equipment, or services of any kind in connection with the Work.
- Z. Substantial Completion: That stage in the progress of the Work where Owner has full and unrestricted use and benefit of the facilities for the purposes intended, as more fully set forth in *SECTION 00706.07*.

DIVISION 0 – GENERAL CONDITIONS

- AA. Work: The construction and services required by the Contract Documents, and includes, but is not limited to, labor, materials, supplies, equipment, services, permits, and the manufacture and fabrication of components, performed, furnished, or provided in accordance with the Contract Documents.

00701.02 ORDER OF PRECEDENCE

Any conflict or inconsistency in the Contract Documents shall be resolved by giving the documents precedence in the following order:

- A. Signed Public Works Contract, including any Change Orders and any Special Forms
- B. *SUPPLEMENTAL CONDITIONS*
- C. *GENERAL CONDITIONS*
- D. Specifications: Provisions in *DIVISION 1* shall take precedence over provision of any other division.
- E. Drawings: In case of conflict within the Drawings, large-scale drawings (24" x 36" shall take precedence over reduced scale drawings.
- F. Signed and Completed *Bid Form*
- G. Instructions to Bidder
- H. Notice to Contractor

00701.03 EXECUTION AND INTENT

Contractor makes the following representations to Owner:

- A. The Contract Sum is reasonable compensation for the Work and the Contract Time is adequate for the performance of the Work, as represented by the Contract Documents.
- B. Contractor has carefully reviewed the Contract Documents, visited and examined the Project site, become familiar with the local conditions in which the Work is to be performed, and satisfied itself as to the nature, location, character, quality and quantity of the Work, labor, materials, equipment, goods, supplies, services, and other items to be furnished and all other requirements of the Contract Documents, as well as the surface and subsurface conditions and other matters that may be encountered at the Project site or affect performance of the Work or the cost or difficulty thereof.
- C. Contractor is financially solvent, able to pay its debts as they mature, and possesses sufficient working capital to complete the Work and perform Contractor's obligations required by the Contract Documents.
- D. Contractor is able to furnish the plants; tools, materials, supplies, equipment, and labor required to complete the Work and perform the obligations required by the Contract Documents and have sufficient experience and competence to do so.

PART 2 - 00702.00 INSURANCE AND BONDS

00702.01 CONTRACTOR'S LIABILITY INSURANCE

Prior to commencement of the Work, Contractor shall obtain all the insurance required by the Contract Documents and provide evidence satisfactory to Owner that such insurance has been procured. Review of the Contractor's insurance by Owner shall not relieve or decrease the liability of Contractor. Companies writing the insurance to be obtained by this section shall be licensed to do business under *Chapter 48 RCW* or comply with the *Surplus Lines Law* of the State of Washington. Contractor shall include in its bid the cost of all insurance and bonds required to complete the base bid work and accepted alternates. Insurance carriers providing insurance in accordance with the Contract Documents shall be rated "B+" or better by A.M. Best and ratings shall be indicated on the insurance certificates.

- A. Contractor shall maintain the following insurance coverage during the Work and for 1 year after Final Acceptance. Contractor shall also maintain the following insurance coverage during the performance of any corrective Work required by *SECTION 00705.16*.
 - 1. General liability on the *ISO 1986 New Occurrence Form* or its equivalent, which will include:
 - a. Completed operations/products liability
 - b. Explosion, collapse, and underground
 - c. Employer's liability coverage
 - 2. Automobile liability
- B. Contractor shall comply with the *Washington State Industrial Insurance Act*, and, if applicable, the *Federal Longshoremen's and Harbor Workers' Act*, and the *Jones Act*.
- C. All insurance coverages shall protect against claims for damages for personal and bodily injury or death, as well as claims for property damage, which may arise from operations in connection with the Work whether such operations are by Contractor or any Subcontractor.
- D. All insurance coverages shall be endorsed to include Owner as an additional named insured for Work performed in accordance with the Contract Documents, and all insurance certificates shall evidence the Owner as an additional insured.

00702.02 COVERAGE LIMITS

- A. Required Insurance Coverages:
 - 1. For a contract less than \$100,000.00, the coverage required is:
 - a. Comprehensive General Liability Insurance – The Contractor shall at all times during the term of this contract, at its cost and expense, carry and maintain general public liability insurance, including contractual liability, against claims for bodily injury, personal injury, death or property damage occurring or arising out of services provided under this contract.

DIVISION 0 – GENERAL CONDITIONS

This insurance shall cover claims caused by any act, omission, or negligence of the Contractor or its officers, agents, representatives, assigns or servants. The limits of liability insurance, which may be increased as deemed necessary by the contracting parties, shall be:

Each Occurrence	\$1,000,000.00
General Aggregate Limits (other than products – commercial operations)	\$1,000,000.00
Products – Commercial Operations Limited	\$1,000,000.00
Personal and Advertising Injury Limit	\$1,000,000.00
Fire Damage Limit (any one fire)	\$50,000.00
Medical Expenses Limit (any one person)	\$5,000.00

- b. If the contract is for underground utility work the Contractor shall provide proof of insurance for that above in the form of Explosion, Collapse and Underground (XCU) coverage.
 - c. Employers Liability on an occurrence basis in an amount not less than \$1,000,000.00 per occurrence.
2. For contracts over \$100,000.00 but less than \$5,000,000.00 the Contractor shall obtain the coverage limits as listed for contracts below \$100,000.00 and General Aggregate and Products – Commercial Operations Limit of not less than \$2,000,000.00.

3. Coverage for Comprehensive General Bodily Injury Liability Insurance for a contract over \$5,000,000.00 is:

Each Occurrence	\$2,000,000.00
General Aggregate Limits (other than products – commercial operations)	\$4,000,000.00
Products – Commercial Operations Limited	\$4,000,000.00
Personal and Advertising Injury Limit	\$2,000,000.00
Fire Damage Limit (any one fire)	\$50,000.00
Medical Expenses Limit (any one person)	\$5,000.00

4. For all Contracts – Automobile Liability; in the event that services delivered pursuant to this contract involve the use of vehicles or the transportation of clients, automobile liability insurance shall be required. If Contractor owned personal vehicles are used, a Business Automobile Policy covering at a minimum Code 2 “owned autos only” must be secured. If Contractor employee’s vehicles are used, the Contractor must also include under the Business Automobile Policy Code 9, coverage for non-owned autos. The minimum limits for automobile liability is: \$1,000,000.00 per occurrence, using a combined single limit for bodily injury and property damage.

DIVISION 0 – GENERAL CONDITIONS

5. For contracts for Hazardous Substance Removal (Asbestos Abatement, PCB Abatement, etc.)

a. In addition to providing insurance coverage for the project as outlined above, the Contractor shall provide Pollution Liability insurance for the hazardous substance removal as follows:

<u>EACH OCCURRENCE</u>	<u>AGGREGATE</u>
\$500,000.00	1,000,000.00

Or \$1,000,000.00 each occurrence/aggregate bodily injury and property damage combined single limit.

- 1) Insurance certificate must state that the insurer is covering hazardous substance removal.
- 2) Should this insurance be secured on a “claims made” basis, the coverage must be continuously maintained for 1 year following the project’s “final completion” through official completion of the project, plus 1 year following.

For contracts where hazardous substance removal is a subcomponent of contracted work, the general contractor shall provide to the Owner a certificate of insurance for coverage as defined in 5a above. The State of Washington must be listed as an additional insured. This certificate of insurance must be provided to the Owner prior to commencing work.

00702.03 INSURANCE COVERAGE CERTIFICATES

- A. Prior to the commencement of the Work, Contractor shall furnish acceptable proof of insurance on the State of Washington Certificate of Insurance Form SF500A, as well as copies of insurance policies.
- B. All insurance certificates shall name Owner's Project number and Project title.
- C. All insurance certificates shall specifically require 45 days prior notice to Owner of cancellation or any material change, except 30 days for surplus line insurance.

702.04.1 PAYMENT AND PERFORMANCE BONDS

- A. Contractor shall provide separate performance and payment bonds, each executed by the Contractor and the Contractor’s Surety.
- B. Option: Contract sums of \$150,000 or less, Owner will not require performance and payments bonds; if Contractor agrees Owner may, in lieu of the bond, retain 10 percent of the Contract Sum.

00702.05 ADDITIONAL BOND SECURITY

Contractor shall promptly furnish additional security required to protect Owner and persons supplying labor or materials required by the Contract Documents if:

- A. Owner has a reasonable objection to the surety; or
- B. Any surety fails to furnish reports on its financial condition if requested by Owner.

00702.06 BID BOND OR PROPOSAL GUARANTEE

- A. For bids of \$35,000 or less, no bid bond is required. Bids greater than \$35,000 shall be accompanied by a certified check, cashier's check, or bid bond payable to the Treasurer of the State of Washington in an amount equal to at least 5 percent of the bid as evidence of good faith and as a guarantee that, if awarded the Contract, the bidder will execute the Contract and give Performance Bond as required. All proposal guarantees may be held a maximum of 30 calendar days, and the 3 lowest bids may be held 45 calendar days from the date of the bid opening. At the end of the 30 calendar day period, all proposal guarantees, except those accompanying the 3 lowest bids, will be returned to the respective bidders. After the Contract and bonds have been executed, the remaining 3 proposal guarantees will be returned to their respective bidders.
- B. Only a cashier's check or certified check will be accepted in lieu of a bid bond. State statute requires deposit of negotiable receipts at the time of receipt. The bidder should be prepared to accept an additional 60 to 90 day delay in obtaining repayment from the State Treasurer.
- C. Fiscal procedures in preparing repayment are time consuming, and result in the requirement for additional time. Failure to comply with this section will cause bid to be considered nonresponsive.

00702.07 BUILDER'S RISK

- A. Contractor shall purchase and maintain property insurance in the amount of the Contract Sum including all Change Orders for the Work on a replacement cost basis until Final Completion. The insurance shall cover the interest of Owner, Contractor, and any Subcontractors, as their interests may appear.
- B. Contractor property insurance shall be placed on an "all risk" basis and insure against the perils of fire and extended coverage and physical loss or damage including theft, vandalism, malicious mischief, collapse, false work, temporary buildings, debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for A/Es' services and expenses required as a result of an insured loss.

DIVISION 0 – GENERAL CONDITIONS

- C. Owner and Contractor waive all subrogation rights against each other, any Subcontractors, A/E, A/Es' sub consultants, separate contractors described in *SECTION 00705.20*, if any, and any of their subcontractors, for damages caused by fire or other perils to the extent covered by property insurance obtained pursuant to this section or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by Owner as fiduciary. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

PART 3 - 00703.00 TIME AND SCHEDULE

00703.01 PROGRESS AND COMPLETION

Contractor shall diligently prosecute the Work, with adequate forces, achieve Substantial Completion within the Contract Time, and achieve Final Completion within a reasonable period thereafter.

00703.02 CONSTRUCTION SCHEDULE

- A. The Contractor shall, at the Preconstruction Conference and prior to Notice to Proceed, submit a Construction Schedule showing the sequence in which the Contractor proposes to perform the work, including dates on which the contractor plans to start and finish major portions of the work, dates for submitting shop drawings and other submittals, and dates for acquisition of materials and equipment.
- B. The Construction Schedule shall be in the form of a bar chart, or a critical path method analysis, as specified by Owner. The preliminary Construction Schedule may be general, showing the major portions of the Work, with more specific Construction Schedules in subsequent months as directed by Owner.
- C. Owner shall return comments on the preliminary Construction Schedule to Contractor within 14 days of receipt. Review by Owner of Contractor's schedule does not constitute an approval or acceptance of Contractor's construction means, methods, or sequencing, or its ability to complete the Work within the Contract Time. Contractor shall revise and resubmit its schedule, as necessary. Owner may withhold progress payments until a Construction Schedule has been submitted that meets the requirements of this section.
- D. Contractor shall utilize and comply with the Construction Schedule. On a monthly basis, or as otherwise directed by Owner, Contractor shall submit an updated Construction Schedule at its own expense to Owner indicating actual progress. If, in the opinion of the Owner, Contractor is not in conformance with the Construction Schedule for reasons other than acts of *force majeure* as identified in *SECTION 00703.05*, Contractor shall take such steps as are necessary to bring the actual completion dates of its work activities into conformance with the Construction Schedule, or revise the Construction Schedule to reconcile with the actual progress of the Work.

DIVISION 0 – GENERAL CONDITIONS

- E. Contractor shall promptly notify Owner in writing of any actual or anticipated event that is delaying or could delay achievement of any milestone or performance of any critical path activity of the Work. Contractor shall indicate the expected duration of the delay, the anticipated effect of the delay on the Construction Schedule, and the action being or to be taken to correct the problem. Provision of such notice does not relieve Contractor of its obligation to complete the Work within the Contract Time.
- F. The Contractor shall notify the Owner or Owner at least 2 weeks in advance if work is to be performed on a Saturday, Sunday, and/or state holiday.
- G. No excavation work, as defined by *SECTION 00705.09*, will be allowed on Saturdays, Sundays and/or state holidays unless specifically authorized by the Owner.

00703.03 OWNER'S RIGHT TO SUSPEND THE WORK FOR CONVENIENCE

- A. Owner may, at its sole discretion, order the Contractor in writing to suspend all or any part of the Work for up to 90 days, or for such longer period as mutually agreed.
- B. Upon receipt of a written notice suspending the Work, Contractor shall immediately comply with its terms and take all reasonable steps to minimize the incurrence of cost of performance directly attributable to such suspension. Within a period up to 90 days after the notice is delivered to Contractor, or within any extension of that period to which the parties shall have agreed, Owner shall either:
 - 1. Cancel the written notice suspending the Work; or
 - 2. Terminate the Work covered by the notice as provided in the termination provisions of *SECTION 00709.00*.
- C. If a written notice suspending the Work is canceled or the period of the notice or any extension thereof expires, Contractor shall resume the Work.
- D. Contractor shall be entitled to an equitable adjustment in the Contract Time, or Contract Sum, or both, for increases in the time or cost of performance directly attributable to such suspension, provided Contractor complies with all requirements set forth in *SECTION 00707.00*.

00703.04 OWNER'S RIGHT TO STOP THE WORK FOR CAUSE

- A. If Contractor fails or refuses to perform its obligations in accordance with the Contract Documents, Owner may order the Contractor in writing to stop the Work, or any portion thereof, until satisfactory corrective action has been taken.
- B. Contractor shall not be entitled to an equitable adjustment in the Contract Time or Contract Sum for any increased cost or time of performance attributable to Contractor's failure or refusal to perform or from any reasonable remedial action taken by Owner based upon such failure.

00703.05 DELAY

- A. Any delay in or failure of performance by Owner or Contractor, other than the payment of money, shall not constitute a default hereunder if and to the extent the cause for such delay or failure of performance was unforeseeable and beyond the control of the party (*force majeure*). Acts of *force majeure* include, but are not limited to:
1. Acts of God or the public enemy
 2. Acts or omissions of any government entity
 3. Fire or other casualty for which Contractor is not responsible
 4. Quarantine or epidemic
 5. Strike or defensive lockout
 6. Unusually severe weather conditions that could not have been reasonably anticipated
 7. Unusual delay in receipt of supplies or products which were ordered and expedited and for which no substitute reasonably acceptable to Owner was available.
- B. Contractor shall be entitled to an equitable adjustment in the Contract Time for changes in the time of performance directly attributable to an act of *force majeure*, provided it makes a request for equitable adjustment according to *SECTION 00707.03*. Contractor shall not be entitled to an adjustment in the Contract Sum resulting from an act of *force majeure*.
- C. Contractor shall be entitled to an equitable adjustment in Contract Time, and may be entitled to an equitable adjustment in Contract Sum, if the cost or time of Contractor's performance is changed due to the fault or negligence of Owner, provided the Contractor makes a request according to *SECTIONS 00707.02* and *00707.03*.
- D. Contractor shall not be entitled to an adjustment in Contract Time or in the Contract Sum for any delay or failure of performance to the extent such delay or failure was caused by Contractor or anyone for whose acts Contractor is responsible.
- E. To the extent any delay or failure of performance was concurrently caused by the Owner and Contractor, Contractor shall be entitled to an adjustment in the Contract Time for that portion of the delay or failure of performance that was concurrently caused, provided it makes a request for equitable adjustment according to *SECTION 00707.03*, but shall not be entitled to an adjustment in Contract Sum.
- F. Contractor shall make all reasonable efforts to prevent and mitigate the effects of any delay, whether occasioned by an act of *force majeure* or otherwise.

00703.06 NOTICE TO OWNER OF LABOR DISPUTES

If Contractor has knowledge that any actual or potential labor dispute is delaying or threatens to delay timely performance in accordance with the Contract Documents, Contractor shall immediately give notice, including all relevant information, to Owner.

Contractor agrees to insert a provision in its Subcontracts and to require insertion in all Sub-subcontracts, that in the event timely performance of any such contract is delayed or threatened by delay by any actual or potential labor dispute, the Subcontractor or Sub-subcontractor shall immediately notify the next higher tier Subcontractor or Contractor, as the case may be, of all relevant information concerning the dispute.

00703.07 DAMAGES FOR FAILURE TO ACHIEVE TIMELY COMPLETION

A. Liquidated Damages:

1. Timely performance and completion of the Work is essential to Owner and time limits stated in the Contract Documents are of the essence. Owner will incur serious and substantial damages if Substantial Completion of the Work does not occur within the Contract Time. However, it would be difficult if not impossible to determine the exact amount of such damages. Consequently, provisions for liquidated damages are included in the Contract Documents.
2. The liquidated damage amounts set forth in the Contract Documents will be assessed not as a penalty, but as liquidated damages for breach of the Contract Documents. This amount is fixed and agreed upon by and between the Contractor and Owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the Owner would in such event sustain. This amount shall be construed as the actual amount of damages sustained by the Owner, and may be retained by the Owner and deducted from periodic payments to the Contractor.
3. Assessment of liquidated damages shall not release Contractor from any further obligations or liabilities pursuant to the Contract Documents.

B. Actual Damages:

Actual damages will be assessed for failure to achieve Final Completion within the time provided. Actual damages will be calculated on the basis of direct architectural, administrative, and other related costs attributable to the Project from the date when Final Completion should have been achieved, based on the date Substantial Completion is actually achieved, to the date Final Completion is actually achieved. Owner may offset these costs against any payment due Contractor.

PART 4 - 00704.00 SPECIFICATIONS, DRAWINGS, AND OTHER DOCUMENTS

00704.01 DISCREPANCIES AND CONTRACT DOCUMENT REVIEW

- A. The intent of the Specifications and Drawings is to describe a complete Project to be constructed in accordance with the Contract Documents. Contractor shall furnish all labor, materials, equipment, tools, transportation, permits, and supplies, and perform the Work required in accordance with the Drawings, Specifications, and other provisions of the Contract Documents.

DIVISION 0 – GENERAL CONDITIONS

- B. The Contract Documents are complementary. What is required by one part of the Contract Documents shall be binding as if required by all. Anything mentioned in the Specifications and not shown on the Drawings, or shown on the Drawings and not mentioned in the Specifications, shall be of like effect as if shown or mentioned in both.
- C. Contractor shall carefully study and compare the Contract Documents with each other and with information furnished by Owner. If during the performance of the Work Contractor finds a conflict, error, inconsistency, or omission in the Contract Documents, it shall promptly and before proceeding with the Work affected thereby report such conflict, error, inconsistency, or omission to A/E in writing.
- D. Contractor shall do no Work without applicable Drawings, Specifications, or written modifications, or shop drawings where required, unless instructed to do so in writing by Owner. If Contractor performs any construction activity, and it knows or should have known that any of the Contract Documents contain a conflict, error, inconsistency, or omission, Contractor shall be responsible for the performance and shall bear the cost for its correction.
- E. Contractor shall provide any work or materials the provision of which is clearly implied in the Contract Documents even if the Contract Documents do not mention them specifically.
- F. Questions regarding interpretation of the requirements of the Contract Documents shall be referred to the A/E.

00704.02 PROJECT RECORD

- A. Contractor shall legibly mark in ink on a separate set of the Drawings and Specifications all actual construction including depths of foundations, horizontal and vertical locations of internal and underground utilities and appurtenances referenced to permanent visible and accessible surface improvements, field changes of dimensions and details, actual suppliers, manufacturers and trade names, models of installed equipment, and Change Order proposals. This separate set of Drawings and Specifications shall be the "Project Record."
- B. The Project Record shall be maintained on the project site throughout the construction and shall be clearly labeled "PROJECT RECORD." The Project Record shall be updated at least weekly noting all changes and shall be available to Owner at all times.
- C. Contractor shall submit the completed and finalized Project Record to A/E prior to Final Acceptance.

00704.03 SHOP DRAWINGS

- A. "Shop Drawings" means documents and other information required to be submitted to A/E by Contractor pursuant to the Contract Documents, showing in detail: the proposed fabrication and assembly of structural elements; and the installation (i.e. form, fit, and attachment details) of materials and equipment. Shop drawings include, but are not limited to, drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, samples, and similar materials furnished by Contractor to explain in detail specific portions of the Work required by the Contract Documents.

DIVISION 0 – GENERAL CONDITIONS

For materials and equipment to be incorporated into the Work, Contractor submittal shall include the name of the manufacturer, the model number, and other information concerning the performance, capacity, nature, and rating of the item. When directed, Contractor shall submit all samples at its own expense. Owner may duplicate, use, and disclose shop drawings provided in accordance with the Contract Documents.

- B. Contractor shall coordinate all shop drawings and review them for accuracy, completeness, and compliance with the Contract Documents and shall indicate its approval thereon as evidence of such coordination and review. Where required by law, shop drawings shall be stamped by an appropriate professional licensed by the State of Washington. Shop drawings submitted to A/E without evidence of Contractor's approval shall be returned for resubmission.

Contractor shall review, approve, and submit shop drawings with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of Owner or separate contractors. Contractor's submittal schedule shall allow a reasonable time for A/E review. A/E will review, approve, or take other appropriate action on the shop drawings. Contractor shall perform no portion of the Work requiring submittal and review of shop drawings until the respective submittal has been reviewed and the A/E has approved or taken other appropriate action. Owner and A/E shall respond to shop drawing submittals with reasonable promptness. Any Work by Contractor shall be in accordance with reviewed shop drawings. Submittals made by Contractor that are not required by the Contract Documents may be returned without action.

- C. Approval or other appropriate action with regard to shop drawings by Owner or A/E shall not relieve Contractor of responsibility for any errors or omissions in such shop drawings, nor from responsibility for compliance with the requirements of the Contract Documents. Unless specified in the Contract Documents, review by Owner or A/E shall not constitute an approval of the safety precautions employed by Contractor during construction, or constitute an approval of Contractor's means or methods of construction. If Contractor fails to obtain approval before installation and the item or work is subsequently rejected, Contractor shall be responsible for all costs of correction.
- D. If shop drawings show variations from the requirements of the Contract Documents, Contractor shall describe such variations in writing, separate from the shop drawings, at the time it submits the shop drawings containing such variations. If A/E approves any such variation, an appropriate Change Order will be issued. If the variation is minor and does not involve an adjustment in the Contract Sum or Contract Time, a Change Order need not be issued; however, the modification shall be recorded on the Project Record.
- E. Unless otherwise provided in *DIVISION 1*, Contractor shall submit to A/E for approval one electronic or paper copy of all shop drawings and submittals, unless otherwise indicated.

00704.04 ORGANIZATION OF SPECIFICATIONS

Specifications are prepared in sections that conform generally with trade practices. These sections are for Owner and Contractor convenience and shall not control Contractor in dividing the Work among the Subcontractors or in establishing the extent of the Work to be performed by any trade.

DIVISION 0 – GENERAL CONDITIONS

00704.05 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS, AND OTHER DOCUMENTS

- A. Drawings, Specifications, and other documents prepared by A/E are instruments of A/E's service through which the Work to be executed by Contractor is described. Neither Contractor nor any Subcontractor shall own or claim a copyright in the Drawings, Specifications, and other documents prepared by A/E, and A/E shall be deemed the author of them and will, along with any rights of Owner, retain all common law, statutory, and other reserved rights, in addition to the copyright. All copies of these documents, except Contractor's set, shall be returned or suitably accounted for to A/E, on request, upon completion of the Work.
- B. The Drawings, Specifications, and other documents prepared by the A/E, and copies thereof furnished to Contractor, are for use solely with respect to this Project. They are not to be used by Contractor or any Subcontractor on other projects or for additions to this Project outside the scope of the Work without the specific written consent of Owner. Contractor and Subcontractors are granted a limited license to use and reproduce applicable portions of the Drawings, Specifications, and other documents prepared by A/E appropriate to and for use in the execution of their Work.
- C. Contractor and all Subcontractors grant a nonexclusive license to Owner, without additional cost or royalty, to use for its own purposes (including reproduction) all shop drawings, together with the information and diagrams contained therein, prepared by Contractor or any Subcontractor. In providing shop drawings, Contractor and all Subcontractors warrant that they have authority to grant to Owner a license to use the shop drawings, and that such license is not in violation of any copyright or other intellectual property right.
- D. Contractor agrees to defend and indemnify Owner pursuant to the indemnity provisions in *SECTION 00705.22* from any violations of copyright or other intellectual property rights arising out of Owner's use of the shop drawings hereunder, or to secure for Owner, at Contractor's own cost, licenses in conformity with this section.
- E. The shop drawings and other submittals prepared by Contractor, Subcontractors, or its or their equipment or material suppliers, and copies thereof furnished to Contractor, are for use solely with respect to this Project. They are not to be used by Contractor or any Subcontractor on other projects or for additions to this Project outside the scope of the Work without the specific written consent of Owner. The Contractor, Subcontractors of any tier, and material or equipment suppliers are granted a limited license to use and reproduce applicable portions of the shop drawings and other submittals appropriate to and for use in the execution of their Work under the Contract Documents.

PART 5 - 00705.00 PERFORMANCE

00705.01 CONTRACTOR CONTROL AND SUPERVISION

- A. Contractor shall supervise and direct the Work, using its best skill and attention, and shall perform the Work in a skillful manner. Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences, and procedures and for coordinating all portions of the Work, unless the Contract Documents give other specific instructions concerning these matters. Contractor shall disclose its means and methods of construction when requested by Owner.

DIVISION 0 – GENERAL CONDITIONS

- B. Performance of the Work shall be directly supervised by a competent superintendent who is satisfactory to Owner, and has authority to act for Contractor. The superintendent shall not be changed without the prior written consent of Owner.
- C. Contractor shall be responsible to Owner for acts and omissions of Contractor, Subcontractors, and their employees and agents.
- D. Contractor shall enforce strict discipline and good order among Contractor's employees and other persons performing the Work. Contractor shall not permit employment of persons not skilled in tasks assigned to them. Contractor's employees shall at all times, conduct business in a manner that assures fair, equal, and nondiscriminatory treatment of all persons. Owner may, by written notice, request Contractor to remove from the Work or Project site any employee Owner reasonably deems incompetent, careless, or otherwise objectionable.
- E. Contractor shall keep on the Project site a copy of the Drawings, Specifications, addenda, reviewed shop drawings, and permits and permit drawings.
- F. Contractor shall ensure that its owner(s) and employees, and those of its Subcontractors, comply with the *Executive Conflict of Interest Act, RCW 42.18*, which, among other things, prohibits state employees from having an economic interest in any Public Works Contract that was made by, or supervised by, that employee. Contractor shall remove at its sole cost and expense any of its or its Subcontractors', employees if they are in violation of this Act.

00705.02 PERMITS, FEES, AND NOTICES

- A. Unless otherwise provided in the Contract Documents, Contractor shall pay for and obtain all permits, licenses, and inspections necessary for proper execution and completion of the Work. Prior to Final Acceptance, the approved, signed permits shall be delivered to Owner.
- B. If allowances for permits or utility fees are called for in the Contract Documents and set forth in Contractor's bid, and the actual costs of those permits or fees differ from the allowances in the Contract Documents, the difference shall be adjusted by Change Order.
- C. Contractor shall comply with and give notices required by all federal, state, and local laws, ordinances, rules, regulations, and lawful orders of public authorities applicable to performance of the Work.
- D. The Contractor shall conform to all local, state, and national codes in all phases of this project. Where conflicts arise between the code requirements and Drawings or Specifications requirements, the code shall govern and prevail unless the Drawings or Specifications impose requirements or limitations that are more stringent than the code requirements, in which case the more stringent requirements or limitations shall govern and prevail...

00705.03 PATENTS AND ROYALTIES

Contractor is responsible for, and shall pay, all royalties and license fees. Contractor shall defend, indemnify, and hold Owner harmless from any costs, expenses, and liabilities arising out of the infringement by Contractor of any patent, copyright, or other intellectual property right used in the Work; however, provided that Contractor gives prompt notice, Contractor shall not be responsible for such defense or indemnity when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents. If Contractor has reason to believe that use of the required design, process, or product constitutes an infringement of a patent or copyright, it shall promptly notify Owner of such potential infringement.

00705.04 PREVAILING WAGES

- A. Contractor shall pay the prevailing rate of wages to all workers, laborers, or mechanics employed in the performance of any part of the Work in accordance with *RCW 39.12* and the rules and regulations of the Department of Labor and Industries (L&I). The schedule of prevailing wage rates for the locality or localities of the Work, as determined by the Industrial Statistician of L&I, is by reference made a part of the Contract Documents as though fully set forth herein.
1. Before commencing the Work, Contractor shall file a statement under oath with Owner and with the Director of L&I certifying the rate of hourly wage paid and to be paid each classification of laborers, workers, or mechanics employed upon the Work by Contractor and Subcontractors. Such rates of hourly wage shall not be less than the prevailing wage rate.
 2. Disputes regarding prevailing wage rates shall be referred for arbitration to the Director of L&I. The arbitration decision shall be final and conclusive and binding on all parties involved in the dispute as provided for by *RCW 39.12.060*.
 3. Each Application for Payment submitted by Contractor shall state that prevailing wages have been paid in accordance with the prefiled statement(s) of intent, as approved. Copies of the approved intent statement(s) shall be posted on the job site with the address and telephone number of the Industrial Statistician of L&I where a complaint or inquiry concerning prevailing wages may be made.
 4. In compliance with *CHAPTER 296-127 WAC*, Contractor shall pay to L&I the currently established fee for each statement of intent and/or affidavit of wages paid submitted to L&I for certification.
 5. Per EHB 2805, public works contracts estimated to cost over \$1 million requires the Contractor and Subcontractor to submit information regarding any off-site, pre-fabricated, non-standard, project-specific items produced under each contract and produced outside Washington.
 6. Contractor and Subcontractor must have the following information on their Affidavit of Wages Paid form:
 - a. The estimated cost of the public works project;
 - b. The name of the awarding agency and the title of the public works project;

DIVISION 0 – GENERAL CONDITIONS

- c. The contract value of the off-site, pre-fabricated, non-standard, project specific items produced outside Washington; and
 - d. The name, address, and federal employer identification number of the contractor that produced the off-site, pre-fabricated, non-standard, project specific items.
- B. Projects identified as having federal financing, excluding FEMA shall comply with *Federal Davis Bacon Act* requirements.
- 1. All laborers, mechanics, and other workers employed by the Contractor or Subcontractors to work on construction projects financed by federal assistance must be paid wages not less than those established for the locality of the project by the U.S. Secretary of Labor (40 Stat 1494, Mar, 3, 1921, Chap, 411, 40 USC276A 276A S).
 - 2. When the project is subject to both state and federal wage rates, and when the rates differ for similar kinds of labor, the Contractor shall not pay less than the higher rate. The area in which the worker is physically employed shall determine which federal wage and fringe benefit rate shall be used to compare against the state wage and fringe benefit rate.
 - 3. Washington State's prevailing wage rate for this project can be found at the Department of Labor and Industries' (L&I) website: <https://fortress.wa.gov/lni/wagelookup/prvwagelookup.aspx>.
- C. Projects identified as having FEMA funding shall comply with Stafford Act Requirements. Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended, 42 U.S.C. 5121 et seq., and Related Authorities.
- 1. All laborers and mechanics employed by contractors or subcontractors in the performance of construction work financed with the assistance of any contribution of Federal funds made by the Administrator under this subsection shall be paid wages at rates not less than those prevailing on similar construction in the locality as determined by the Secretary of Labor in accordance with sections 3141-3144, 3146, and 3147 of title 40, and every such employee shall receive compensation at a rate not less than one and 1/2 times the basic rate of pay of the employee for all hours worked in any workweek in excess of 8-hours in any workday or 40 hours in the workweek, as the case may be. The Administrator shall make no contribution of Federal funds without first obtaining adequate assurance that these labor standards will be maintained upon the construction work. The Secretary of Labor shall have, with respect to the labor standards specified in this subsection, the authority and functions set forth in Reorganization Plan Numbered 14 of 1950 (5 U.S.C. App.) and section 3145 of title 40.
 - 2. When the project is subject to both state and federal wage rates, and when the rates differ for similar kinds of labor, the Contractor shall not pay less than the higher rate. The area in which the worker is physically employed shall determine which federal wage and fringe benefit rate shall be used to compare against the state wage and fringe benefit rate.

00705.05 HOURS OF LABOR

- A. Contractor shall comply with all applicable provisions of *RCW 49.28*, and they are incorporated herein by reference. Pursuant to that statute no laborer, worker, or mechanic employed by Contractor, any Subcontractor, or any other person performing or contracting to do the whole or any part of the Work shall be permitted or required to work more than 8 hours in any one calendar day, provided that in cases of extraordinary emergency, such as danger to life or property, the hours of work may be extended, but in such cases the rate of pay for time employed in excess of 8 hours of each calendar day shall be not less than 1½ times the rate allowed for this same amount of time during 8 hours of service.
- B. Notwithstanding the preceding paragraph, *RCW 49.28* permits a Contractor or Subcontractor in any Public Works Contract subject to those provisions to enter into an agreement with its employees in which the employees work up to 10 hours in a calendar day. No such agreement may provide that the employees work 10 hour days for more than 4 calendar days a week. Any such agreement is subject to approval by the employees. The overtime provisions of *RCW 49.28* shall not apply to the hours, up to 40 hours per week, worked pursuant to any such agreement.

00705.06 NONDISCRIMINATION

- A. Discrimination in all phases of employment is prohibited by, among other laws and regulations, *Title VII of the Civil Rights Act of 1964*, the *Vietnam Era Veterans Readjustment Act of 1974*, *Sections 503 and 504 of the Vocational Rehabilitation Act of 1973*, the *Equal Employment Act of 1972*, the *Age Discrimination Act of 1967*, the *Americans with Disabilities Act of 1990*, the *Civil Rights Act of 1991*, *Presidential Executive order 11246*, *Presidential Executive Order 11375*, *Presidential Executive Order 13672*, the *Washington State Law Against Discrimination, RCW 49.60*, and *Gubernatorial Executive Order 85-09*. These laws and regulations establish minimum requirements for affirmative action and fair employment practices which Contractor must meet.
- B. During Performance of the Work:
 - 1. Contractor shall not discriminate against any employee or applicant for employment because of race, creed, color, national origin, sex, sexual orientation, age, marital status, or the presence of any physical, sensory, or mental disability, Vietnam era veteran status, or disabled veteran status, nor commit any other unfair practices as defined in *RCW 49.60*.
 - 2. Contractor shall, in all solicitations or advertisements for employees placed by or for it, state that all qualified applicants will be considered for employment without regard to race, creed, color, national origin, sex, sexual orientation, age, marital status, or the presence of any physical, sensory, or mental disability.
 - 3. Contractor shall send to each labor union, employment agency, or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice advising the labor union, employment agency, or workers' representative of Contractor's obligations according to the Contract Documents and *RCW 49.60*.

DIVISION 0 – GENERAL CONDITIONS

4. Contractor shall permit access to its books, records, and accounts, and to its premises by Owner, and by the Washington State Human Rights Commission, for the purpose of investigation to ascertain compliance with this section of the Contract Documents.
5. Contractor shall include the provisions of this section in every Subcontract.

00705.07 SAFETY PRECAUTIONS

- A. Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Work.
- B. In carrying out its responsibilities according to the Contract Documents, Contractor shall protect the lives and health of employees performing the Work and other persons who may be affected by the Work; prevent damage to materials, supplies, and equipment whether onsite or stored offsite; and prevent damage to other property at the site or adjacent thereto. Contractor shall comply with all applicable laws, ordinances, rules, regulations, and orders of any public body having jurisdiction for the safety of persons or property, or to protect them from damage, injury, or loss; shall erect and maintain all necessary safeguards for such safety and protection; and shall notify owners of adjacent property and utilities when prosecution of the Work may affect them.
- C. Contractor shall maintain an accurate record of exposure data on all incidents relating to the Work resulting in death, traumatic injury, occupational disease, or damage to property, materials, supplies, or equipment. Contractor shall immediately report any such incident to Owner. Owner shall, at all times, have a right of access to all records of exposure.
- D. Contractor shall provide all persons working on the Project site with information and training on hazardous chemicals in their work at the time of their initial assignment, and whenever a new hazard is introduced into their work area.
 1. Information: At a minimum, Contractor shall inform persons working on the Project site of:
 - a. The requirements of *CHAPTER 296-62 WAC, General Occupational Health Standards*
 - b. Any operations in their work area where hazardous chemicals are present
 - c. The location and availability of written hazard communication programs, including the required list(s) of hazardous chemicals and Safety Data Sheets (SDS) required by *CHAPTER 296-62 WAC*.
 2. Training: At a minimum, Contractor shall provide training for persons working on the project site, which includes:
 - a. Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.).
 - b. The physical and health hazards of the chemicals in the work area.

DIVISION 0 – GENERAL CONDITIONS

- c. The measures such persons can take to protect themselves from these hazards, including specific procedures Contractor, or its Subcontractors, or others have implemented to protect those on the Project site from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used.
 - d. The details of the hazard communication program developed by Contractor or its Subcontractors, including an explanation of the labeling system and the SDS, and how employees can obtain and use the appropriate hazard information.
- E. Contractor's responsibility for hazardous, toxic, or harmful substances shall include the following duties:
 - 1. Contractor shall not keep, use, dispose, transport, generate, or sell on or about the Project site any substances now or hereafter designated as, or which are subject to regulation as, hazardous, toxic, dangerous, or harmful by any federal, state, or local law, regulation, statute or ordinance (hereinafter collectively referred to as "hazardous substances"), in violation of any such law, regulation, statute, or ordinance, but in no case shall any such hazardous substance be stored more than 90 days on the Project site.
 - 2. Contractor shall promptly notify Owner of all spills or releases of any hazardous substances that are otherwise required to be reported to any regulatory agency and pay the cost of cleanup. Contractor shall promptly notify Owner of all failures to comply with any federal, state, or local law, regulation, or ordinance; all inspections of the Project site by any regulatory entity concerning the same; all regulatory orders or fines; and all responses or interim cleanup actions taken by or proposed to be taken by any government entity or private party on the Project site.
- F. All Work shall be performed with due regard for the safety of the public. Contractor shall perform the Work so as to cause a minimum of interruption of vehicular traffic or inconvenience to pedestrians. All arrangements to care for such traffic shall be Contractor's responsibilities. All expenses involved in the maintenance of traffic by way of detours shall be borne by Contractor.
- G. In an emergency affecting the safety of life or the Work or of adjoining property, Contractor is permitted to act, at its discretion, to prevent such threatened loss or injury, and Contractor shall so act if so authorized or instructed.
- H. Nothing provided in this section shall be construed as imposing any duty upon Owner or A/E with regard to, or as constituting any express or implied assumption of control or responsibility over, Project site safety, or over any other safety conditions relating to employees or agents of Contractor or any of its Subcontractors, or the public.

00705.08 OPERATIONS, MATERIAL HANDLING, EASEMENTS AND STORAGE AREAS

- A. Contractor shall confine all operations, including storage of materials, to Owner-approved areas. The Owner has acquired ownership and/or easement of lands for the construction as indicated on the Drawings without cost to the Contractor. It is understood and agreed by the Contractor that if it should appear at any time that the Owner has not acquired title to all of the right-of-ways and lands necessary for the performance of the Work under the provisions of this Contract, and that if any delay in the performance of said Work occasioned by the failure of the Owner, its officers, or employees to acquire a title of any of said lands or right-of-way, such failure shall extend the Contract completion date the number of days equal to the period of such delay. The Contractor waives any and all claims for damages against the Owner, its officers, and employees which the Contractor may sustain by reason of delay in the Work.
- B. Temporary buildings (e.g. storage sheds, shops, offices) and utilities may be provided by Contractor only with the consent of Owner and without expense to Owner. The temporary buildings and utilities shall remain the property of Contractor and shall be removed by Contractor at its expense upon completion of the Work.
- C. Contractor shall use only established roadways or temporary roadways authorized by Owner. When materials are transported in prosecuting the Work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by federal, state, or local law or regulation.
- D. Ownership and control of all materials or facility components to be demolished or removed from the Project site by Contractor shall immediately vest in Contractor upon severance of the component from the facility or severance of the material from the Project site. Contractor shall be responsible for compliance with all laws governing the storage and ultimate disposal. Contractor shall provide Owner with a copy of all manifests and receipts evidencing proper disposal when required by Owner or applicable law.
- E. Contractor shall be responsible for the proper care and protection of its materials and equipment delivered to the Project site. Materials and equipment may be stored on the premises subject to approval of Owner. When Contractor uses any portion of the Project site as a shop, Contractor shall be responsible for any repairs, patching, or cleaning arising from such use.
- F. Contractor shall protect and be responsible for any damage or loss to the Work, or to the materials or equipment until the date of Substantial Completion, and shall repair or replace without cost to Owner any damage or loss that may occur, except damages or loss caused by the acts or omissions of Owner. Contractor shall also protect and be responsible for any damage or loss to the Work, or to the materials or equipment, after the date of Substantial Completion, and shall repair or replace without cost to Owner any such damage or loss that might occur, to the extent such damages or loss are caused by the acts or omissions of Contractor, or any Subcontractor.

00705.09 PRIOR NOTICE OF EXCAVATION

"Excavation" means an operation in which earth, rock, or other material on or below the ground is moved or otherwise displaced by any means, except the tilling of soil less than 12 inches in depth for agricultural purposes, or road ditch maintenance that does not change the original road grade or ditch flow line. Before commencing any excavation, Contractor shall provide notice of the scheduled commencement of excavation to all owners of underground facilities and utilities through locator services.

00705.10 UNFORSEEN PHYSICAL CONDITIONS

- A. If Contractor encounters conditions at the site which are subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents, or unknown physical conditions of an unusual nature which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, then Contractor shall give written notice to Owner promptly before conditions are disturbed and in no event later than 7 days after the first observance of the conditions.
- B. If such conditions differ materially and cause a change in Contractor's cost of, or time required for, performance of any part of the Work, the Contractor may be entitled to an equitable adjustment in the Contract Time or Contract Sum or both, provided it makes a request thereof as provided in *SECTION 00707.00 - CHANGES*.

00705.11 PROTECTION OF EXISTING STRUCTURES, EQUIPMENT, STOCK, VEGETATION, UTILITIES, AND IMPROVEMENTS

- A. Contractor shall protect from damage all existing structures, equipment, improvements, utilities, and vegetation at or near the Project site, and on adjacent property of a third party, the locations of which are made known to or should be known by Contractor. Contractor shall repair any damage, including that to the property of a third party, resulting from failure to comply with the requirements of the Contract Documents or failure to exercise reasonable care in performing the Work. If Contractor fails or refuses to repair the damage promptly, Owner may have the necessary work performed and charge the cost to Contractor.
- B. Contractor shall only remove trees when specifically authorized to do so, and shall protect vegetation that will remain in place.
- C. Damage to facility production resulting in death or sickness of stock shall result in claims against the Contractor for loss of production or costs incurred by any extraordinary measures required to save production.

00705.12 LAYOUT OF WORK

- A. Contractor shall plan and lay out the Work in advance of operations so as to coordinate all work without delay or revision.

DIVISION 0 – GENERAL CONDITIONS

- B. Contractor shall do all cutting, fitting, or patching that may be required to make its several parts fit together properly, or receive or be received by work of others set forth in, or reasonable implied by, the Contract Documents. Contractor shall not endanger any work by cutting, excavating, or otherwise altering the Work and shall not cut or alter the work of any other contractor unless approved in advance by Owner.
- C. Should any of the Work be found defective, or in any way not in accordance with the Contract Documents, this work, in whatever state of completion, may be rejected by Owner.

00705.13 MATERIAL AND EQUIPMENT

- A. All equipment, material, and articles incorporated into the Work shall be new and of the most suitable grade for the purpose intended, unless otherwise specifically provided in the Contract Documents. References in the Specifications to equipment, material, articles, or patented processes by trade name, make, or catalog number, shall be regarded as establishing a standard quality and shall not be construed as limiting competition. Contractor may, at its option, use any equipment, material, article, or process that, in the judgment of A/E, is equal to that named in the Specifications, unless otherwise specifically provided in the Contract Documents.
- B. It shall be the responsibility of the Contractor to furnish proof of equality in all respects to specified items when proposing alternate brands or items. Any significant deviations from Specifications, Drawings, or equality must be noted by the Contractor when submitting alternate materials for approval. The Owner shall be the sole judge of the equality and suitability of any products, materials, or components proposed by the Contractor as alternates to specified items. The Contractor shall, at their own expense, make any secondary changes required to incorporate an approved substitute or alternate into the project. No offers for substitution will be acknowledged from suppliers, distributors, manufacturers, or Subcontractors.
- C. Contractor shall do all cutting, fitting, or patching that may be required to make its several parts fit together properly, or receive or be received by work of others set forth in, or reasonably implied by, the Contract Documents. Contractor shall not endanger any work by cutting, excavating, or otherwise altering the Work and shall not cut or alter the work of any other contractor unless approved in advance by Owner.
- D. Should any of the Work be found defective, or in any way not in accordance with the Contract Documents, this work, in whatever stage of completion, may be rejected by Owner.

00705.14 AVAILABILITY AND USE OF UTILITY SERVICES

- A. Owner shall make all reasonable utilities available to Contractor from existing outlets and supplies, as specified in the Contract Documents. Unless otherwise provided in the Contract Documents, the utility service consumed shall be charged to or paid for by Contractor at prevailing rates charged to Owner or, where the utility is produced by Owner, at reasonable rates determined by Owner. Contractor will carefully conserve any utilities furnished.

DIVISION 0 – GENERAL CONDITIONS

- B. Contractor shall, at its expense and in a skillful manner satisfactory to Owner, install and maintain all necessary temporary connections and distribution lines, together with appropriate protective devices and all meters required to measure the amount of each utility used for the purpose of determining charges. Prior to Final Completion, Contractor shall remove all temporary connections, distribution lines, meters, and associated equipment and materials.

00705.15 TESTS AND INSPECTION

- A. Contractor shall maintain an adequate testing and inspection program and perform such tests and inspections as are necessary or required to ensure that the Work conforms to the requirements of the Contract Documents. Contractor shall be responsible for inspection and quality surveillance of all its Work and all Work performed by any Subcontractor. Unless otherwise provided, Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. Contractor shall give Owner timely notice of when and where tests and inspections are to be made. Contractor shall maintain complete inspection records and make them available to Owner.
- B. Owner may, at any reasonable time, conduct such inspections and tests, as it deems necessary to ensure that the Work is in accordance with the Contract Documents. Owner shall promptly notify Contractor if an inspection or test reveals that the Work is not in accordance with the Contract Documents. Unless the subject items are expressly accepted by Owner, such Owner inspection and tests are for the sole benefit of Owner and do not:
 - 1. Constitute or imply acceptance
 - 2. Relieve Contractor of responsibility for providing adequate quality control measures
 - 3. Relieve Contractor of responsibility for risk of loss or damage to the Work, materials, or equipment
 - 4. Relieve Contractor of its responsibility to comply with the requirements of the Contract Documents
 - 5. Impair Owner's right to reject defective or nonconforming items or to avail itself of any other remedy to which it may be entitled.
- C. In addition to any inspections required by local authorities or permitting agencies, the State will appoint its own inspector for the project. Construction inspectors employed by the State shall assist the Owner in making all necessary inspections and measurements and shall enforce a strict compliance with the terms of the Contract and the orders of the Owner. The Inspector will have the authority to reject materials or workmanship which do not fulfill the requirements of these Specifications. In case of dispute, the Contractor may appeal to the Owner whose decision shall be final. The acceptance of any material by the Inspector shall not hinder its subsequent rejection if found defective. Rejected materials and workmanship shall be replaced promptly or be remedied by the Contractor, without additional cost to the Owner.

DIVISION 0 – GENERAL CONDITIONS

- D. Neither observations by an inspector retained by Owner, the presence or absence of such inspector on the site, nor inspections, tests, or approvals by others, shall relieve Contractor from any requirement of the Contract Documents, nor is any such inspector authorized to change any term or condition of the Contract Documents.
- E. Contractor shall promptly furnish, without additional charge, all facilities, labor, material, and equipment reasonably needed for performing such safe and convenient inspections and tests as may be required by Owner. Owner may charge Contractor any additional cost of inspection or testing when Work is not ready at the time specified by Contractor for inspection or testing, or when prior rejection makes re-inspection or retest necessary. Owner shall perform its inspections and tests in a manner that will cause no undue delay in the Work.

00705.16 CORRECTION OF NONCONFORMING WORK

- A. If a portion of the Work is covered contrary to the requirements of the Contract Documents, it must, if required in writing by Owner, be uncovered for Owner's observation and be replaced at the Contractor's expense and without change in the Contract Time.
- B. If any time prior to Final Completion Owner desires to examine the Work or any portion of it that has been covered, Owner may request to see such Work, and it shall be uncovered by Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an adjustment in the Contract Sum for the costs of uncovering and replacement, and if completion of the Work is thereby delayed, an adjustment in the Contract Time, provided it makes a request therefore as provided in *SECTION 00707.00 - CHANGES*. If such Work is not in accordance with the Contract Documents, the Contractor shall pay the costs of examination and reconstruction.
- C. Contractor shall promptly correct Work found by Owner not to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed, or completed. Contractor shall bear all costs of correcting such nonconforming Work, including additional testing and inspections.
- D. If, within 1 year after the date of Substantial Completion of the Work, or designated portion thereof, or within 1 year after the date for commencement of any system warranties established under *SECTION 00706.08*, or within the terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, Contractor shall correct it promptly after receipt of written notice from Owner to do so. Owner shall give such notice promptly after discovery of the condition. This period of 1 year shall be extended, with respect to portions of Work first performed after Substantial Completion, by the period of time between Substantial Completion and the actual performance of the Work. Contractor's duty to correct with respect to Work repaired or replaced shall run for 1 year from the date of repair or replacement. Obligations under this paragraph shall survive Final Acceptance.
- E. Contractor shall remove from the Project site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by Contractor nor accepted by Owner.

DIVISION 0 – GENERAL CONDITIONS

- F. If Contractor fails to correct nonconforming Work within a reasonable time after written notice to do so, Owner may replace, correct, or remove the nonconforming Work and charge the cost thereof to the Contractor.
- G. Contractor shall bear the cost of correcting destroyed or damaged Work, whether completed or partially completed, caused by Contractor's correction or removal of Work which is not in accordance with the requirements of the Contract Documents.
- H. Nothing contained in this section shall be construed to establish a period of limitation with respect to other obligations that Contractor might have according to the Contract Documents. Establishment of the time period of 1 year, as described in *SECTION 00705.16D*, relates only to the specific obligation of Contractor to correct the Work, and has no relationship to the time within which the Contractor's obligation to comply with the Contract Documents may be sought to be enforced, including the time within which such proceedings may be commenced.
- I. If Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, Owner may do so instead of requiring its removal and correction, in which case the Contract sum may be reduced as appropriate and equitable.

00705.17 CLEANUP

Contractor shall at all times keep the Project site, including hauling routes, infrastructures, utilities, and storage areas, free from accumulations of waste materials. Before completing the Work, Contractor shall remove from the premises its rubbish, tools, scaffolding, equipment, and materials. Upon completing the Work, Contractor shall leave the Project site in a clean, neat, and orderly condition satisfactory to Owner. If Contractor fails to clean up as provided herein, and after reasonable notice from Owner, Owner may do so and the cost thereof shall be charged to Contractor.

00705.18 ACCESS TO WORK

Contractor shall provide Owner and A/E access to the Work in progress wherever located.

00705.19 OTHER CONTRACTS

Owner may undertake or award other contracts for additional work at or near the Project site. Contractor shall reasonably cooperate with the other contractors and Owner's employees and shall carefully adapt scheduling and perform the Work in accordance with Contract Documents to reasonably accommodate the other work.

00705.20 SUBCONTRACTORS AND SUPPLIERS

- A. Before submitting its first Application for Payment, Contractor shall furnish in writing to Owner the names, addresses, and telephone numbers of all Subcontractors, as well as suppliers providing materials in excess of \$2,500. Contractor shall utilize Subcontractors and suppliers which are experienced and qualified, and meet the requirements of the Contract Documents, if any. Contractor shall not utilize any Subcontractor or supplier to whom the Owner has a reasonable objection, and shall obtain Owner's written consent before making any substitutions or additions.

DIVISION 0 – GENERAL CONDITIONS

- B. All Subcontracts must be in writing. By appropriate written agreement, Contractor shall require each Subcontractor, so far as applicable to the Work to be performed by the Subcontractor, to be bound to Contractor by terms of the Contract Documents, and to assume toward Contractor all the obligations and responsibilities which Contractor assumes toward Owner in accordance with the Contract Documents. Each Subcontract shall preserve and protect the rights of Owner in accordance with the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights. Where appropriate, Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. However, nothing in this paragraph shall be construed to alter the contractual relations between Contractor and its Subcontractors with respect to insurance or bonds.
- C. Contractor shall schedule, supervise, and coordinate the operations of all Subcontractors. No Subcontracting of any of the Work shall relieve Contractor from its responsibility for the performance of the Work in accordance with the Contract Documents or any other obligations of the Contract Documents.
- D. Each subcontract agreement for a portion of the Work is hereby assigned by Contractor to Owner provided that:
 - 1. The assignment is effective only after termination by Owner for cause pursuant to *SECTION 00709.01* and only for those Subcontracts which Owner accepts by notifying the Subcontractor in writing; and
 - 2. After the assignment is effective, Owner will assume all future duties and obligations toward the Subcontractor that Contractor assumed in the Subcontract.
 - 3. The assignment is subject to the prior rights of the surety, if any, obligated under any bond provided in accordance with the Contract Documents.

00705.21 WARRANTY OF CONSTRUCTION

- A. In addition to any special warranties provided elsewhere in the Contract Documents, Contractor warrants that all Work conforms to the requirements of the Contract Documents and is free of any defect in equipment, material, or design furnished, or workmanship performed by Contractor.
- B. With respect to all warranties, express or implied, for Work performed or materials furnished according to the Contract Documents, Contractor shall:
 - 1. Obtain all warranties that would be given in normal commercial practice.
 - 2. Require all warranties to be executed, in writing, for the benefit of Owner.
 - 3. Enforce all warranties for the benefit of Owner, if directed by Owner.
 - 4. Be responsible to enforce any subcontractor's, manufacturers', or supplier's warranty should they extend beyond the period specified in the Contract Documents.
- C. The obligations under this section shall survive Final Acceptance.

00705.22 INDEMNIFICATION

- A. Contractor shall defend, indemnify, and hold Owner and A/E harmless from and against all claims, demands, losses, damages, or costs, including but not limited to damages arising out of bodily injury or death to persons and damage to property, caused by or resulting from:
 - 1. The sole negligence of Contractor or any of its Subcontractors
 - 2. The concurrent negligence of Contractor, or any Subcontractor, but only to the extent of the negligence of Contractor or such Subcontractor
 - 3. The use of any design, process, or equipment which constitutes an infringement of any United States patent presently issued or violates any other proprietary interest, including copyright, trademark, and trade secret.

- B. In any action against Owner and any other entity indemnified in accordance with this section by any employee of Contractor, its Subcontractors, Sub-subcontractors, agents, or anyone directly or indirectly employed by any of them, the indemnification obligation of this section shall not be limited by a limit on the amount or type of damages, compensation, or benefits payable by or for Contractor or any Subcontractor under *RCW Title 51, the Industrial Insurance Act*, or any other employee benefit acts. In addition, Contractor waives immunity as to Owner and A/E only, in accordance with *RCW Title 51*.

00705.23 REQUIRED PAYROLL DOCUMENTS

- A. The Contractor shall submit to the Owner the following for itself and for each subcontractor and each agent to a Subcontractor that performed work on the Contract:
 - 1. *A Statement of Intent to Pay Prevailing Wages.* The Contracting Agency will make no payment under this Contract for the work performed until this statement has been completed and submitted.
 - 2. *An Affidavit of Wages Paid with the Final Contract Voucher Certification.* The Contracting Agency will not release to the Contractor any funds retained under *RCW 60.28.010* until all of the *Affidavit of Wages Paid* forms have been completed and submitted.

- B. In addition, the Prime Contractor shall submit a Request for Release to the Washington State Labor and Industries (L&I), (L&I provides the form).

- C. Certified payrolls are required to be submitted by the Contractor to the Owner for the Contractor and all Subcontractors or agents on all federally funded projects, and when requested in writing by the Owner, on projects funded with only Contracting Agency funds. If these payrolls are not supplied within 10 calendar days of the end of the proceeding weekly payroll period for federally funded projects, or within 10 calendar days from the date of the written request on projects with only Contracting Agency funds, any or all payments may be withheld until compliance is achieved. Also, failure to provide these payrolls could result in other sanctions as provided by state laws (*RCW 39.12.050*) and/or federal regulations (*29 CFR 5.12*). All certified payrolls shall be complete and explicit.

DIVISION 0 – GENERAL CONDITIONS

Employee work classification codes used on certified payrolls shall coincide exactly with the occupation codes listed on the minimum wage schedule, unless the Owner specifically approves an alternate method to identify the occupation coding used by the Contractor to compare with the codes listed. When an apprentice is shown on the certified payroll at a rate less than the minimum prevailing journey wage rate, the apprenticeship registration number for that employee from the State Apprenticeship and Training Council shall be shown, along with the correct employee classification code.

00705.24 STATEMENT OF APPRENTICE/JOURNEYMAN PARTICIPATION

In accordance with *RCW 39.04.320*, the State of Washington requires a mandatory 15 percent apprenticeship (labor hours) participation for projects estimated to cost \$1,000,000 or more. Apprentice participation under this contract may be counted towards the required percentage (%) only if the apprentices are from an apprenticeship program registered and approved by the Washington State Apprenticeship and Training Council (*RCW 49.04* and *WAC 296-04*).

- A. For each project that has apprentice requirements, the contractor shall submit a **“Statement of Apprentice/Journeyman Participation (See SECTION 00670)”** on forms provided by the Washington Department of Fish and Wildlife, with every request for progress payment. The Contractor shall submit consolidated and cumulative data collected by the Contractor and collected from all Subcontractors by the Contractor. The submitted data includes the following:
1. Contractor name and address;
 2. Contract number;
 3. Project name;
 4. Contract value;
 5. Reporting period “Notice to Proceed” through “Invoicing Date”;
 6. Name and registration number of each apprentice;
 7. Total number of apprentices and labor hours worked by them, categorized by trade or craft;
 8. Total number of journeymen and labor hours worked by them, categorized by trade or craft;
 9. Cumulative combined total of apprentice and journeymen labor hours; and
 10. Total percentage of apprentice hours worked.
- B. No changes to the required percentage (%) of apprentice participation shall be allowed without written approval of the Owner. In any request for the change the Contractor shall clearly demonstrate a good faith effort to comply with the requirements for apprentice participation.

DIVISION 0 – GENERAL CONDITIONS

- C. Any substantive violation of the mandatory requirements of this part of the contract may be a material breach of the contract by the Contractor.

00705.25 FEDERALLY FUNDED CONTRACT CONDITIONS

A. Equal Employment Opportunity :

1. The Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, national origin, sex, sexual orientation, religion, marital status, age, Vietnam era and disabled veteran's status, or other presence of any sensory, mental, or physical handicap. The Contractor will take affirmative action to ensure that applications are employed and that employees are treated during employment without regard to their race, creed, color, national origin, sex, sexual orientation, religion, marital status, age, Vietnam era and disabled veteran's status or the presence of any sensory, mental, or physical handicap.

Such action shall include, but not be limited to the following: Employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.

2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, national origin, sex, sexual orientation, religion, marital status, age, Vietnam era and disabled veteran's status, or the presence of any sensory, mental, or physical handicap.
3. The Contractor will send to each labor union, or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided by the agency contracting officer advising the labor union or workers' representative of the Contractor's commitments under *Section 202 of Executive Order No. 11246 of September 24, 1965*, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
4. The Contractor will comply with all provisions of *Executive Order No. 11246 of September 24, 1965*, and the rules, regulations, and relevant orders of the Secretary of Labor.
5. The Contractor will furnish all information and reports required by *Executive Order No. 11246 of September 24, 1965*, and by the rules, regulations, and orders of the Secretary of Labor or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

DIVISION 0 – GENERAL CONDITIONS

6. In the event of the Contractor's noncompliance with the nondiscrimination clauses of this Contract or with any of the said rules, regulations, or orders, this Contract may be canceled, terminated, or suspended in whole or in part, and the Contractor may be declared ineligible for further government contracts in accordance with procedures authorized in *Executive Order No. 11246 of September 24, 1965*, and such other sanctions may be imposed and remedies invoked as provided in the said Executive Order, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
 7. The Contractor will include the provisions of *Paragraphs "1" through "7"* in every Subcontract or Purchase Order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to *Section 204 of Executive Order No. 11246 of September 24, 1965*, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions, including the sanctions for noncompliance, provided however that in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.
- B. *Civil Rights Act of 1964 (P.L. 88-352, 78 STAT. 241)*:
1. *Section 601 (In General)*: No person in the United States shall, on the grounds of race, color, national origin, sex, religion, marital status, age, Vietnam era and disabled veteran status, or the presence of any sensory, mental, or physical handicap be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance.
 2. *Section 602 (Effecting Compliance)*: Each federal department and agency which is empowered to extend federal financial assistance to any program or activity by way of grant, loan, or contract other than a contract of insurance or guaranty, is authorized and directed to effectuate the provisions of *Section 601* with respect to such program or activity by issuing rules, regulations, or orders of general applicability which shall be consistent with achievement of the objectives the statute authorizing the financial assistance in connection with which the action is taken. No such rule, regulation, or order shall become effective unless and until approved by the President. Compliance with any requirement adopted pursuant to this section may be effected by:
 - a.) The termination of or refusal to grant or to continue assistance under such programs or activity to any recipient as to whom there has been an express finding on the record, after opportunity for hearing, of a failure to comply with such requirement, but such termination or refusal shall be limited to the particular political entity, or part thereof, or other recipient as to whom such a finding has been made, and shall be limited in its effect to the particular program, or part thereof, in which such noncompliance has been so found, and;

DIVISION 0 – GENERAL CONDITIONS

- b.) By any other means authorized by law, provided, however, that no such action shall be taken until the department or agency concerned has advised the appropriate person or persons of the failure to comply with a requirement imposed pursuant to this section, the head of the federal department or agency shall file with the committees of the House and Senate having legislative jurisdiction over the program or activity involved a full written report of the circumstances and the grounds for such action. No such action shall become effective until 30 days have elapsed after the filing of such report.
3. **Section 603 (Judicial Review):** Any department or agency action taken pursuant to Section 602 shall be subject to such judicial review as may otherwise be provided by law for similar action taken by such department or agency on other grounds. In the case of action not otherwise subject to judicial review, terminating or refusing to grant or to continue financial assistance upon finding or failure to comply with any requirement imposed pursuant to Section 602, any assistance upon a finding or failure to comply with any requirement imposed pursuant to Section 602, any person aggrieved (including any State or political subdivision thereof or any agency of either) may obtain judicial review of such action in accordance with Section 10 of the Administrative Procedure Act, and such action shall not be deemed committed to unreviewable agency discretion within the meaning of that section.
4. **Section 604 (Restriction on Action):** Nothing contained in this title shall be construed to authorized action under this title by any department or agency with respect to any employment practice of any employer, employment agency, or labor organization except where a primary objective of the federal financial assistance is to provide employment.
5. **Section 605 (Existing Authority Not Impaired):** Nothing in this title shall add to or detract from any existing authority with respect to any program or activity under which federal financial assistance is extended by way of a contract of insurance or guaranty.
- C. Contracts in excess of \$10,000 shall comply with *Executive Order No. 11246*, entitled *Equal Employment Opportunity*, as amended by *Executive Order No. 11375*, *Executive Order No., 13672* and as supplemented in *Department of Labor Regulations (41 CFR, Part 60)*.
- D. This Contract shall comply with the *Copeland Anti-Kick Back Act (18 U.S.C. 874)* as supplemented in *Department of Labor Regulations (29 CFR, Part 3)*. The Contractor shall not induce by any means any person employed in the construction, completion, or repair of public work to give up any part of the compensation to which he is otherwise entitled.
- E. Contracts in excess of \$2,000 shall comply with the *Davis-Bacon Act (40 U.S.C. 276a to a-7)* and as supplemented by *Department of Labor Regulations (29 CFR, Part 5)*. Contractors shall pay wages to laborers and mechanics at a rate not less than the minimum wages specified in a wage determination made by the Secretary of Labor, and shall pay wages not less often than once a week.

DIVISION 0 – GENERAL CONDITIONS

- F. Contracts in excess of \$2,000 which involve the employment of mechanics or laborers shall comply with *Section 103 and 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 327-330)* as supplemented by *Department of Labor Regulations (29 CFR, Part 5)*. Each Contractor shall compute the wages of every mechanic and laborer on the basis of a standard workday of eight hours, and a standard workweek of 40 hours. Work in excess of the standard workday or workweek is permissible, provided that the worker is compensated at a rate of not less than 1½ times the basic rate of pay for all hours worked in excess of eight hours in any calendar day of 40 hours in the workweek. No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety as determined under construction, safety, and health standards promulgated by the Secretary of Labor.
- G. Contracts in excess of \$100,000 require the recipient to agree to comply with applicable standards, orders, or regulations pursuant to the Clean Air Act of 1970 (42 U.S.C. 1857 et seq.) and the Federal Water Pollution Control Act (33 U.S.C. 1251 et seq.), amended.
- H. Contractor shall submit Certified Payrolls as described in *Section 00705.23*.

PART 6 - 00706.00 PAYMENTS AND COMPLETION

00706.01 CONTRACT SUM

Owner shall pay Contractor the Contract Sum for performance of the Work in accordance with the Contract Documents. The Contract Sum shall include all taxes imposed by law and properly chargeable to the Project, including sales tax.

00706.02 SCHEDULE OF VALUES

Prior to Notice to Proceed, Contractor shall submit to Owner for approval a breakdown allocating the total Contract Sum to each principle category of work, in such detail as requested by Owner ("Schedule of Values"). The approved Schedule of Values shall include appropriate amounts for demobilization, record drawings, operation and maintenance manuals, and any other requirements for Project closeout and shall be used by Owner as the basis for progress payments. Payment for Work shall be made only for and in accordance with those items included in the Schedule of Values.

00706.03 APPLICATION FOR PAYMENT

- A. At monthly intervals, unless determined otherwise by Owner, Contractor shall submit to Owner an itemized Application for Payment for Work completed in accordance with the Contract Documents and the approved Schedule of Values. Each application shall be supported by such substantiating data as Owner may require.
- B. By submitting an Application for Payment, Contractor is certifying that all Subcontractors have been paid, less earned retainage in accordance with *RCW 60.28.010*, as their interests appeared in the last preceding certificate of payment. By submitting an Application for Payment, Contractor is recertifying that the representations set forth in *SECTION 00701.03* are true and correct, to the best of Contractor's knowledge, as of the date of the Application for Payment.

DIVISION 0 – GENERAL CONDITIONS

- C. At the time the Contractor submits an Application for Payment, Contractor shall analyze and reconcile, to the satisfaction of Owner, the actual progress of the Work with the Construction Schedule.
- D. If authorized by Owner, the Application for Payment may include request for payment for material delivered to the Project site and suitably stored, or for completed preparatory work. Payment may similarly be requested for material stored off the Project site, provided Contractor complies with or furnishes satisfactory evidence of the following:
 - 1. The material will be placed in a warehouse that is structurally sound, dry, lighted, and suitable for the materials to be stored.
 - 2. The warehouse is located within a 10-mile radius of the Project. Other locations may be utilized if approved in writing by Owner.
 - 3. Only materials for the Project are stored within the warehouse (or secure portion of a warehouse set aside for the Project).
 - 4. Contractor furnishes Owner a Certificate of Insurance extending Contractor's insurance coverage for damage, fire, and theft to cover the full value of all materials stored or in transit.
 - 5. The warehouse (or secure portion thereof) is continuously under lock and key, and only Contractor's authorized personnel shall have access.
 - 6. Owner shall at all times have the right of access in company of Contractor.
 - 7. The Contractor and its surety assume total responsibility for the stored materials.
 - 8. Contractor furnishes to Owner certified lists of materials stored, bills of lading, invoices, and other information as may be required, and shall also furnish notice to Owner when materials are moved from storage to the Project site.

00706.04 PROGRESS PAYMENTS

- A. Owner shall make progress payments, in such amounts as Owner determines are properly due, within 30 days after receipt of a properly executed Application for Payment. Owner shall notify Contractor in accordance with *RCW 39.76* if the Application for Payment does not comply with the requirements of the Contract Documents.
- B. Owner shall retain 5 percent of the amount of each progress payment until 30 days after Final Acceptance and receipt of all documents required by law or the Contract Documents including, at Owner's request, consent of surety to release of the retainage. In accordance with *RCW 60.28*, Contractor may request that monies reserved be retained in a fund by Owner, deposited by Owner in a bank or savings and loan, or placed in escrow with a bank or trust company to be converted into bonds and securities to be held in escrow with interest to be paid to Contractor. Owner may permit Contractor to provide an appropriate bond in lieu of the retained funds.
- C. For Base Bids of \$150,000 or less, Owner may at Contractor Request, retain 10% of the amount of each progress payment, in lieu of payment and performance bonds.

DIVISION 0 – GENERAL CONDITIONS

- D. Title to all Work and materials covered by a progress payment shall pass to Owner at the time of such payment free and clear of all liens, claims, security interests, and encumbrances. Passage of title shall not, however, relieve Contractor from any of its duties and responsibilities for the Work or materials, or waive any rights of Owner to insist on full compliance by Contractor with the Contract Documents.
- E. Payments due and unpaid in accordance with the Contract Documents shall bear interest as specified in *RCW 39.76*.

00706.05 PAYMENTS WITHHELD

- A. Owner may withhold or, on account of subsequently discovered evidence, nullify the whole or part of any payment to such extent as may be necessary to protect Owner from loss or damage for reasons including but not limited to:
 - 1. Work not in accordance with the Contract Documents
 - 2. Reasonable evidence that the Work required by the Contract Documents cannot be completed for the unpaid balance of the Contract Sum
 - 3. Work by Owner to correct defective Work or complete the Work in accordance with *SECTION 00705.16*
 - 4. Failure to perform in accordance with the Contract Documents
 - 5. Cost or liability that may occur to Owner as the result of Contractor's fault or negligent acts or omissions.
- B. In any case where part or all of a payment is going to be withheld for unsatisfactory performance, Owner shall notify Contractor in accordance with *RCW 39.76*.

00706.06 RETAINAGE AND BOND CLAIM RIGHTS

RCW CHAPTERS 39.08 and 60.28, concerning the rights and responsibilities of Contractor and Owner with regard to the performance and payment bonds and retainage, are made a part of the Contract Documents by reference as though fully set forth herein.

00706.07 SUBSTANTIAL COMPLETION

Substantial Completion is the stage in the progress of the Work (or portion thereof designated and approved by Owner) when the construction is sufficiently complete, in accordance with the Contract Documents, so Owner can fully occupy the Work (or the designated portion thereof) for the use for which it is intended. All Work other than incidental corrective or punch list work shall have been completed. Substantial Completion shall not have been achieved if all systems and parts are not functional, if utilities are not connected and operating normally, if all required occupancy permits have not been issued, or if the Work is not accessible by normal vehicular and pedestrian traffic routes. The date Substantial Completion is achieved shall be established in writing by Owner. Contractor may request an early date of Substantial Completion, which must be approved by Change Order. Owner's occupancy of the Work or designated portion thereof does not necessarily indicate that Substantial Completion has been achieved.

0706.08 PRIOR OCCUPANCY

- A. Owner may, upon written notice thereof to Contractor, take possession of or use any completed or partially completed portion of the Work ("prior occupancy") at any time prior to Substantial Completion. Unless otherwise agreed in writing, prior occupancy shall not: be deemed an acceptance of any portion of the Work; accelerate the time for any payment to Contractor; prejudice any rights of Owner provided by any insurance, bond, guaranty, or the Contract Documents; relieve Contractor of the risk of loss or any of the obligations established by the Contract Documents; establish a date for termination or partial termination of the assessment of liquidated damages; or constitute a waiver of claims.
- B. Notwithstanding anything in the preceding paragraph, Owner shall be responsible for loss or damage to the Work resulting from its prior occupancy. Contractor's 1 year duty to repair and any system warranties shall begin on building systems activated and used by Owner as agreed in writing by Owner and Contractor.

00706.09 FINAL COMPLETION, ACCEPTANCE, AND PAYMENT

- A. Final Completion shall be achieved when the Work is fully and finally complete in accordance with the Contract Documents. The date Final Completion is achieved shall be established by Owner in writing.
- B. Final Acceptance is the formal action of Owner acknowledging Final Completion. Prior to Final Acceptance, Contractor shall, in addition to all other requirements in the Contract Documents, submit to Owner a written notice of any outstanding disputes or claims between Contractor and any of its Subcontractors, including the amounts and other details thereof. Neither Final Acceptance nor final payment shall release Contractor or its sureties from any obligations of these Contract Documents or the Public Works Bond, or constitute a waiver of any claims by Owner arising from Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Acceptance of final payment by Contractor or any Subcontractor shall constitute a waiver and release to Owner of all claims by Contractor or any such Subcontractor for an increase in the Contract Sum or the Contract Time, and for every act or omission of Owner relating to or arising out of the Work, except for those Claims made in accordance with the procedures, including the time limits, set forth in *SECTION 00708.00*.

PART 7 - 00707.00 CHANGES

00707.01 CHANGES IN THE WORK

- A. Owner may at any time and without notice to Contractor's surety order additions, deletions, revisions, or other changes in the Work. These changes in the Work shall be incorporated into the Contract Documents through the execution of Change Orders. If any change in the Work ordered by Owner causes an increase or decrease in the Contract Sum or the Contract Time, an equitable adjustment shall be made as provided in *SECTION 00707.02* or *00707.03*, respectively, and such adjustment(s) shall be incorporated into a Change Order.

DIVISION 0 – GENERAL CONDITIONS

- B. If Owner desires to order a change in the Work, it may request a written Change Order proposal from Contractor. Contractor shall submit a Change Order proposal within 14 days of the request from Owner, or within such other period as mutually agreed. Contractor's Change Order proposal shall be full compensation for implementing the proposed change in the Work, including any adjustment in the Contract Sum or Contract Time, and including compensation for all delays in connection with such change in the Work and for any expense or inconvenience, disruption of schedule, or loss of efficiency or productivity occasioned by the change in the Work.
- C. Upon receipt of the Change Order proposal, or a request for equitable adjustment in the Contract Sum or Contract Time, or both, as provided in *SECTIONS 00707.02 and 00707.03*, Owner may accept or reject the proposal, request further documentation, or negotiate acceptable terms with Contractor. Pending agreement on the terms of the Change Order, Owner may direct Contractor to proceed immediately with the Change Order Work. Contractor shall not proceed with any change in the Work until it has obtained Owner's approval. All Work done pursuant to any Owner-directed change in the Work shall be executed in accordance with the Contract Documents.
- D. If Owner and Contractor reach agreement on the terms of any change in the Work, including any adjustment in the Contract Sum or Contract Time, such agreement shall be incorporated in a Change Order. The Change Order shall constitute full payment and final settlement of all claims for time and for direct, indirect, and consequential costs, including costs of delays, inconvenience, disruption of schedule, or loss of efficiency or productivity, related to any Work either covered or affected by the Change Order, or related to the events giving rise to the request for equitable adjustment.
- E. If Owner and Contractor are unable to reach agreement on the terms of any change in the Work, including any adjustment in the Contract Sum or Contract Time, Contractor may at any time, in writing, request a final offer from Owner. Owner shall provide Contractor with its written response within 30 days of Contractor's request. Owner may also provide Contractor with a final offer at any time. If Contractor rejects Owner's final offer or the parties are otherwise unable to reach agreement, Contractor's only remedy shall be to file a Claim as provided in *SECTION 00708.00*.

00707.02 CHANGE IN THE CONTRACT SUM

- A. General Application:
 - 1. The Contract Sum shall only be changed by a Change Order. Contractor shall include any request for a change in the Contract Sum in its Change Order proposal.
 - 2. If the cost of Contractor's performance is changed due to the fault or negligence of Owner or anyone for whose acts Owner is responsible, Contractor shall be entitled to make a request for an equitable adjustment in the Contract Sum in accordance with the following procedure. No change in the Contract Sum shall be allowed to the extent that Contractor's changed cost of performance is due to the fault or negligence of Contractor or anyone for whose acts Contractor is responsible; the change is concurrently caused by Contractor and Owner; or the change is caused by an act of force majeure, as defined in *SECTION 00703.05*.

DIVISION 0 – GENERAL CONDITIONS

- a. A request for an equitable adjustment in the Contract Sum shall be based on written notice delivered to Owner within 7 days of the occurrence of the event-giving rise to the request. For purposes of this part, "occurrence" means when Contractor knew, or in its diligent prosecution of the Work should have known, of the event-giving rise to the request. If Contractor believes it is entitled to an adjustment in the Contract Sum, Contractor shall immediately notify Owner and begin to keep and maintain complete, accurate, and specific daily records. Contractor shall give Owner access to any such records and, if requested, shall promptly furnish copies of such records to Owner.
- b. Contractor shall not be entitled to any adjustment in the Contract Sum for any occurrence of events or costs that occurred more than 7 days before Contractor's written notice to Owner. The written notice shall set forth, at a minimum, a description of: the event giving rise to the request for an equitable adjustment in the Contract Sum; the nature of the impacts to Contractor and its Subcontractors, if any; and, to the extent possible, the amount of the adjustment in Contract Sum requested. Failure to properly give such written notice shall, to the extent Owner's interests are prejudiced, constitute a waiver of Contractor's right to an equitable adjustment.
- c. Within 30 days of the occurrence of the event giving rise to the request, unless Owner agrees in writing to allow an additional period of time to ascertain more accurate data, Contractor shall supplement written notice provided in accordance with Subparagraph "a" (above) with additional supporting data. Such additional data shall include, at a minimum: the amount of compensation requested, itemized in accordance with the procedure set forth herein; specific facts, circumstances, and analysis that confirms not only that Contractor suffered the damages claimed, but that the damages claimed were actually a result of the act, event, or condition complained of and that the Contract Documents provide entitlement to an equitable adjustment to Contractor for such act, event, or condition; and documentation sufficiently detailed to permit an informed analysis of the request by Owner.

When the request for compensation relates to a delay or other change in Contract Time, Contractor shall demonstrate the impact on the critical path, in accordance with *SECTION 00707.03C*. Failure to provide such additional information and documentation within the time allowed or within the format required shall, to the extent Owner's interests are prejudiced, constitute a waiver of Contractor's right to an equitable adjustment.

- d. Pending final resolution of any request made in accordance with this paragraph, unless otherwise agreed in writing, Contractor shall proceed diligently with performance of the Work.
- e. Any requests by Contractor for an equitable adjustment in the Contract Sum and in the Contract Time that arise out of the same event(s) shall be submitted together.

DIVISION 0 – GENERAL CONDITIONS

3. The value of any work covered by a Change Order or of any request for an equitable adjustment in the Contract Sum shall be determined by one of the following methods:
 - a. On the basis of a fixed price as determined in *SECTION 00707.02B*.
 - b. By application of unit prices to the quantities of the items involved as determined *SECTION 00707.02C*.
 - c. On the basis of time and material as determined in *SECTION 00707.02D*.
 4. When Owner has requested Contractor to submit a Change Order proposal, Owner may direct Contractor as to which method in Subparagraph 3 (above) to use when submitting its proposal. Otherwise, Contractor shall determine the value of the Work or of a request for an equitable adjustment, on the basis of the fixed price method.
- B. Change Order Pricing - Fixed Price: When the fixed price method is used to determine the value of any Work covered by a Change Order or of a request for an equitable adjustment in the Contract Sum, the following procedures shall apply:
1. Contractor's Change Order Proposal or request for adjustment in the Contract Sum shall be accompanied by a complete itemization of the costs including labor, materials, subcontractor costs, and overhead and profit. The costs shall be itemized in the manner set forth below and shall be submitted on breakdown sheets in a form approved by Owner.
 2. All costs shall be calculated based on appropriate industry standard methods of calculating labor, material quantities, and equipment costs.
 3. If any of Contractor's pricing assumptions are contingent upon anticipated actions of Owner, Contractor shall clearly state them in the proposal or request for an equitable adjustment.
 4. The cost of any additive or deductive changes in the Work shall be calculated as set forth below, except that overhead and profit shall not be included on deductive changes in the Work. Where a change in the Work involves additive and deductive work by the same Contractor or Subcontractor, small tools, overhead, profit, bond, and insurance markups will apply to the net difference.
 5. If the total cost of the change in the Work or request for equitable adjustment does not exceed \$1,000, Contractor shall not be required to submit a breakdown if the description of the change in the Work or request for equitable adjustment is sufficiently definitive for Owner to determine fair value.
 6. If the total cost of the change in the Work or request for equitable adjustment is between \$1,000 and \$2,500, Contractor may submit a breakdown in the following level of detail if the description of the change in the Work or if the request for equitable adjustment is sufficiently definitive to permit the Owner to determine fair value:
 - a. Lump sum labor

DIVISION 0 – GENERAL CONDITIONS

- b. Lump sum material
 - c. Lump sum equipment usage
 - d. Overhead and profit as set forth below
 - e. Insurance and bond costs as set forth below
7. Any request for adjustment of Contract Sum based upon the fixed price method shall include only the following items:
- a. Craft Labor Costs: These are the labor costs determined by multiplying the estimated or actual additional number of craft hours needed to perform the change in the Work by the hourly labor costs. Craft hours should cover direct labor as well as indirect labor due to trade inefficiencies. The hourly costs shall be based on the following:
 - 1) Basic Wages and Benefits: Hourly rates and benefits as stated on the L&I approved Statement of Intent to Pay Prevailing Wages. Direct supervision shall be a reasonable percentage not to exceed 15 percent of the cost of direct labor. No supervision markup shall be allowed if a working supervisor's hours are included in the breakdown.
 - 2) Worker's Insurance: Direct contributions to the State of Washington for industrial insurance, medical aid, and supplemental pension by the class and rates established by L&I.
 - a. Federal Insurance: Direct contributions required by the *Federal Insurance Compensation Act*, *Federal Unemployment Tax Act*, and the *State Unemployment Compensation Act*.
 - 4) Safety: Costs incurred due to the *Washington Industrial Safety and Health Act*, which shall be a reasonable percentage not to exceed 2 percent of the sum of the amounts calculated in SUBPARAGRAPHS (1), (2), and (3) above.
 - 5) Travel Allowance: Travel allowance and/or subsistence, if applicable, not exceeding those allowances established by regional labor union agreements, which are itemized and identified separately.
 - b. Material Costs: This is an itemization of the quantity and cost of materials needed to perform the change in the Work. Material costs shall be developed from actual known costs, supplier quotations or standard industry pricing guides. Material costs shall consider all available discounts. Freight costs, express charges, or special delivery charges shall be itemized.

DIVISION 0 – GENERAL CONDITIONS

- c. Equipment Costs: This is an itemization of the type of equipment and the estimated or actual length of time the construction equipment appropriate for the Work is or will be used on the change in the Work. Costs will be allowed for construction equipment only if used solely for the changed Work or for additional rental costs actually incurred by the Contractor. Equipment charges shall be developed from the current edition of one of the following sources:
- 1) *Associated General Contractors - Washington State Department of Transportation Equipment Rental Agreement; latest edition.*
 - 2) *The State of Washington Utilities and Transportation Commission for trucks used on highways.*
 - 3) *The National Electrical Contractors Association for equipment used on electrical work.*
 - 4) *The Mechanical Contractors Association of America for equipment used on mechanical work.*
 - 5) *Equipment Watch Rental Rate (Blue Book) for Construction Equipment* shall be used as a basis for establishing rental rates of equipment not listed in the above sources. The maximum rate for standby equipment shall not exceed 50 percent of the applicable rate.
- d. Allowance for Small Tools, Expendables, and Consumable Supplies: Small tools consist of tools that cost \$250 or less and are normally furnished by the performing Contractor. The maximum rate for small tools shall not exceed the following:
- 1) For Contractor, 3 percent of direct labor costs.
 - 2) For Subcontractors, 5 percent of direct labor costs.
- Expendables and consumable supplies directly associated with the change in Work must be itemized.
- e. Subcontractor Costs: This is defined as payments Contractor makes to Subcontractors for changed Work performed by Subcontractors of any tier. The Subcontractors' cost of Work shall be calculated and itemized in the same manner as prescribed herein for Contractor.

DIVISION 0 – GENERAL CONDITIONS

- f. Allowance for Overhead and Profit: This is defined as costs of any kind attributable to direct and indirect delay, acceleration, or impact, added to the total cost to Owner of any Change Order, or any request for additional Work or extra payment of any kind on the Project. This allowance shall compensate Contractor for all non-craft labor, temporary construction facilities, field engineering, schedule updating, as-built drawings, home office cost, Business and Occupation taxes, office engineering, estimating costs, additional overhead because of extended time, and any other cost incidental to the change in the Work. It shall be strictly limited in all cases to a reasonable amount, mutually acceptable, or if none can be agreed upon to an amount not to exceed the following:
- 1) For Contractor, for any Work actually performed by Contractor's own forces, 22 percent of the first \$50,000 of the cost and 10 percent of the remaining cost, if any.
 - 2) For each Subcontractor (including lower tier subcontractors), for any Work actually performed by its own forces, 22 percent of the first \$50,000 of the cost and 10 percent of the remaining cost, if any.
 - 3) For Contractor, for any Work performed by its Subcontractor(s), 8 percent of the first \$50,000 of the amount due each Subcontractor and 6 percent of the remaining amount, if any.
 - 4) For each Subcontractor, for any Work performed by its Subcontractor(s) of any lower tier, 8 percent of the first \$50,000 of the amount due the sub-Subcontractor and 6 percent of the remaining amount, if any.
 - 5) The cost to which overhead and profit is to be applied shall be determined in accordance with *SUBPARAGRAPHS a-e* above.
- g. Cost of Change in Insurance or Bond Premium: This is defined as:
- 1) Contractor's Liability Insurance: The cost of any changes in Contractor's liability insurance arising directly from execution of the Change Order; and
 - 2) Public Works Bond(s): The cost of the additional premium for Contractor's bond arising directly from the changed Work.

The costs of any change in insurance or bond premium shall be added after overhead and profit are calculated in accordance with *SUBPARAGRAPH "f"* above.

C. Change Order Pricing - Unit Prices:

1. Whenever Owner authorizes Contractor to perform Work on a unit-price basis, Owner's authorization shall clearly state:
 - a. Scope of work to be performed

DIVISION 0 – GENERAL CONDITIONS

- b. Type of reimbursement including pre-agreed rates for material quantities
 - c. Cost limit of reimbursement
 - 2. Contractor shall:
 - a. Cooperate with Owner and assist in monitoring the Work being performed. As requested by Owner, Contractor shall identify workers assigned to the Change Order Work and areas in which they are working.
 - b. Leave access as appropriate for quantity measurement.
 - c. Not exceed any cost limit(s) without Owner's prior written approval.
 - 3. Contractor shall submit costs in accordance with *SECTION 00707.02B* and satisfy the following requirements:
 - a. Unit prices shall include reimbursement for all direct and indirect costs of the Work, including overhead and profit and bond and insurance costs.
 - b. Quantities must be supported by field measurement statements signed by Owner.
- D. Change Order Pricing - Time and Material Prices:
- 1. Whenever Owner authorizes Contractor to perform work on a time-and-material basis, Owner's authorization shall clearly state:
 - a. Scope of work to be performed
 - b. Type of reimbursement including pre-agreed rates, if any, for material quantities or labor
 - c. Cost limit of reimbursement
 - 2. Contractor shall:
 - a. Cooperate with Owner and assist in monitoring the Work being performed. As requested by Owner, identify workers assigned to the Change Order Work and areas in which they are working.
 - b. Identify on daily timesheets all labor performed in accordance with this authorization. Submit copies of daily timesheets within 2 working days for Owner's review.
 - c. Leave access as appropriate for quantity measurement.
 - d. Perform all Work in accordance with this section as efficiently as possible.
 - e. Not exceed any cost limit(s) without Owner's prior written approval.

DIVISION 0 – GENERAL CONDITIONS

3. Contractor shall submit costs in accordance with *SECTION 00707.02B* and additional verification supported by:
 - a. Labor detailed on daily timesheets
 - b. Invoices for material

00707.03 CHANGE IN THE CONTRACT TIME

- A. The Contract Time shall only be changed by a Change Order. Contractor shall include any request for a change in the Contract Time in its Change Order proposal.
- B. If the time of Contractor's performance is changed due to an act of force majeure or due to the fault or negligence of Owner or anyone for whose acts Owner is responsible, Contractor shall be entitled to make a request for an equitable adjustment in the Contract Time in accordance with the following procedure. No adjustment in the Contract Time shall be allowed to the extent Contractor's changed time of performance is due to the fault or negligence of Contractor or anyone for whose acts Contractor is responsible.
 1. A request for an equitable adjustment in the Contract Time shall be based on written notice delivered within 7 days of the occurrence of the event-giving rise to the request. If Contractor believes it is entitled to adjustment of Contract Time, Contractor shall immediately notify Owner and begin to keep and maintain complete, accurate, and specific daily records. Contractor shall give Owner access to any such records and, if requested, shall promptly furnish copies of such records to Owner.
 2. Contractor shall not be entitled to an adjustment in the Contract Time for any events that occurred more than 7 days before Contractor's written notice to Owner. The written notice shall set forth, at a minimum, a description of: the event giving rise to the request for an equitable adjustment in the Contract Time; the nature of the impacts to Contractor and its Subcontractors of any tier, if any; and, to the extent possible, the amount of the adjustment in Contract Time requested. Failure to properly give such written notice shall, to the extent Owner's interests are prejudiced, constitute a waiver of Contractor's right to an equitable adjustment.
 3. Within 30 days of the occurrence of the event giving rise to the request, unless Owner agrees in writing to allow an additional period of time to ascertain more accurate data, Contractor shall supplement the written notice provided in accordance with *SECTION 00707.03B.2* with additional supporting data. Such additional data shall include, at a minimum: the amount of delay claimed, itemized in accordance with the procedure set forth herein; specific facts, circumstances, and analysis that confirms not only that Contractor suffered the delay claimed, but that the delay claimed was actually a result of the act, event, or condition complained of, and that the Contract Documents provide entitlement to an equitable adjustment in Contract Time for such act, event, or condition; and supporting documentation sufficiently detailed to permit an informed analysis of the request by Owner. Failure to provide such additional information and documentation within the time allowed or within the format required shall, to the extent Owner's interests are prejudiced, constitute a waiver of Contractor's right to an equitable adjustment.

DIVISION 0 – GENERAL CONDITIONS

4. Pending final resolution of any request in accordance with this paragraph, unless otherwise agreed in writing, Contractor shall proceed diligently with performance of the Work.
- C. Any change in the Contract Time covered by a Change Order or based on a request for an equitable adjustment in the Contract Time shall be limited to the change in the critical path of Contractor's schedule attributable to the change of Work or event(s) giving rise to the request for equitable adjustment. Any Change Order proposal or request for an adjustment in the Contract Time shall demonstrate the impact on the critical path of the schedule. Contractor shall be responsible for showing clearly on the Construction Schedule that the change or event: had a specific impact on the critical path, and except in case of concurrent delay, was the sole cause of such impact; and could not have been avoided by re-sequencing of the Work or other reasonable alternatives.
- D. Contractor may request compensation for the cost of a change in Contract Time in accordance with this section, *00707.03D*, subject to the following conditions:
1. The change in Contract Time shall solely be caused by the fault or negligence of Owner or A/E.
 2. Compensation under this paragraph is limited to changes in Contract Time for which Contractor is not entitled to be compensated under *SECTION 00707.02*.
 3. Contractor shall follow the procedure set forth in *SECTION 00707.03B*.
 4. Contractor shall establish the extent of the change in Contract Time in accordance with *SECTION 00707.03C*.
 5. The daily cost of any change in Contract Time shall be limited to:
 - a. Cost of nonproductive field supervision or labor extended because of the delay
 - b. Cost of weekly meetings or similar indirect activities extended because of the delay
 - c. Cost of temporary facilities or equipment rental extended because of the delay
 - d. Cost of insurance extended because of the delay
 - e. General and administrative overhead in an amount to be agreed upon, but not to exceed 3 percent of Contract Sum divided by the Contract Time for each day of the delay.

PART 8 - 00708.00 CLAIMS AND DISPUTE RESOLUTION

00708.01 CLAIMS PROCEDURE

- A. If the parties fail to reach agreement on the terms of any Change Order for Owner-directed Work as provided in *SECTION 00707.01*, or on the resolution of any request for an equitable adjustment in the Contract Sum as provided in *SECTION 00707.02* or the Contract Time as provided in *SECTION 00707.03*, Contractor's only remedy shall be to file a Claim with Owner as provided in this section.
- B. Contractor shall file its Claim within the earlier of: 120 days from Owner's final offer in accordance with *SECTION 00707.01E*, or the date of Final Acceptance.
- C. The Claim shall be deemed to cover all changes in cost and time (including direct, indirect, impact, and consequential) to which Contractor may be entitled. It shall be fully substantiated and documented. At a minimum, the Claim shall contain the following information:
 - 1. A detailed factual statement of the Claim for additional compensation and time, if any, providing all necessary dates, locations, and items of Work affected by the Claim
 - 2. The date on which facts arose which gave rise to the Claim
 - 3. The name of each employee of Owner or A/E knowledgeable about the Claim
 - 4. The specific provisions of the Contract Documents that support the Claim
 - 5. The identification of any documents and the substance of any oral communications that support the Claim
 - 6. Copies of any identified documents, other than the Contract Documents, that support the Claim;
 - 7. If an adjustment in the Contract Time is sought: the specific days and dates for which it is sought; the specific reasons Contractor believes an extension in the Contract Time should be granted; and Contractor's analysis of its Construction Schedule to demonstrate the reason for the extension in Contract Time.
 - 8. If an adjustment in the Contract Sum is sought, the exact amount sought and a breakdown of that amount into the categories set forth in, and in the detail required by, *SECTION 00707.02*.
 - 9. A statement certifying, under penalty of perjury, that the Claim is made in good faith, that the supporting cost and pricing data are true and accurate to the best of Contractor's knowledge and belief, that the Claim is fully supported by the accompanying data, and that the amount requested accurately reflects the adjustment in the Contract Sum or Contract Time for which Contractor believes Owner is liable.

DIVISION 0 – GENERAL CONDITIONS

- D. After Contractor has submitted a fully documented Claim that complies with all applicable provisions of *SECTIONS 00707.00* and *00708.00*, Owner shall respond, in writing, to Contractor as follows:
1. If the Claim amount is less than \$50,000, with a decision within 60 days from the date the Claim is received; or
 2. If the Claim amount is \$50,000 or more, with a decision within 60 days from the date the Claim is received or, with notice to Contractor, of the date by which it will render its decision. Owner will then respond with a written decision in such additional time.
- E. To assist in the review of Contractor's Claim, Owner may visit the Project site or request additional information in order to fully evaluate the issues raised by the Claim. Contractor shall proceed with performance of the Work pending final resolution of any Claim. Owner's written decision, as set forth above, shall be final and conclusive as to all matters set forth in the Claim unless Contractor follows the procedure set forth in *SECTION 00708.02*.
- F. Any Claim of the Contractor against the Owner for damages, additional compensation, or additional time shall be conclusively deemed to have been waived by the Contractor unless timely made in accordance with the requirements of this section.

00708.02 ARBITRATION

- A. If Contractor disagrees with Owner's decision rendered in accordance with *SECTION 00708.01D*, Contractor shall provide Owner with a written demand for arbitration. No demand for arbitration of any such Claim shall be made later than 30 days after the date of Owner's decision on such Claim. Failure to demand arbitration within said 30 day period shall result in Owner's decision being final and binding upon Contractor and its Subcontractors.
- B. Notice of the demand for arbitration shall be filed with the *American Arbitration Association (AAA)*, with a copy provided to Owner. The parties shall negotiate or mediate under the *Voluntary Construction Mediation Rules* of the AAA or mutually acceptable service before seeking arbitration in accordance with the *Construction Industry Arbitration Rules of AAA* as follows:
1. Disputes involving \$30,000 or less shall be conducted in accordance with the *Northwest Region Expedited Commercial Arbitration Rules*; or
 2. Disputes over \$30,000 shall be conducted in accordance with the *Construction Industry Arbitration Rules of the AAA*, unless the parties agree to use the expedited rules.
- C. All Claims arising out of the Work shall be resolved by arbitration. The judgment upon the arbitration award may be entered, or review of the award may occur, in the superior court having jurisdiction thereof. No independent legal action relating to or arising from the Work shall be maintained.

DIVISION 0 – GENERAL CONDITIONS

- D. Claims between Owner and Contractor, Contractor and its Subcontractors, Contractor and A/E, and Owner and A/E shall, upon demand by Owner, be submitted in the same arbitration or mediation.
- E. If the parties resolve the Claim prior to arbitration judgment, the terms of the resolution shall be incorporated in a Change Order. The Change Order shall constitute full payment and final settlement of the Claim, including all claims for time and for direct, indirect, or consequential costs including costs of delays, inconvenience, disruption of schedule, or loss of efficiency or productivity.

00708.03 CLAIMS AUDITS

- A. All Claims filed against Owner shall be subject to audit at any time following the filing of the Claim. Failure of Contractor, or Subcontractors of any tier, to maintain and retain sufficient records to allow Owner to verify all or a portion of the Claim or to permit Owner access to the books and records of Contractor, or Subcontractors of any tier, shall constitute a waiver of the Claim and shall bar any recovery.
- B. In support of Owner's audit of any Claim, Contractor shall, upon request, promptly make available to Owner the following documents:
 - 1. Daily time sheets and supervisor's daily reports
 - 2. Collective bargaining agreements
 - 3. Insurance, welfare, and benefits records
 - 4. Payroll registers
 - 5. Earnings records
 - 6. Payroll tax forms
 - 7. Material invoices, requisitions, and delivery confirmations
 - 8. Material cost distribution worksheet
 - 9. Equipment records (list of company equipment, rates, etc.)
 - 10. Vendors', rental agencies', Subcontractors', and agents' invoices
 - 11. Contracts between Contractor and each of its Subcontractors, and all lower-tier Subcontractor contracts and supplier contracts
 - 12. Subcontractors' and agents' payment certificates
 - 13. Canceled checks (payroll and vendors)
 - 14. Job cost report, including monthly totals
 - 15. Job payroll ledger

DIVISION 0 – GENERAL CONDITIONS

16. Planned resource loading schedules and summaries
 17. General ledger
 18. Cash disbursements journal
 19. Financial statements for all years reflecting the operations on the Work. In addition, the Owner may require, if it deems it appropriate, additional financial statements for 3 years preceding execution of the Work.
 20. Depreciation records on all company equipment, whether these records are maintained by the company involved, its accountant, or others.
 21. If a source other than depreciation records is used to develop costs for Contractor's internal purposes in establishing the actual cost of owning and operating equipment, all such other source documents.
 22. All non-privileged documents which relate to each and every Claim together with all documents which support the amount of any adjustment in Contract Sum or Contract Time sought by each Claim.
 23. Worksheets or software used to prepare the Claim establishing the cost components for items of the Claim including but not limited to labor, benefits and insurance, materials, equipment, Subcontractors, all documents which establish the time periods, individuals involved, hours for the individuals, and rates for individuals.
 24. Worksheets, software, and all other documents used by Contractor to prepare its bid.
- C. The audit may be performed by employees of Owner or a representative of Owner. Contractor and its Subcontractors shall provide adequate facilities acceptable to Owner for the audit during normal business hours. Contractor and all Subcontractors shall make a good-faith effort to cooperate with Owner's auditors.

PART 9 - 00709.00 TERMINATION OF THE WORK

00709.01 TERMINATION BY OWNER FOR CAUSE

- A. Owner may, upon 7 days written notice to Contractor and to its surety, terminate (without prejudice to any right or remedy of Owner) the Work or any part of it for cause upon the occurrence of any one or more of the following events:
1. Contractor fails to prosecute the Work or any portion thereof with sufficient diligence to ensure Substantial Completion of the Work within the Contract Time.
 2. Contractor is adjudged bankrupt, makes a general assignment for the benefit of its creditors or a receiver is appointed on account of its insolvency.

DIVISION 0 – GENERAL CONDITIONS

3. Contractor fails in a material way to replace or correct Work not in conformance with the Contract Documents.
 4. Contractor repeatedly fails to supply skilled workers or proper materials or equipment.
 5. Contractor repeatedly fails to make prompt payment due to Subcontractors or for labor.
 6. Contractor materially disregards or fails to comply with laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction.
 7. Contractor is otherwise in material breach of any provision of the Contract Documents.
- B. Upon termination, Owner may at its option:
1. Take possession of the Project site and take possession of or use all materials, equipment, tools, and construction equipment and machinery thereon owned by Contractor to maintain the orderly progress of and to finish the Work
 2. Accept assignment of subcontracts pursuant to *SECTION 00705.21*.
 3. Finish the Work by whatever other reasonable method it deems expedient.
- C. Owner's rights and duties upon termination are subject to the prior rights and duties of the surety, if any, obligated under any bond provided in accordance with the Contract Documents.
- D. When Owner terminates the Work in accordance with this section, Contractor shall take the actions set forth in *SECTION 00709.02B* and shall not be entitled to receive further payment until the Work is accepted.
- E. If the unpaid balance of the Contract Sum exceeds the cost of finishing the Work, including compensation for A/E's services and expenses made necessary thereby and any other extra costs or damages incurred by Owner in completing the Work, or as a result of Contractor's actions, such excess shall be paid to Contractor. If such costs exceed the unpaid balance, Contractor shall pay the difference to Owner. These obligations for payment shall survive termination.
- F. Termination of the Work in accordance with this section shall not relieve Contractor or its surety of any responsibilities for Work performed.
- G. If Owner terminates Contractor for cause and it is later determined that none of the circumstances set forth in *SECTION 00709.01A* exist, then such termination shall be deemed a termination for convenience pursuant to *SECTION 00709.02*.

00709.02 TERMINATION BY OWNER FOR CONVENIENCE

- A. Owner may, upon written notice, terminate (without prejudice to any right or remedy of Owner) the Work or any part of it for the convenience of Owner.

DIVISION 0 – GENERAL CONDITIONS

- B. Unless Owner directs otherwise, after receipt of a written notice of termination for either cause or convenience, Contractor shall promptly:
1. Stop performing Work on the date and as specified in the notice of termination.
 2. Place no further orders or subcontracts for materials, equipment, services or facilities, except as may be necessary for completion of such portion of the Work as is not terminated.
 3. Cancel all orders and subcontracts, upon terms acceptable to Owner, to the extent that they relate to the performance of Work terminated.
 4. Assign to Owner all of the rights, title, and interest of Contractor in all orders and subcontracts.
 5. Take such action as may be necessary or as directed by Owner to preserve and protect the work, Project site, and any other property related to this Project in the possession of Contractor in which Owner has an interest.
 6. Continue performance only to the extent not terminated.
- C. If Owner terminates the Work or any portion thereof for convenience, Contractor shall be entitled to make a request for an equitable adjustment for its reasonable direct costs incurred prior to the effective date of the termination plus a reasonable allowance for overhead and profit on Work performed prior to termination and the reasonable administrative costs of the termination but shall not be entitled to any other costs or damages whatsoever, provided however, the total sum payable upon termination shall not exceed the Contract Sum reduced by prior payments. Contractor shall be required to make its request in accordance with the provisions of *SECTION 00707.00*.
- D. If Owner terminates the Work or any portion thereof for convenience, the Contract Time shall be adjusted as determined by Owner.

PART 10 - 00710.00 MISCELLANEOUS PROVISIONS

00710.01 GOVERNING LAW

The Contract Documents and the rights of the parties herein shall be governed by the laws of the State of Washington. Venue shall be in Thurston County unless otherwise specified by the Owner.

00710.02 SUCCESSORS AND ASSIGNS

Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to the other party hereto and to partners, successors, assigns, and legal representatives of such other party in respect to covenants, agreements, and obligations contained in the Contract Documents. Neither party shall assign the Work without written consent of the other, except that Contractor may assign the Work for security purposes, to a bank or lending institution authorized to do business in the State of Washington. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations set forth in the Contract Documents.

00710.03 MEANING OF WORDS

Unless otherwise stated in the Contract Documents, words which have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings. Reference to standard specifications, manuals, or codes of any technical society, organization, or association, or the code of any governmental authority, whether such reference be specific or by implication, shall be to the latest standard specification, manual, or code in effect on the date for submission of bids, except as may be otherwise specifically stated. Wherever in these Drawings and Specifications an article, device, or piece of equipment is referred to in the singular manner, such reference shall apply to as many such articles as are shown on the Drawings or are required to complete the installation.

00710.04 RIGHTS AND REMEDIES

No action or failure to act by Owner or A/E shall constitute a waiver of a right or duty afforded them under the Contract Documents, nor shall such action or failure to act constitute approval of an acquiescence in a breach therein, except as may be specifically agreed in writing.

00710.05 CONTRACTOR REGISTRATION

Pursuant to *RCW 39.06*, Contractor shall be registered or licensed as required by the laws of the State of Washington, including but not limited to *RCW 18.27*.

00710.06 TIME COMPUTATIONS

When computing any period of time, the day of the event from which the period of time begins shall not be counted. The last day is counted unless it falls on a weekend or legal holiday, in which event the period runs until the end of the next day that is not a weekend or holiday. When the period of time allowed is less than 7 days, intermediate Saturdays, Sundays, and legal holidays are excluded from the computation.

0710.07 RECORDS RETENTION

The wage, payroll, and cost records of Contractor and its Subcontractors, and all records subject to audit in accordance with *SECTION 00708.03*, shall be retained for a period of not less than 6 years after the date of Final Acceptance.

00710.08 THIRD-PARTY AGREEMENTS

The Contract Documents shall not be construed to create a contractual relationship of any kind between: A/E and Contractor; Owner and any Subcontractor; or any persons other than Owner and Contractor.

00710.09 ANTITRUST ASSIGNMENT

Owner and Contractor recognize that in actual economic practice, overcharges resulting from antitrust violations are in fact usually borne by the purchaser. Therefore, Contractor hereby assigns to Owner any and all claims for such overcharges as to goods, materials, and equipment purchased in connection with the Work performed in accordance with the Contract Documents, except as to overcharges that result from antitrust violations commencing after the Contract Sum is established and that are not passed on to Owner under a Change Order. Contractor shall put a similar clause in its Subcontracts and require a similar clause in its sub-Subcontracts, such that all claims for such overcharges on the Work are passed to Owner by Contractor.

00710.10 IDENTIFICATION OF SUBCONTRACTORS FOR PROJECTS GREATER THAN \$1,000,000

When an Owner's Estimate is in excess of \$1,000,000 for Public Works described in these documents, the bidder must as part of the bid, submit the names of the subcontractors with whom the bidder, if awarded the contract, will subcontract for performance of the work of the following:

- A. Heating, Ventilation, and Air Conditioning (HVAC);
- B. Plumbing, per RCW Chapter 18.106; and
- C. Electrical, per RCW Chapter 19.28 or to name itself for the work.

The Prime Contractor shall not list more than one subcontractor, or self, for each category of work identified.

Failure of the Prime Contractor to submit, as part of the bid names of such sub-contractors or itself to perform such work, or naming two (2) or more subcontractors to perform such work shall render the Contract bidder's bid as non-responsive and therefore void, in accordance with RCW 39.30.060.

END OF SECTION 00700

**SECTION 00800
TABLE OF CONTENTS**

00800 SUPPLEMENTAL CONDITIONS

In accordance with the *GENERAL CONDITIONS*, *SUPPLEMENTAL CONDITIONS* take precedence over *GENERAL CONDITIONS*.

00802.07	Builders Risk Insurance
00810.13	Abbreviations of Administrative Organizations

00802.07 BUILDERS RISK INSURANCE

This section supersedes Section 00702.07.
Builders Risk Insurance is not required.

00810.13 ABBREVIATIONS OF ADMINISTRATIVE ORGANIZATIONS

This section supplements SECTION 00710.03 of the GENERAL CONDITIONS.

TABLE 00810.13	
ABBREVIATIONS OF ADMINISTRATIVE ORGANIZATIONS	
<i>AASHTO</i>	<i>American Association of State Highway and Transportation Officials</i>
<i>ACI</i>	<i>American Concrete Institute</i>
<i>AF&PA</i>	<i>American Forest & Paper Association</i>
<i>AIA</i>	<i>American Institute of Architects</i>
<i>AISC</i>	<i>American Institute of Steel Construction</i>
<i>AISI</i>	<i>American Iron and Steel Institute</i>
<i>AITC</i>	<i>American Institute of Timber Construction</i>
<i>ANSI</i>	<i>American National Standards Institute</i>
<i>APA</i>	<i>APA – The Engineered Wood Association</i>
<i>APWA</i>	<i>American Public Works Association</i>
<i>AREMA</i>	<i>American Railway Engineering and Maintenance-of-Way Association</i>
<i>ASCE</i>	<i>American Society of Civil Engineers</i>
<i>ASME</i>	<i>American Society of Mechanical Engineers</i>
<i>ASTM</i>	<i>ASTM International (formerly American Society of Testing and Materials)</i>
<i>AWPA</i>	<i>American Wood Protection Association</i>
<i>AWPI</i>	<i>American Wood Preservers Institute</i>
<i>AWS</i>	<i>American Welding Society</i>
<i>AWWA</i>	<i>American Water Works Association</i>
<i>CSI</i>	<i>Construction Specifications Institute</i>
<i>NEC</i>	<i>National Electrical Code</i>
<i>IAPMO</i>	<i>International Association of Plumbing and Mechanical Officials</i>
<i>IBC</i>	<i>International Building Code</i>
<i>IEEE</i>	<i>Institute of Electrical and Electronics Engineers</i>
<i>NEMA</i>	<i>National Electrical Manufacturers Association</i>
<i>NFPA</i>	<i>National Fire Protection Association</i>
<i>OSHA</i>	<i>Occupational Safety and Health Administration</i>
<i>RCW</i>	<i>Revised Code of Washington</i>
<i>SAE</i>	<i>SAE International (formerly Society of Automotive Engineers)</i>
<i>SSPC</i>	<i>Society of Protective Coatings (formerly Steel Structures Painting Council)</i>
<i>TAA</i>	<i>The Aluminum Association</i>
<i>UL</i>	<i>Underwriters Laboratories, Inc.</i>
<i>UMC</i>	<i>Uniform Mechanical Code (developed by the IAPMO)</i>
<i>UPC</i>	<i>Uniform Plumbing Code (developed by the IAPMO)</i>
<i>WAC</i>	<i>Washington Administrative Code</i>
<i>WISHA</i>	<i>Washington Industrial Safety and Health Administration</i>
<i>WSDOT</i>	<i>Washington State Department of Transportation</i>
<i>WWPA</i>	<i>Western Wood Products Association</i>

Reference herein to specifications issued by the above named or other organization shall mean the latest edition of said specifications, unless otherwise noted.

**SECTION 01000
GENERAL REQUIREMENTS**

01010 SUMMARY OF WORK

The Soos Creek Fish Hatchery raises, and releases fall Chinook salmon, Coho salmon, and both winter- and summer-run steelhead. A major redevelopment of the Soos Creek Fish Hatchery was recently completed to update facilities and move operations out of the flood plain. Work included a new pumped water intake structure, heavy and fine settling ponds, distribution boxes, fish rearing raceways, adult holding ponds, incubation building, and other components. To improve water delivery, this project includes the following work.

Bid Item 1 – Mobilization, TESC, D-Box 2 and Raceway Supply Pipe Replacement: Provide all labor, material, equipment, and miscellaneous items necessary and incidental to perform the following work, all as shown and described in the Drawings and Specifications.

- A. Mobilize to the site.
- B. Establish and maintain Temporary Erosion and Sediment Controls (TESC).
- C. Sawcut, trench, remove and salvage approximately 650 linear feet of existing 24-inch HDPE pipes and two 24-inch butterfly valves.
- D. Enlarge two concrete wall openings in D-box 1 and one concrete wall opening in D-box 2 for larger pipe penetrations.
- E. Install the Owner-provided 36-inch Distribution Box 2 supply pipe.
- F. Install the Owner-provided 42-inch raceway supply and two capped branches to a future overflow vault, including three Owner-provided butterfly valves and prefabricated 42-inch and 36-inch manifold sections, also provided by the Owner.
- G. Install 8-inch raceway riser assemblies and 6-inch supply manifolds for each of the 18 raceways.
- H. Install a 24-inch blow-off valve and tee connection from raceway supply to existing drain.
- I. Install a vault and Owner-provided flow meter on the 42-inch line. Include electrical conduit, wire, and necessary connections from nearest available power source.
- J. Install 24-inch Tee connection, with vertical pipe and elbow, in existing raceway supply for connection to future reuse system.
- K. Install conduit for a future 24-inch diameter HDPE pipe under the future raceway filter building, extending a minimum of 5 feet beyond the building footprint on each end.
- L. Relocate fish transfer pipe, round pond supply pipe, draft hydrant, and other utilities impacted by new piping.
- M. Complete backfill and compaction.
- N. Restore surfaces (grass, crushed rock, asphalt, and curb) to pre-project conditions.
- O. Demobilize from the site.

This bid item will provide a complete and operable water delivery to D-Box 2 and all 18 raceways and restore full functionality of existing facilities.

DIVISION 1 – GENERAL REQUIREMENTS

01011 OWNER FURNISHED ITEMS

The following items are furnished by the Owner. Not all items listed will be needed for this project. Shop drawings are available for review (posted to Builders Exchange during bid phase).

A. HDPE DR17 pipe and fittings:

Diameter	Item	Qty	Units
42	Pipe, in 50-foot lengths	300	LF
42	45 elbow	5	EA
42	Tee	2	EA
42	x 36" eccentric reducer	1	EA
36	Pipe, in 50-foot lengths	400	LF
36	22.5 elbow	2	EA
36	45 elbow	5	EA
36	x 24" eccentric reducer	1	EA
24	Pipe, in 50-foot lengths	300	LF
24	45 elbow	1	EA
24	90 elbow	2	EA
24	Tee	2	EA
24	x12" Tee	3	EA

B. Romac couplings and stiffeners:

Diameter	Item	Qty	Units
42	FC400 flanged couplings	2	EA
42	400 couplings	5	EA
42	stiffeners	12	EA
36	400 couplings	2	EA
36	stiffeners	4	EA
24	400 couplings	1	EA
24	stiffeners	2	EA

C. Fabricated HDPE raceway supply manifold: 81 feet of 42-inch diameter with eight 8-inch tees and 95 feet of 36-inch diameter with ten 8-inch tees.

D. Butterfly valves: three 42-inch diameter Valmatic butterfly valves.

E. Flexium Fluxus flow meter with associated transducers and mounting tracks.

01012 CONTRACT TIME

To accommodate hatchery production, Substantial Completion shall be achieved by November 18, 2022.

Final Completion shall be achieved by November 30, 2022.

DIVISION 1 – GENERAL REQUIREMENTS

01030 SCHEDULE OF VALUES

Upon contract award, the Owner will provide an electronic copy of the Schedule of Values shown in Section 00650. At or before the preconstruction meeting, complete and submit this form to the Owner for approval.

- A. Show in detail all items performed on this Project. For each major line item, list sub-values of material and installation.
- B. Include a line item identified as "Submittal of Signed Permits, Project Record, and Operation and Maintenance Manuals" with an assigned value of \$1,000. This amount will be withheld from the final payment until Project Engineer has received and approved the above-mentioned document(s).
- C. The sum of all values listed in the Schedule shall equal the total Base Bid.

01040 COORDINATION

- A. The Contractor shall, before preparing the construction schedule, consult with the Owner to determine any particular scheduling or operational coordination conditions that will arise during the course of construction and coordinate work accordingly to minimize disruption to Owner or to progress of the work.
- B. The Contractor shall coordinate all materials, supplies, subcontract work, and its own work to ensure conflict-free and uniform flow of construction activities to completion within time set forth in Paragraph 01012.

01060 REGULATORY REQUIREMENTS

- A. Washington Department of Fish and Wildlife has obtained the following listed permits:
 - State Environmental Policy Act (SEPA) Mitigated Determination of Non-significance (MDNS)
 - Shoreline Substantial Development Permit (SSDP) Extension
 - Building Permit (Pending)
 1. The permits with provisions affecting the construction methods or schedule of this project have been incorporated in Attachment 1 at the end of this division. The Contractor shall abide by all restrictions noted in these permits as the construction is in progress.
 2. All other permits or fees required by local, state, or federal governmental agencies necessary for the accomplishment of this project shall be obtained and paid for by the Contractor, except that any utility company costs for new permanent service shall be paid directly to the utility company by the State.
 3. All costs associated with obtaining the permits, including labor, materials, and equipment shall be included in the Base Bid, except for permit fees.
 4. The Contractor shall pay all permit fees. The Contractor shall not include any permit fees in the Base Bid. The State shall reimburse the Contractor by Change Order for the actual fees charged by city, state, or county authorities with no Contractor markup. The Contractor shall provide to the State documentation regarding costs for fees paid.
- B. The Contractor shall notify city, county, and state authorities of any inspections and/or approvals required.

DIVISION 1 – GENERAL REQUIREMENTS

- C. Contractor shall follow the Cultural Resource plan including Inadvertent Discovery Plan shown in Attachment 2.

01100 SPECIAL PROJECT PROCEDURES

- A. Contractors working on WDFW property will adhere to these COVID-19 Requirements:
1. Face coverings:
 - a. Encouraged but not required in indoor public areas. Public areas include lobbies, reception or customer service areas, or other settings where interaction with customers or others with unknown vaccination status occurs.
 - b. Required for indoor, non-public, controlled-access areas, such as back offices and residences. Exception for those with verified vaccination per Business Partner Access Agreement, available by request.
 - c. Not required outdoors, unless in close proximity to persons of unknown vaccination status or other transmission risk factors are present.
 2. The Contractor must also be aware of and comply with current L&I and local/county COVID-19 requirements.
 3. These requirements are subject to change. Always follow applicable requirements in effect throughout the project duration.
- B. To reduce wildfire risk, the following conditions apply on the project site, when Industrial Fire Precaution Levels (IFPL) are activated. If any conditions are lifted, it shall be done in writing by the Owner. If any additional conditions are required it shall be done in writing by the Owner.
1. No smoking except in an enclosed vehicle, per WAC 232-13-07000A.
 2. No fires or campfires, per WAC 232-1307000A.
 3. No open flame, welding, metal cutting, chainsaw operation, or any activity that may cause a spark or hot metal, per WAC 232-13-05000A.
 4. No operation or parking of a motor vehicle (road vehicles and off-road vehicles) off developed roadways. However, it is permissible to park in an area devoid of vegetation within 10 feet of a developed roadway. For purposes of this paragraph, a developed roadway is a roadway constructed for standard highway vehicles with an asphalt, gravel or dirt surface with no vegetation, 14 feet wide or more. Trails or tracks are not such roadways.
 5. A violation of these provisions is punishable under RCW 77.15.160(5)(b). A violation of these provisions may result in removal of offending personnel from the work, per General Conditions Section 00705.01 Contractor Control and Supervision.
 6. All vehicles shall be equipped with a fire extinguisher, 2 gallons of water, and a shovel. All worksites shall have a fire extinguisher and shovel present. The Contractor shall take all reasonable precautions to prevent fires.
 7. The Contractor shall have an employee remain at the worksite with sufficient firefighting capability, for at least one hour after work has ceased for the day, or if leaving for more than one hour, to ensure no fires have started.
 8. The Contractor shall contact the Site/Facility Manager at the beginning of each week; Monday mornings, for any special instructions.

01200 PROJECT MEETINGS

- A. Contractor shall attend a preconstruction meeting with the Owner's representative prior to receiving the Notice to Proceed, to discuss the work and contracting procedures.
- B. Weekly project progress meetings, attended by key representatives of the Contractor and Owner, will be held on-site throughout the duration of work. The agenda will include updates to the Construction Schedule, 3-week look ahead schedule, status of Submittals and requests for information (RFIs), Project Record review, pay request verification, and any issues brought forth by the Contractor, Project Manager, Inspector, and/or Hatchery Staff. Other potential topics may include safety, phasing or sequencing, coordination, review of procedures for testing, inspecting, and acceptance.

01300 CONTRACTOR SUBMITTALS

A. Preliminary Submittals

Within 7 calendar days after the date of Notice to Proceed, the Contractor shall submit the following items to the Owner for review:

- 1. A preliminary schedule of Shop Drawings and Samples. The schedule of submittals shall be based on Contractor's priority, planned construction sequence and schedule, long lead items, and size of submittal package. Allow time for project resubmittals. The Owner is not responsible for any delay associated with project resubmittals. The schedule shall include at a minimum the submittal number, Specification section and description of the submittal contents.
- 2. A list of permits and licenses the Contractor shall obtain, indicating the agency required to grant the permit, such as building permits, equipment or clearance permits, etc. and the expected date of submittal for the permit and required date for receipt of the permit.

B. Preconstruction Conference Submittals

At or before the preconstruction conference of Paragraph 01010 - Summary of Work, submit the following items in accordance with Division 0 – General Conditions 00703.2 to the Owner for review and approval:

- 1. List of subcontractors and suppliers of work and materials greater than \$2,500.
- 2. A preliminary Construction Schedule.
- 3. A preliminary Schedule of Values.

C. Shop Drawings

- 1. Wherever called for in the Contract or where required by the Owner, the Contractor shall furnish 1 hardcopy (to be retained by the Owner) plus one complete electronic copy in Acrobat (pdf) format, of each Shop Drawing submittal unless otherwise indicated in the Contract. Shop Drawings may include, but not limited to detail design calculations, shop-prepared drawings, fabrication and installation drawings, erection drawings, lists, graphs, catalog sheets, data sheets, and similar items.
- 2. Whenever the Contractor is required to submit design calculations as part of a submittal, such calculations shall bear the signature and seal of an Engineer registered in the appropriate branch and in the state wherein the work is located, unless otherwise indicated.

DIVISION 1 – GENERAL REQUIREMENTS

3. Organization:

- a. A single submittal transmittal form shall be used for each technical Specification section or item or class of material or equipment for which a submittal is required. A single submittal covering multiple sections will not be acceptable, unless the primary Specification references other sections for components.

Example: if a pump section references other sections for the motor, shop-applied protective coating, anchor bolts, local control panel, and variable frequency drive, a single submittal would be acceptable and should be submitted under the pump section. A single submittal covering vertical turbine pumps and horizontal split case pumps would not be acceptable.

- b. On the transmittal form, index the components of the submittal and insert tabs in the submittal to match the components. Relate the submittal components to Specification paragraph and subparagraph, Drawing number, detail number, schedule title, room number, or building name, as applicable.
- c. Terminology and equipment tag names and numbers used in submittals shall match those used in the Contract. Where a submittal includes multiple pieces covered under a section the submittal shall clearly indicated the tag name or number for each piece included on all pages related to that piece.
- d. Disorganized submittals that do not meet the requirements of the Contract will be returned without review.

4. Format:

- a. Minimum sheet size: 8 1/2 inches by 11 inches; maximum sheet size: 11 inches by 17 inches. Every page in a submittal shall be numbered in sequence. Each copy of a submittal shall be collated and stapled or bound, as appropriate. The Owner will not collate sheets or copies.
- b. Where product data from a manufacturer is submitted, clearly mark which model is proposed, along with all complete pertinent options, data, capacities, dimensions, clearances, diagrams, controls, connections, anchorage, and supports indicated. Sufficient level of detail shall be presented for assessment of compliance with the Contract. Indicating marks or methods shall be such that they are reproducible and remain legible when scanned or copied in black and white system. The Contractor shall clearly indicate what is to be provided, the Owner will make no assumptions from unmarked options lists.
- c. Assign each submittal a unique, sequential number, clearly noted on the transmittal with the primary Specification number included.

Original submittals shall be assigned a numeric submittal number followed by a numeric resubmittal number to distinguish between the original submittal (0) and each resubmittal (1, 2, etc.). In the name of the electronic file, number submittals sequentially using a set brief descriptor followed by the unique sequential submittal number, submittal content title and 6-digit primary specification section number.

Examples: “[Project Name] 1.0-Schedule of Values- 01300.pdf”; “[Project Name] 2.0-Construction Schedule-01300.pdf”.

Resubmittals, if required, shall include only information directly related to the previous submittal. If portions of a submittal are changed and other portions remain the same upon resubmittal, the resubmittal shall include all changed and unchanged portions so that each resubmittal is a complete document.

DIVISION 1 – GENERAL REQUIREMENTS

Resubmittal Examples: “[Project Name] Submittal 1.1-Schedule of Values- 01300.pdf” for the first resubmittal and “[Project Name] Submittal 1.2-Schedule of Values- 01300.pdf” for the second resubmittal, and so on.

5. Review Process:

- a. Except as may otherwise be indicated, the Owner will return each submittal to the Contractor with comments noted thereon, within 14 calendar days following receipt by the Owner. It is considered reasonable that the Contractor will make a complete and acceptable submittal to the Owner by the first resubmittal on an item. For example, for a submittal that requires two resubmittals before it is complete, the accumulated review period could be 42 calendar days.
- b. If a submittal is returned to the Contractor marked “NO EXCEPTIONS TAKEN,” formal revision and resubmission of the submittal will not be required. If a component or section of the submittal is returned to the Contractor specifically marked “NO EXCEPTIONS TAKEN,” formal revision and resubmission of that component or section of the submittal will not be required.
- c. If a submittal is returned marked “Make Corrections Noted,” Contractor shall make the corrections on the submittal, but formal revision and resubmission will not be required. If a component or section of the submittal is returned to the Contractor specifically marked “Make Corrections Noted,” formal revision and resubmission of that component or section of the submittal will not be required.
- d. If a submittal, or portion of a submittal, is returned marked “AMEND-RESUBMIT,” the Contractor shall revise it and shall resubmit the required number of copies. If any portion of a submittal is returned marked “AMEND-RESUBMIT,” the status of the entire submittal shall be considered “AMEND-RESUBMIT,” however, only the portions indicated need to be updated in the resubmittal.
- e. If a submittal is returned marked “REJECTED-RESUBMIT.” it shall mean either that the proposed material or product does not satisfy the Specification, the submittal is so incomplete that it cannot be reviewed or is a substitution request that will not be reviewed because it is not submitted in accordance with the Contract. The Contractor shall prepare a new submittal and shall submit the required number of copies.
- f. Resubmittal of rejected portions of a previous submittal will not be allowed. Every change from a submittal to a resubmittal or from a resubmittal to a subsequent resubmittal shall include a summary page at the front of the submittal listing responses to previous review comments and a list of items that have changed from the previous submittal/resubmittal. Changed items shall be flagged where they occur in the resubmittal.
- g. Fabrication of an item may commence only after the Owner has reviewed the pertinent submittals and returned copies to the Contractor with the submittal marked either “NO EXCEPTIONS TAKEN” or “MAKE CORRECTIONS NOTED.” Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the work and shall not be taken as changes to the Contract.
- h. Submittals shall be carefully reviewed by an authorized representative of the Contractor prior to submission to the Owner. Each submittal shall be dated and signed by the Contractor as being correct and in strict conformance with the Contract. In the case of Shop Drawings, each sheet shall be so dated and signed. Any approved deviations from the Contract shall be noted on the transmittal sheet.

DIVISION 1 – GENERAL REQUIREMENTS

- i. The Owner will only review submittals that have been so verified by the Contractor. Non-verified submittals will be returned to the Contractor without action taken by the Owner, and any delays caused thereby shall be the total responsibility of the Contractor.
 - j. Corrections or comments made on the Contractor's Shop Drawings during review do not relieve the Contractor from compliance with Contract Drawings and Specifications. Review is for conformance to the design concept and general compliance with the Contract only. The Contractor is responsible for confirming and correlating quantities and dimensions, fabrication processes and techniques, coordinating work with the trades, and satisfactory and safe performance of the work.
6. The Contractor shall schedule submittals such that the Owner has 14 calendar days to review and respond, and the Contractor has sufficient time to provide the products or materials without delay to the construction schedule. The Contract Times will not be extended for the Contractor's failure to submit complete or approvable submittals or allow ample review and approval time.

D. Samples

1. Submit the number of samples indicated by the Specifications. If the number is not indicated, submit not less than 3 samples. Where the amount of each sample is not indicated, submit such amount as necessary for proper examination and testing by the methods indicated.
2. Samples shall be individually and indelibly labeled or tagged, indicating the salient physical characteristics and manufacturer's name. Upon acceptance by the Owner, one set of the samples will be stamped, dated, and returned to the Contractor, one set of samples will be retained by the Owner, and one set shall remain at the Work Site in the Owner's field office until completion of the work.
3. Unless indicated otherwise, the Owner will select colors and textures from the manufacturer's standard colors and standard materials, products, or equipment lines. If certain samples represent non-standard colors, materials, products, or equipment lines that will require an increase in Contract Times or Price, the Contractor shall clearly state so on the transmittal page of the submittal.
4. The Contractor shall schedule sample submittals such that:
 - a. Sample submittals for color and texture selection are complete so the Owner has 14 calendar days to assemble color panels and select color and texture dependent products and materials without delay to the construction schedule, and
 - b. After the Owner selects colors and textures, the Contractor has sufficient time to provide the products or materials without delay to the construction schedule. The Contract Times will not be extended for the Contractor's failure to allow enough review and approval or selection time, failure to submit complete samples requiring color or texture selection, or failure to submit complete or approvable samples.

E. Record Drawings

1. The Contractor shall maintain one set of Drawings at the Project Site for the preparation and weekly update of record drawings.

DIVISION 1 – GENERAL REQUIREMENTS

2. The Record Drawings shall mark every project condition, location, configuration, and any other change or deviation which may differ from the Contract Drawings at the time of award, including buried or concealed construction and utility features that are revealed during the course of construction. Special attention shall be given to recording the horizontal and vertical location of buried utilities that differ from the locations indicated, or that were not indicated on the Contract Drawings.
3. Record Drawings shall be supplemented by any detailed sketches as necessary or as Contractor is directed, to fully indicate the work as actually constructed. These record drawings are the Contractor's representation of as-built conditions, shall include revisions made by addenda and change orders, and shall be maintained up-to-date during the progress of the work.

F. Quality Control (QC) Submittals

1. Quality control submittals are defined as those required by the Specifications to present documentary evidence to the Owner that the Contractor has satisfied certain requirements of the Contract.
2. Unless otherwise indicated, submit QC submittals before delivery and unloading, for the following types of submittals:
 - a. Manufacturers' installation instructions
 - b. Manufacturers' and Installers' experience qualifications
 - c. Ready mix concrete delivery tickets
 - d. Design calculations
 - e. Affidavits and manufacturers' certification of compliance with indicated product requirements
 - f. Laboratory analysis results
 - g. Factory test reports
 - h. Inspection results and reports of Contractor's testing firm for special inspections.
3. Unless otherwise indicated, submit QC submittals within 30 business days of the event documented for the following types of submittals:
 - a. Manufacturer's field representative certification of proper installation
 - b. Field measurement
 - c. Field test reports
 - d. Receipt of permit
 - e. Receipt of regulatory approval
4. The Owner will record the date that a QC submittal was received and review it for compliance with submittal requirements, but the review procedures and Owner time limits above for Shop Drawings and samples will not apply.

DIVISION 1 – GENERAL REQUIREMENTS

01510 TEMPORARY UTILITIES

- A. The State will pay the energy costs for construction power used from any of the existing state services, but the Contractor shall provide and maintain any required connections or extensions.
- B. The Contractor shall provide adequate temporary toilet facilities, where directed, when work is started for all those connected with the work. The Contractor shall keep the toilet facilities in a sanitary condition and remove the toilet facilities at the end of the project and disinfect the premises.
- C. Drinking water is not available at the site. Provide single-service containers or a sanitary drinking device from a proven safe source for all those connected with the work.
- D. Water for construction purposes is available at the site. The State does not guarantee quantity or quality of water sources.

01730 OPERATIONS AND MAINTENANCE (O&M) MANUALS

- A. Before final acceptance, the Contractor shall instruct the Owner on the proper operation and maintenance of all mechanical systems, equipment, and controls under this Contract. A qualified technician for each component of this installation shall be made available by the Contractor for this instruction.
- B. The Contractor shall compile and summarize information from the individual equipment O&M manuals for reference by WDFW. This information is anticipated to include basic operational information for the equipment, alarms, troubleshooting, and lockout/tagout (LOTO) procedures where appropriate. Submit O&M equipment manuals and instructions electronically in .pdf format, and submit three bound sets of equipment manuals and operating instructions to the Owner.
 - 1. Flysheets: Separate each portion of the manual with neatly prepared flysheets briefly describing contents of the ensuing portion. Flysheets must be in color.
 - 2. Binding: The Contractor shall use heavy-duty plastic or fiberboard front and back covers with 3-ring binders. All binding is subject to the Owner's approval.
- C. The front and back covers will include, at least, the following information:

OPERATIONS AND MAINTENANCE (O&M) INSTRUCTIONS
Prepared for the Washington Department of Fish and Wildlife
(Project Title and Number)
(Name of Contractor)
(General Subject of this Manual)
- D. Contents: The Contractor shall include at least the following:
 - 1. Neatly typewritten index near the front of the manual giving immediate information as to location within the manual of all emergency information regarding the installation.
 - 2. Complete instructions regarding operation and maintenance of all equipment involved including lubrication, disassembly, and reassembly.

DIVISION 1 – GENERAL REQUIREMENTS

3. Complete nomenclature of all parts of all equipment.
4. Complete nomenclature and part number of all replaceable parts name and address of nearest vendor, and all other data pertinent to procurement procedures.
5. Copy of all guarantees and warranties issued.
6. Manufacturers' bulletins, catalog cuts, and other pertinent descriptive data, clearly indicating the precise items included in the installation and deleting, or otherwise clearly indicating, all manufacturers' data with which this installation is not concerned.
7. A pump performance curve showing head, quantity, net positive suction head required, brake horsepower, and efficiency shall be included in equipment manuals.
8. The operating instructions, in conjunction with the maintenance manuals, shall include written step-by-step detail of start-up and shutdown procedures.
9. Such other data as required in pertinent sections of the Contract Documents.

END OF SECTION 01000

ATTACHMENT 1 – PERMITS

**State Environmental Policy Act (SEPA) Mitigated Determination of Non-significance (MDNS)
Shoreline Substantial Development Permit (SSDP) Extension
Building Permit (Pending)**



State of Washington
DEPARTMENT OF FISH AND WILDLIFE

Mailing Address: P.O. Box 43200, Olympia, WA 98504-3200 • (360) 902-2200 • TDD (360) 902-2207
Main Office Location: Natural Resources Building, 1111 Washington Street SE, Olympia, WA

**ADDENDUM 21-039 TO MITIGATED DETERMINATION OF NONSIGNIFICANCE
(MDNS) 13-074
DATED: OCTOBER 28, 2013**

Name of Proposal: MDNS 13-074: SOOS CREEK FISH HATCHERY REDEVELOPMENT

Description of Addendum 21-039: Note that a previous Addendum (16-016) was issued for earlier design changes and modified plans. This Addendum 21-039 is for Water Filtration System Upgrades.

In 2017 the Soos Creek hatchery began major renovations in order to address a series of environmental and resource management issues that threatened the continued function of the hatchery. This renovation was necessary in order to upgrade facilities that were constructed 70 years ago and had outlived their life expectancy and to address the altered flow regime of Big Soos Creek (Soos Creek) resulting from upstream development. Due to the scale of this renovation project, permitting and construction have been carried out in phases dependent on funding made available by the legislature. The most essential components of the redevelopment (relocating the hatchery facilities to the northern site outside of the Soos Creek 100-year floodplain) have been prioritized and were completed in 2019. However, additional upgrades to the hatchery's water treatment system are still necessary in order to address fish pathogens within the water and Soos Creek's altered flow regime, both of which threaten the health of the salmon stock and the continuation of hatchery operations. The funding for these water treatment upgrades has become available due to the support of the Muckleshoot Tribe and WDFW is proposing to construct these system upgrades in 2022. The upgrades would take place within the footprint of the disturbed area from the 2017 phase of the hatchery redevelopment and would not involve work within Soos Creek. This project would result in 3,797 square feet (SF) of additional impervious surfaces within the buffer of Soos Creek and would be mitigated for accordingly.

This project proposes to install a water treatment supply for the raceways and the hatchery building. For the raceway water supply treatment, three drum filtration units will be constructed in a new filter building located in the area east of the raceways. Additionally, the existing pump back system will be expanded to include two more reuse pumps, which will require redesigning the reuse screening, expanding the sump footprint, and adding packed column aerators to Distribution Box 2. A new fish release channel will be installed to the north of the raceway ponds, which will be optimized by adding submerged weirs. For the hatchery water supply treatment, the existing fine settling pond will be adapted with two new drum filtration units. A metal canopy will be constructed over the existing fine settling pond to protect the new equipment. Additional electrical upgrades will be made to ensure the electrical infrastructure supports the new mechanical upgrades to include total load, backup power, controls, alarms, uninterruptible power supply (UPS) and spare pathways. Finally, two pipes will be resized in

order to meet proper water flow specifications (a 24" pipe will be resized to 36" and a 24" pipe will be resized to 42").

The project work will take place within the 200-foot shore jurisdiction and within the 165 foot aquatic buffer of Soos Creek. No work will take place below the ordinary high water mark (OHWM) of Soos Creek. The project will result in an additional 3,797 SF of impervious surface within the buffer. The majority of this new impervious surface will come from the raceway filter building (1835 SF) and the metal canopy over the fine settling pond (1547 SF) with the screened water chamber (96 SF), reuse pump vault expansion (68 SF) and Distribution Box 2 expansion (250 SF) accounting for the remaining impervious surface additions.

Soos Creek Hatchery is 73,524 SF, though the project will be restricted to the North Site. The existing impervious surface of the Soos Creek Hatchery is 52,636 SF and the new impervious area being developed is 3,797 SF for a new impervious surface of 56,433 SF. This would represent a 5% increase in impervious surfaces, which would be mitigated through the planting of native species within the aquatic buffer (mitigation plan sheet in development).

These impacts would be mitigated at a ratio of 1:1 with the planting of 3,797 SF of the western bank of Soos Creek, ensuring no net loss to the shoreline environment. All of the project activities would take place outside of the 100-year floodplain. The riparian habitat enhancement proposed as mitigation for the project would restore the buffer habitat where the old hatchery facilities were previously located.

Description of Original Proposal:

The first phase includes redevelopment of the critical functions of hatchery operation that are located in or immediately adjacent to Soos Creek. The second phase includes the remaining important elements of the hatchery operation. The third phase completes the redevelopment with support facilities such as staff housing and public amenities that serve visitor needs.

The project will first replace the in-water structures including construction of a new water intake, new adult pond, and creation of a fish ladder. The existing lumber shed will be demolished and removed. The northern bridge across Soos Creek will be widened and elevated and include improvements with timber curbs and hand railing.

Once the new fish ladder, adult ponds, and intake prove fully functional the existing adult pond, diversion dam, intake facility, and downstream weir of the adult pond will be removed. Soos Creek will be restored at the location of the existing adult pond to historic bankfull widths. The upstream weir will be reconstructed with new materials to retain the diversion dam function with a tainter-gate allowing for fish migration up- and down-stream approximately 6 weeks/year. Riparian restoration of the areas impacted by removal of the former in- and near-water structures will be conducted directly upon their removal to complete the first phase of redevelopment.

Redevelopment of the remainder of the fish rearing facilities will follow, in a second phase, including construction of a hatchery building (with incubation racks, rearing troughs, and offices), fish feed storage building, an abatement pond, two water-system settling ponds, and two sets of rearing ponds. Once the new ponds (abatement, settling, and rearing) prove fully functional the outdated southern rearing ponds shall be restored to wetland habitat suitable for the likely hydrology and soils regime that will be established in this location. Demolition of the hatchery buildings and other structures, with the exception of existing rearing ponds 1-8, the storage garage, and the maintenance building, are scheduled for removal during this phase. The

remaining areas, mostly within the jurisdictional shoreline area, shall be enhanced with a native vegetative community commensurate with the natural area of this shoreline environment.

The final phase of construct consists of two staff residences and public amenities. Demolition of the old Auburn Maintenance Buildings including: main maintenance building, lumber shed, equipment storage building, and another storage building will occur followed by construct of two residences, parking areas, kiosks, restrooms, paved connections and enhancement and restoration to a substantial portion of former Soos Creek Fish Hatchery.

The proponent shall incorporate the following mitigation measures into the project:

The three-part project has been planned methodically to avoid actions that cause adverse environmental effects. Even with efforts to minimize impacts, several components were downsized, there remain unavoidable impacts that require mitigation. The redevelopment has been sequenced to assure that the development impacts occurring in each phase includes mitigation, listed below, that more than adequately addresses these impacts.

Phase I

- A. Removal of in-stream adult pond to an adjacent upland location,
- B. Installation of a fish ladder to allow up-stream migrating fish to access the hatchery adult pond and up-stream habitat when released to through return conduit,
- C. Enhancement and/or restoration of riparian zones associated with the former hatchery near-stream facilities, including these areas:
 - 1. existing adult pond, including all of the lower weir (footings, etc.), and
 - 2. existing intake facility, including removal of the diversion dam.
- D. Endangered species, cultural and historical resource considerations shall be fully addressed and mitigation specific to the in-water, and near-water, work proscribed in concert with US Army Corps of Engineers, the Muckleshoot Tribe, the Services (NMFS & USFWS), King County and the Department of Archaeology and Historic Preservation. Two listed species are reared in this hatchery: Puget Sound Chinook and Puget Sound steelhead trout. The federal and state environmental review processes include cultural and historical resource considerations.

Phase II

- A. Remove southern rearing ponds and restored the whole area to wetland habitat suitable for this location. This restoration plan must be completed prior the construction of any new rearing pond; and shall be a required component of the permitting, notably under King County's SMP, prior to Phase II approval. A preliminary restoration plan for Phase II will be included in Phase I reviews.
- B. The hatchery buildings and other structures shall be properly evaluated and inventoried as with regard to their historical significance. A Historic Property Evaluation shall be conducted.
- C. Where structures have been removed, including paved areas, areas shall be enhanced with a native vegetative community commensurate with the natural area of this shoreline environment. As stated above, this enhancement plan must be finalized prior the construction or demolition of any structures; and will be a required component of the permitting with preliminary restoration plans included in Phase I reviews.

Phase III

- A. Where structures have been removed, including paved areas, areas shall be enhanced with a native vegetative community commensurate with the natural area of this shoreline environment.
- B. Preliminary restoration plans will be included in Phase I and Phase II reviews with an adequate level of detail to afford public and permit reviewers to determine that mitigation requirements are being met.

Proponent/Applicant: Washington State Department of Fish and Wildlife (WDFW)
Contact: Sara Kuhn
600 Capitol Way N
Olympia, WA 98501
(360) 819-3886
Sara.Kuhn@dfw.wa.gov

Location of Proposal, including street, if any: WDFW Soos Creek Hatchery, 13030 SE Auburn-Black Diamond Road, Auburn, King County, Washington: Township 21N, Range 5E, Section 16.

Lead Agency: Washington Department of Fish and Wildlife (WDFW)

This addendum is being distributed pursuant to WACs 197-11-600 and 197-11-625. The updated information provided above does not substantially change the analysis of significant impacts in the existing environmental checklist. Based on the original DNS and the updated information provided in this addendum, we have determined that a new threshold determination is not warranted. There is no comment period associated with this SEPA addendum.

Responsible Official: Lisa Wood

Position/Title: SEPA/NEPA Coordinator, WDFW Habitat Program, Protection Division

Address: P.O. Box 43200, Olympia, WA 98504-3200

Applicants may view the supporting documents for this addendum on the WDFW SEPA website: <https://wdfw.wa.gov/licenses/environmental/sepa/closed-final>.

If you have questions about this DNS or the details of the proposal, contact Lisa Wood at SEPADesk2@dfw.wa.gov.

DATE OF ISSUE: August 3, 2021

SIGNATURE:



SEPA Log Number: ADD 21-039 to MDNS 13-074

Individuals who need to receive this information in an alternative format or language, or who need reasonable accommodations to participate in WDFW-sponsored public meetings or other activities may contact the Title VI/ADA Compliance Coordinator by phone at 360-902-2349, TTY (711), or email (Title6@dfw.wa.gov).



King County

Permitting Division

Department of Local Services

35030 SE Douglas Street, Suite 210

Snoqualmie, WA 98065-9266

206-296-6600 | Relay: 711

<https://kingcounty.gov/permits>

February 11, 2022

Sara Kuhn, Environmental Planner
Capital and Asset Management Program
Washington Department of Fish and Wildlife
600 Capitol Way N., Olympia, WA 98501

RE: SHOR14-0010 – Soos Creek Fish Hatchery
Shoreline Substantial Development Permit Extension Granted

Dear Ms. Kuhn:

King County Permitting received your request for extension of Shoreline Substantial Development Permit (SSDP), SHOR14-0010, via email on November 08, 2021. SHOR14-0010, was issued on March 17, 2017. As a condition of permit approval, and as required by WAC 173-27-090, authorization to conduct development activities shall terminate five years after the effective date of a substantial development permit. Pursuant to condition four of SHOR14-0010, the effective date of a shoreline permit shall be the date of the last action required on the shoreline permit and all other government permits and approvals that authorize the development to proceed. A subsequent commercial building permit, COMM17-0003, was issued on September 21, 2017. The effective date of SHOR14-0010 is, therefore, September 21, 2017, and SHOR14-0010 will expire on September 21, 2022.

Local government may authorize a single extension for a period not to exceed one year based on reasonable factors, if a request for extension has been filed before the expiration date and notice of the proposed extension is given to parties of record and to the department. A single one-year extension is hereby granted for SHOR14-0010 with an expiration date of September 21, 2023.

Sincerely,

Greg Goforth

Project/Program Manager II, Environmental Planner

Cc: Ty Peterson, Commercial Product Line Manager, KC DLS Permitting Division
Railin Santiago, Shoreline Planner, WA Department of Ecology

ATTACHMENT 2 – CULTURAL RESOURCES

Inadvertent Discovery Plan (IDP)

**WASHINGTON STATE DEPARTMENT OF FISH & WILDLIFE
INADVERTENT DISCOVERY PLAN FOR CULTURAL RESOURCES
FOR THE SOOS CREEK HATCHERY SUPPLY PIPE REPLACEMENT PROJECT IN
KING COUNTY, WASHINGTON**

The Inadvertent Discovery Plan is intended to provide clear guidance related to the management of an unexpected discovery or unearthing of cultural artifacts, archaeological features or other evidence of cultural materials and/or of skeletal material of human or unknown origin during WDFW projects not governed by a DAHP-issued excavation permit, or by a Monitoring or Site Protection Plan for a specific area or activity.

This plan is to be implemented without exception whenever such discoveries occur, and applies to WDFW staff, contractors, subcontractors, volunteers, and others who may be involved with projects initiated by WDFW, or occurring on WDFW-managed land. This plan does not supersede or satisfy requirements for Monitoring, Site Protection, or other plans developed to address concerns at known archaeological and historic sites.

PRE-FIELD ACTIONS

Prior to ground disturbance, the WDFW project or program manager (PM) will notify work crews/machine operators that they are obligated to cease work in the immediate area and notify supervisory personnel upon discovery of any bones or objects of human manufacture, particularly suspected Native American artifacts. This action will be repeated prior to commencement of work in new locations, after significant changes in field staff, and if work is re-started after a hiatus. Field supervisors will be made aware of their responsibilities for interim protection and notification as detailed below.

FIELD ACTIONS

Specific Procedures for the Inadvertent Discovery of Archaeological Resources

In the event that cultural resources (not including human remains) are encountered during project implementation, the following actions will be taken:

1. All work within the discovery area and a surrounding buffer adequate and sufficient to prevent further disturbance will cease. The field supervisor will notify the PM immediately.
2. The PM will immediately contact WDFW archaeologist or archaeological monitor. If an archaeological monitor is present, he/she will notify the WDFW archaeologist.
3. If the WDFW archaeologist determines that potentially significant archaeological materials or historic sites are present, the PM will be advised of interim protective measures. Work may resume outside the buffer, unless the WDFW archaeologist directs otherwise.

4. The WDFW archaeologist will initiate Tribal and DAHP consultation regarding evaluation of the find's significance, potential for effects caused by the project, and subsequent treatment plans or Memoranda of Agreement (MOA).
5. Wherever possible, the preferred treatment of significant archaeological resources and historic sites will be in situ preservation. If a treatment plan requires that such resources be excavated or removed, an agreement must first be reached between WDFW and the consulting parties.

Specific Procedures for the Inadvertent Discovery of Human Remains

Inadvertent finds of what appear to be human remains introduce cultural concerns and legal requirements that initiate a different response than cultural resources. Human remains must be treated with utmost respect. The following language is to be followed to the letter:

Inadvertent Discovery of Human Skeletal Remains on Non-Federal and Non-Tribal Land in the State of Washington (RCWs 68.50.645, 27.44.055, and 68.60.055)

If ground disturbing activities encounter human skeletal remains during the course of construction, then all activity will cease that may cause further disturbance to those remains. The area of the find will be secured and protected from further disturbance until the State provides notice to proceed. The finding of human skeletal remains will be reported to the county medical examiner/coroner and local law enforcement in the most expeditious manner possible. The remains will not be touched, moved, or further disturbed. The county medical examiner/coroner will assume jurisdiction over the human skeletal remains and make a determination of whether those remains are forensic or non-forensic. If the county medical examiner/coroner determines the remains are non-forensic, then they will report that finding to the Department of Archaeology and Historic Preservation (DAHP) who will then take jurisdiction over the remains. The DAHP will notify any appropriate cemeteries and all affected tribes of the find. The State Physical Anthropologist will make a determination of whether the remains are Indian or Non-Indian and report that finding to any appropriate cemeteries and the affected tribes. The DAHP will then handle all consultation with the affected parties as to the future preservation, excavation, and disposition of the remains.

Under no conditions are WDFW staff or other project personnel to make the location or contents of inadvertent human remains finds public, unless specifically authorized to do so in the burial treatment plan.

CONTACTS

WASHINGTON STATE DEPARTMENT OF FISH & WILDLIFE

Department Archaeologist

Adam Rorabaugh, CAMP Archaeologist 360-789-3290

Project Manager and Alternative Contact

Kelly Smith, WDFW Project Manager 360-789-2759

MUCKLESHOOT INDIAN TRIBE

Laura Murphy, Cultural Resources 253-876-3272

PUYALLUP TRIBE

Brandon Reynon, Cultural Resources 253-573-7986

SNOQUALMIE INDIAN TRIBE

Steve Mullen-Moses, Archaeology and Historic Preservation 425-292-0249 x 2010

TULALIP TRIBES

Richard Young, Cultural Resources 360-716-2652

WASHINGTON STATE DEPARTMENT OF ARCHAEOLOGY AND HISTORIC PRESERVATION

Allyson Brooks, State Historic Preservation Officer 360-586-3066

Rob Whitlam, State Archaeologist 360-586-3080

Guy Tasa, State Physical Anthropologist 360-586-3534

KING COUNTY

King County Sherriff's Office 206-296-4155

King County Medical Examiner 206-731-3232

Definitions:

Archaeological Features are physical alterations in the natural environment such as pits or house foundations.

Archaeological materials are the physical remains of human cultural behavior, including artifacts and features left on the landscape.

Artifacts are the physical objects of a culture, including tools with evidence of intentional modification (such as flaked stone blades) as well as those objects such as fire-cracked rock that reflect human activity.

Burial statutes include the 2008 Washington State legislation that established current practices for inadvertent burial treatment through additions and amendments to the code, including 27.44 RCW (Indian Graves and Records, as amended), 27.53 (Archaeological Sites and Resources, as amended), as well as chapters 27.34, 43.334, 68.60, and 68.60 RCW.

Consulting parties are those which have a legal right to comment on determinations of significance and NRHP eligibility, project effects on cultural resources, and human remains. This may vary according to projects, but typically includes DAHP and Tribes whose Ceded Lands or Usual and Accustomed areas include the project area.

Coroner refers to the office of the local county coroner or medical examiner, and is responsible for confirming that the remains are human and determining whether they are forensic (dead less than 50 years, and therefore a law enforcement matter) or non-forensic (more than 50 years, and therefore subject to burial statutes).

Cultural Deposits are layers or features of sediment containing cultural materials.

Cultural Resources include archaeological resources and historic sites.

Historic sites are locations 50 years old or older, where native or non-native events and activities have taken place since the arrival of Euro-Americans, and which are considered by DAHP to be historic site types.

Human remains are any physical remains that are known to be human, or could be human but have not yet been positively identified.

Physical anthropologist in this case refers to the professional physical anthropologist employed at DAHP, who determines whether human remains are Native American (if possible), and is the individual responsible for handling human remains.

**SECTION 02000
GENERAL SITE WORK PROVISIONS**

PART 1 - GENERAL

1.01 SECTION INCLUDES

This section specifies general requirements for all sections of Division 2 – Site Work.

1.02 RELATED SECTIONS

Not Used.

1.03 REFERENCES

References listed in Division 2 are from the following organizations' publications and reference standards:

AASHTO – American Association of State Highway and Transportation Officials

ANSI – American National Standards Institute

ASTM – ASTM International (formerly American Society for Testing and Materials)

OSHA – Occupational Safety and Health Administration Construction Standards

RCW – Revised Code of Washington

IBC – International Building Code

WAC – Washington Administrative Code

WISHA – Washington Industrial Safety and Health Act

WSDOT – Washington State Department of Transportation Standard Specifications for Road, Bridge, and Municipal Construction, latest edition

1.04 SUBMITTALS

Make submittals for items in all sections of Division 2 in accordance with Sections 00704.03 Shop Drawings and 01300 Contractor Submittals.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect all materials from exposure to moisture, wind, sunlight, or other excessive weather conditions that will render them unsuitable for usage as intended and be cause for rejection.

B. Stockpile or store in areas protected from contamination and physical damage.

C. Contractor is responsible for all costs associated with replacement of all rejected items.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION 02000

02000 - 1

**SECTION 02010
SUBSURFACE INVESTIGATION**

PART 1 - GENERAL

1.01 SECTION INCLUDES

This section summarizes available soil investigations and requirements for additional subsurface investigation, at Contractor's option.

1.02 SOILS INVESTIGATIONS

- A. A geotechnical engineering report for the design of this project was prepared by PanGeo, Inc., dated January 24, 2017. A copy of this report is included with the Contract Documents on Builders Exchange.
- B. It is the responsibility of the Contractor to satisfy themselves as to actual field conditions.
- C. Subject to Owner's approval, Contractor may conduct their own independent subsurface investigation at Contractor's expense following the Notice to Proceed. Receive Owner's written approval prior to performing onsite investigation.
- D. Contractor is responsible for use or interpretations of subsurface information and recommendations.

1.03 SUBMITTALS

- A. Prior to any onsite soil investigation work, submit the following:
 - 1. Proposed test locations, depths, and equipment to be used;
 - 2. Work schedule;
 - 3. Proposed backfill placement techniques and levels of compaction equipment to be used.
- B. Submit copies of any reports, results, and findings to Owner.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION 02010

**SECTION 02050
DEMOLITION**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. The work under this Section includes providing all labor, materials, tools, and equipment necessary for removing and disposing of or salvaging existing structures, utilities, and materials. The work includes removal, wholly or in part, and satisfactory disposal of utilities, pipelines, fences, structures, light fixtures, conduits, wires, and other obstructions as shown on the Drawings and described in these Specifications.
- B. The Demolition work included on the Drawings is for guidance only to indicate typical general construction features of the various types of structures and is not to be construed as definitive or adequate to supplant the actual on-site inspection by the Contractor.
- C. The Contractor assumes full responsibility for the proper disposal, reuse, recycling, or salvage of all demolition materials.

1.02 RELATED SECTIONS

Section 02200 – Earthwork

1.03 REFERENCES

Not Used.

1.04 SUBMITTALS

Submit a demolition plan that at a minimum, addresses the following:

- A. Method of demolition.
- B. Worker safety.
- C. Protection of the public.
- D. Protection of the environment.
- E. Work sequence.
- F. Means and methods to minimize waste and maximize salvage.
- G. Disposal procedures.
- H. Disposal site(s) approved by applicable environmental agencies, including necessary permits and permissions.

1.05 JOB CONDITIONS

- A. The Contractor represents that it has visited the site to become familiar with the quantity and character of all materials to be demolished. The Contractor agrees that the premises were made available prior to deadline for submission of bids for whatever inspection and tests the Contractor deemed appropriate.
- B. Underground structures and utilities may not be in the exact locations shown.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.01 DEMOLITION

- A. Prior to demolition, obtain the Owner's approval of the demolition plan.
- B. Blasting is not permitted.

3.02 REMOVAL

- A. Remove all structures or designated portions thereof without disturbing adjoining facilities.
- B. Where concrete or asphaltic concrete walks, roadways, or floors are to be removed, saw cutting or other approved method shall be performed. Saw cutting shall be to the full thickness of the structure and shall be straight and true.

3.03 SALVAGE

- A. The following materials are designated to be salvaged.
 - 1. HDPE pipe and fittings greater than 12-inch diameter.
 - 2. Water supply valves.
 - 3. Raceway supply header assemblies.
- B. Carefully dismantle/remove items and neatly stockpile in a location as approved by the Owner.

3.04 DISPOSAL

All materials not designated to be salvaged become the Contractor's property. Remove from the project site and dispose of legally. Prior to disposal, provide the Owner with the locations of all disposal sites to be used and copies of applicable permits and approvals for each site.

- A. An onsite disposal area for concrete, debris, or other material unsuitable for use as backfill is shown on the Drawings.
- B. Burning is not allowed at the designated disposal site.

END OF SECTION 02050

**SECTION 02100
SITE PREPARATION****PART 1 - GENERAL**

1.01 SECTION INCLUDES

The work of this section consists of clearing, grubbing, stripping, and storage of topsoil and protection of vegetation to remain, including other related work.

1.02 JOB CONDITIONS

Bidders shall examine the work site to determine the character of materials to be encountered, trees to be removed or protected, and nature of the work in general. All required excavation is unclassified.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.01 SITE CLEARING

- A. Clearing: Clear all trees, stumps, brush, roots, rubbish and other objectionable matter within clearing limits shown on the Drawings, staked in the field, or as directed by the Owner. Do not disturb any vegetation or roots thereof designated to remain more than absolutely necessary to assure completion of new construction.
- B. Grubbing: Remove all stumps and roots within clearing limits to a depth of at least 12 inches below natural ground.
- C. Stripping: Remove all humus, vegetation, existing roadway aggregate or other objectionable material encountered within the top 6 inches of soil in areas of project construction, areas to be excavated, and areas where embankment or excess earth will be placed. Upon removal of objectionable material, strip the top 6 inches of soil and stockpile as topsoil at a site designed by the Owner. This material is to be stockpiled separately and not mixed with any other material.

3.02 PROTECTION

Trees, shrubs, roots, and other landscape features designated on Drawings or in the field for preservation, or those located outside of the construction limits shall be carefully protected from marring or damage during construction operations. Continual parking and/or servicing of equipment within areas designated for preservation will not be permitted. Trees and shrubs designated for preservation and pruning shall be trimmed as directed. At no time shall excavation be within the drip line of trees designated to remain.

3.03 DISPOSAL

All debris resulting from clearing and grubbing shall be removed from the project site and disposed of properly. Prior to disposal, the Contractor shall provide the Owner with the locations of all disposal sites to be used.

END OF SECTION 02100

**SECTION 02140
DEWATERING**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. The project site is located in a historic floodplain adjacent to Big Soos Creek. The finished grade is above the mapped 100-year floodplain elevations, but groundwater shall be assumed to be encountered in excavations. Contractor shall provide all materials and labor to manage groundwater in excavations and to meet the requirements of all work specified herein.
- B. Design, furnish, install, operate and maintain all pumps, piping, drains, well points, wells, and other facilities for the control, collection and disposal of groundwater or surface water for the proper construction of all work. The dewatering system shall prevent loss of fines, boiling, quick conditions, and softening of foundation strata and shall maintain stability of excavation bottoms.

1.02 DEFINITIONS

- A. Special Dewatering: Dewatering by single or multiple stage well points or deep wells.
- B. Hydrostatic Groundwater Level: The groundwater level at any location at the time of construction and prior to dewatering.

1.03 REFERENCES

NMFS Screen Criteria – National Marine Fisheries Service, Specific criteria and guidelines for pump intake screen meshes

WAC 173-201A-200 – Fresh water designated uses and criteria

ASTM D4632 – Standard test method for grab breaking load and elongation of geotextiles

1.04 SUBMITTALS

- A. 21 days prior to the start of construction, the Contractor shall submit a written plan that provides specific dewatering and sediment control measures to minimize delivery of soil and turbidity into the stream during the construction period including a channel diversion and dewatering plan where dewatering is required. Include the sequence of operations and information on equipment, materials and suppliers. Include details regarding the anticipated types and locations of various dewatering features, as well as appropriate design calculations to substantiate the dewatering plan. The plan shall also indicate discharge treatment, discharge location, and receiving body.
- B. Measures given in the Drawings and Specifications are minimum requirements, the Contractor shall supplement the measures described to the extent necessary to achieve the required results. Engineer's review of the Contractor's proposed dewatering system does not relieve the Contractor of the full responsibility for the adequacy of the dewatering system.
- C. Submit a Water Quality Monitoring Plan as needed for in water work to measure water quality per WAC 173-201A-200.

1.05 REGULATOR REQUIREMENTS

- A. All dewatering activities shall comply with all local, state, and federal regulations, including the requirements of the Washington State Department of Ecology (WDOE) and WDFW HPA's.
- B. No in-water work may begin until WDFW biologists have approved work areas and performed trapping and transporting of aquatic species within work areas. The Contractor shall be responsible coordinating in-water work schedules and notifying the Engineer not less than 14 days prior to the anticipated beginning of in-water work so that WDFW biologists can perform trapping and transporting.

PART 2 - PRODUCTS

2.01 COMPONENTS

The materials and construction of the dewatering wells, and any required observation wells shall be selected by the Contractor and his dewatering specialist.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Do not begin work until the necessary dewatering and de-sediment control measures for that particular phase of work has been implemented. Incorporate all sediment control features into the project at the earliest practicable time.
- B. At all times during construction, the Contractor shall provide ample means and devices to promptly remove and properly dispose of all water entering excavation such that the bottom is kept firm and acceptably free of standing water until the structures to be built therein are completed.
- C. The Contractor shall provide continuous superintendence during all periods of dewatering.
- D. The location of every element of the dewatering system shall be such that interference with excavation and construction activity is minimized.
- E. Discharged water shall be directed into settling basins or areas where silts and sediments may be filtered prior to entry into waterways or other property. At streamside construction and other locations where siltation or erosion may occur, silt fencing and/or other control measures shall be installed as required to control and prevent siltation.
- F. The Contractor may use sheeting to help achieve the dewatering requirement as specified in this Section. If sheeting is used, submit a sheeting design by a Structural Engineer registered in Washington State.
- G. Special dewatering shall be required in any location where the soil and/or groundwater conditions would otherwise tend to result in boiling or other disturbance to the subsoils and/or walls of the excavation.

3.02 DEWATERING

Construct temporary channels, temporary culverts, earth berms, or sandbag berms to divert water around disturbed areas and work areas.

3.03 OPERATION OF DEWATERING SYSTEMS

- A. Operate dewatering systems in a manner that will avoid harm to aquatic organisms, namely by preventing discharge or runoff of turbid/impaired water to Big Soos Creek.
- B. Prior to any excavation below the hydrostatic groundwater level, the dewatering system shall be operated to lower the water levels as required. Then it shall be operated continuously, 24 hours per day, seven days per week, until all facilities and structures affected by the dewatering have been satisfactorily constructed, including placement of fill materials to an elevation above the hydrostatic groundwater level.
- C. Wherever special dewatering is used, the dewatering system shall lower the groundwater level in the entire excavation at least 1 foot below bottom grade or the bottom of over-excavation of unsuitable material.
- D. Positive measures shall be taken to prevent flotation or uplift of partially completed structures until they are able to sufficiently resist water pressures.
- E. The pumping and dewatering operations shall be carried out in such a manner that no disturbance to the bearing soil or to soil supporting overlying and adjacent structures from this or any other work will result.
- F. Where existing wells are utilized for the Contractor's dewatering purposes, the Contractor shall take full responsibility for the protection, maintenance, and any required development of the wells during the construction period.
- G. The Contractor shall provide complete standby equipment and power sources available for immediate operation as may be required to adequately maintain the dewatering on a continuous basis in the event that all or any part of the dewatering system may become inadequate or fail.

3.04 REPAIR AND RESTORATION

When failure to provide adequate dewatering and drainage causes disturbance to the soils below bottom grade, slope instability, or damage to foundations or structures, the Contractor shall, at his own expense, provide all materials and labor to perform all work required for restoration of subgrade soils, slopes, foundations, or structures to the satisfaction of the Engineer.

3.05 REMOVAL

- A. An adequate weight of backfill material to prevent flotation of pipes or structures shall be in place before any dewatering systems are shut off.
- B. At the completion of the dewatering work, all units of the dewatering system installed by the Contractor shall be removed and the holes backfilled with clean sand or cement grout.

END OF SECTION 02140

**SECTION 02200
EARTHWORK**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Perform earthwork indicated and required for construction of the work, complete and in place.
- B. Perform preloading and monitoring for the foundation for the new Raceway Filter Building.
- C. Field observation and testing shall be performed by the Contractor as required to control its work and perform in compliance to these specifications.

1.02 RELATED SECTIONS

Section 02100 - Site Preparation
Section 02140 - Dewatering
Section 02240 - Construction Geotextiles

1.03 REFERENCES

RCW 49.17 - Washington State Industrial Safety and Health Act
WSDOT Section 9-03.12(3) - Gravel Backfill for Pipe Zone Bedding
WSDOT Section 9-03.10 - Aggregate for Gravel Base
WSDOT Section 9-03.17 - Class A Foundation Material
WSDOT Section 9-03.9(3) - Top Course and Keystone
WSDOT Section 9-03.14(2) – Select Borrow
WSDOT 9.03.12(4) – Gravel Backfill for Drains
WSDOT 9-03.1(2)B - Grading
ASTM D2487 - Classification of Soils for Engineering Purpose
ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils
ASTM D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
29CFR1926 - Safety and Health Regulations for Construction
ASTM D1557 - Test Method for Laboratory Compaction Characteristics of Soils Using Modified Effort
ASTM D4253 - Test Method for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
ASTM D4254 - Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

1.04 SUBMITTALS

- A. Submit samples for all materials proposed for the work in accordance with WSDOT Standard Specifications.
- B. Submit gradation analysis and certified test results for all imported fill material and onsite material to be incorporated into the work.
- C. When requested, submit sample for analysis by Engineer's testing laboratory. Sample sizes shall be as determined by the testing laboratory.
- D. Test Laboratory: Submit name and qualifications of test laboratory, including inspection personnel qualifications, for approval. Submit copies of current laboratory and personnel certifications.

1.05 JOB SITE CONDITIONS

- A. Consult the recommendations of the geotechnical report provided by WDFW and have been included as attachments to these Specifications, see Section 02010. Earthwork operations shall not be performed if the weather conditions, in the opinion of the Engineer, are inappropriate. Work in muddy or frozen ground will not be allowed.
- B. Maintain proper drainage at all times.
- C. Stockpiles:
 - 1. All stockpile locations shall be approved by the Engineer and shall be located so as not to interfere with other work or disturb adjoining property owners.
 - 2. Stockpiles shall not exceed 10 feet in height.
- D. Contractor shall maintain stormwater and erosion controls at all times.

1.06 SAFETY AND PROTECTION

- A. Contractor shall barricade open excavations occurring as part of this work and post warning lights. Operate warning lights during hours from dusk to dawn each day and as otherwise required by applicable safety regulations.
- B. Contractor shall protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining washout, and other hazards created by all earthwork related operations.
- C. Contractor shall be responsible for contacting utility companies to locate service lines prior to any excavation.
- D. Contractor shall proceed with caution in the excavation so that damage to underground structures, both known and unknown, may be avoided.
- E. Contractor shall take extreme precautions for the protection of utility lines and other subsurface improvements. Any improvements damaged by construction operations shall be repaired at the Contractor's expense in compliance with the requirements of the utility owner and to the Engineer's satisfaction.
- F. Trenches and excavations shall be sheeted, shored, and braced where required in a manner consistent with established safe practices and in accordance with all applicable safety regulations.

- G. Contractor shall comply with Chapter 49.17 RCW, the Washington State Industrial Safety and Health Act, if trench excavation exceeds 4 feet in depth. Contractor shall also include cost of required safety systems in all bid schedules and shall list as a separate Bid Item on the Bid Proposal Form.
- H. Contractor shall provide all materials, equipment, and labor necessary to provide support to manholes, footings, and foundation walls during excavation and backfilling at all locations.

PART 2 - PRODUCTS

2.01 FILL AND BACKFILL MATERIAL REQUIREMENTS

- A. General: Fill, backfill, and embankment materials shall be selected or processed clean, fine earth, rock, gravel, or sand, free from grass, roots, brush, other vegetation, and organic matter.
- B. Fill and backfill materials to be placed within 6-inches of any structure or pipe shall be free of rocks or unbroken masses of earth materials having a maximum dimension larger than 3-inches.
- C. Materials: Materials not defined as unsuitable in Section 2.02 below are suitable materials and may be used in fills, backfilling, and embankment construction subject to the indicated requirements. In addition, if acceptable to the Engineer, some of the material listed as unsuitable may be used when thoroughly mixed with suitable material to form a stable composite. Such mixing or blending of materials to obtain a suitable composite is the Contractor's option but is subject to the approval of the Engineer.
- D. Suitable materials may be obtained from onsite excavations, may be processed onsite materials, or may be imported. If imported materials are required by this section or to meet the quantity requirements of the work, the Contractor shall provide the imported materials as part of the work.
- E. The following types of materials are as defined as follows:
 - 1. Type 1, Pipe Zone Bedding Material: Pipe zone bedding material shall be clean sand/gravel mixture free from organic matter and conforming to meet the requirements of WSDOT Section 9-03.12(3) Gravel Backfill for Pipe Zone Bedding as modified below.

TABLE 02200 - 2.01E1	
Sieve Designation	Percent Passing by Weight
1 1/2 Inch Square	99-100
1 Inch Square	75-100
5/8 Inch Square	50-100
US No. 4	20-80
US No. 40	10-55
US No. 200	10 max
Sand Equivalent	27 Minimum

DIVISION 2 - SITE WORK

2. Type 2, Native Material for Trench Zone Backfill in Unimproved Areas: Suitable excavated native soil from the trench may be used for trench zone backfill in unimproved areas that are not subject to vehicular traffic use and where post construction subsidence of the trench is manageable by means of "mounding". Native soils used for trench zone backfill must be free of rocks larger than 3", debris or deleterious materials and the moisture content must be within 2% of optimum to allow for proper placement and compaction.
3. Type 3, Imported Material for Trench Zone Backfill: Trench zone backfill material in improved areas shall consist of aggregate for gravel base, as specified in Section 9-03.10 Aggregate for Gravel Base, excepting however, that 100 percent of the material shall pass a 2 1/2 -inch sieve opening. If wet weather construction conditions are encountered, then the amount of fines (material passing a U.S. No. 200 sieve) shall not exceed 5% based on the fraction of the material passing a 3/4 -inch sieve. Trench zone backfill material in improved areas must not be subject to post construction settlement. Improved areas include any paved surfaces and any other surfaces subject to vehicular traffic use such as road shoulders, dirt or gravel roads and parking areas.
4. Type 4, (9-03.17) Foundation Material for Backfill of Over Excavation: Foundation material for backfill of over excavation shall meet the requirements of WSDOT Section 9-03.17 Class A Foundation Material.
5. Type 5, Native Topsoil Backfill: Stockpiled topsoil material is native soil which has been obtained at the site by removing soil to a depth not exceeding 18 inches, subsequently segregating it and protecting it from contamination, compaction, drying, erosion or excessive moisture. Native topsoil shall not contain woody vegetation or debris. Native topsoil from wetlands and wetland buffers shall be removed and replaced from the same location. Native topsoil from wetlands may include existing seeds, viable roots and vegetation parts that are capable of reestablishing themselves. Native topsoil from agricultural lands shall be removed and replaced from the same location. The final native topsoil backfill soil shall be mounded directly over the excavation to a height of about 6 to 10 inches to accommodate subsequent consolidation of the backfill.
6. Type 6, (9-03.9(3)), Crushed Surfacing Top Course (CSTC) and Base Course (CSBC): Imported crushed surfacing material in accordance with WSDOT 9- 03.9(3) shall be properly compacted and leveled prior to placement of final surfacing material (gravel, asphalt, concrete, etc.). All foundation material for structures shall meet the requirements of WSDOT Section 9-03.9(3) for Top Course and Keystone. Material for use as Gravel Surfacing shall meet the requirements of WSDOT Section 9-03.9(3) for Base Course. CSTC and CSBC shall meet the following gradations:

TABLE 02200 - 2.01E6a Crushed Surfacing Base Course (CSBC)	
Sieve Designation	Percent Passing by Weight
1 1/4 Inch Square	99-100
1 Inch Square	80-100
5/8 Inch Square	50-80
US No. 4	25-45
US No. 40	3-18
US No. 200	7.5 Maximum
Sand Equivalent	32 Minimum
Percent Fracture	75 Minimum

DIVISION 2 - SITE WORK

TABLE 02200 - 2.01E6b Crushed Surfacing Top Course (CSTC)	
Sieve Designation	Percent Passing by Weight
3/4 Inch Square	99-100
1/2 Inch Square	80-100
US No. 4	46-66
US No. 40	8-24
US No. 200	10 Maximum
Sand Equivalent	32 Minimum
Percent Fracture	75 Minimum

7. Type 8, Select Borrow: Select borrow material shall consist of granular material, either naturally occurring or processed, and shall meet the requirements of WSDOT Section 9-03.14(2).
8. Type 10, Quarry Spalls: Material for quarry spalls shall meet the requirements of WSDOT Section 9-13.1 as modified below.

TABLE 02200 - 2.01E10	
Sieve Designation	Percent Passing by Weight
8 Inch Square	100
3 Inch Square	40 Maximum
3/4 Inch Square	10 Maximum

9. Type 14, Drain Rock: Drain Rock shall be washed and have the following gradation (WSDOT 9.03.12(4)):

TABLE 02220 - 2.01E14	
Sieve Designation	Percent Passing by Weight
1 Inch Square	100
3/4 Inch Square	80-100
3/8 Inch Square	10-40
US No. 4	0-4
US No. 200	0-2

10. Type 15, Gravel Base: Gravel base material shall meet the requirements of Aggregate for Gravel Base as specified in WSDOT Section 9-03.10.
11. Type 17 Modified HMA Class 1/2": Aggregate material shall meet the requirements of Aggregates for Porous CSTC meeting the following grading:

TABLE 02200 - 2.01E17	
Sieve Designation	Percent Passing
3/4"	100
1/2"	90-100
3/8"	70-90
No. 4	20-40
No. 8	10-20
No. 200	0-3

12. Type 18 Sand Backfill: Sand shall be clean and uniformly graded with the following gradation (WSDOT 9-03.1(2)B, Class 1):

TABLE 02200 - 2.01E18	
Sieve Designation	Percent Passing by Weight
3/8 Inch Square	100
US No. 4	95-100
US No. 8	68-86
US No. 16	47-65
US No. 30	27-42
US No. 50	9-20
US No. 100	0-7
US No. 200	0-2.5

13. Type 19 Structural Fill: Free-draining mineral soil, free from organic matter, frozen or lumpy materials, vegetation, roots, debris, and any other deleterious matter. Structural fill shall meet the following requirements when tested in accordance with ASTM C136:

TABLE 02200 - 2.01E19	
Sieve Designation	Percent Passing by Weight
2 Inches	100
1/2 Inch	60-80
No. 4	30 Maximum
No. 200	0-5
Sand Equivalent	45 Minimum

14. Type 20 Common Borrow: Common borrow shall be defined as fill required to raise existing grade or backfill excavations beyond 5 feet of a structure. Common borrow shall be material from common excavation or from a borrow site which is free of deleterious materials and moisture content that does not render it unsuitable per paragraph 2.02. Deleterious material includes wood, organic waste, or any other objectionable material greater than 3 percent by weight.
15. Type 21 Pea Gravel: Crushed rock or gravel with 100 percent passing a 1/2 inch sieve and not more than 10 percent passing a Number 4 sieve.

2.02 UNSUITABLE MATERIAL

A. Unsuitable materials include the materials listed below.

1. Soils which, when classified under ASTM D 2487, fall in the classifications of Pt, OH, CH, MH, or OL.
2. Soils which cannot be compacted sufficiently to achieve the density specified for the intended use, such as moisture content varying more than +3% from optimum, after proper soil moisture conditioning.
3. Materials that contain hazardous or designated waste materials including petroleum hydrocarbons, pesticides, heavy metals, and any material which may be classified as hazardous or toxic according to applicable regulations.
4. Topsoil, except as directed by the Contract plans.

2.03 MATERIALS TESTING

- A. Soils testing of samples submitted by the Contractor shall be done by a testing laboratory approved by the Engineer and at the Contractor’s expense. At its discretion, the Engineer may request that the Contractor supply samples for testing of any material used in the work.
- B. Particle size analysis of soils and aggregates will be performed using ASTM D422 .
- C. Determination of sand equivalent value will be performed using ASTM D2419.
- D. Unified Soil Classification System: References in this section to soil classification types and standards shall have the meanings and definitions indicated in ASTM D2487. The Contractor shall be bound by applicable provisions of ASTM D2487 in the interpretation of soil classifications.

2.04 IDENTIFICATION TAPE

Unless indicated otherwise, identification tape shall be placed above buried pipelines that are non-metallic. Identification tape shall be 6-inches wide, yellow in color, polyethylene, with integral metallic wire. Tape shall be labeled with CAUTION – BURIED UTILITIES, where BURIED UTILITIES shall identify WATER, SEWER, or STORM.

2.05 BACKFILL SCHEDULE:

- A. Materials shall be used as indicated below unless otherwise noted on the drawings:

USE	FILL TYPE
Embankment Fills	20 or mixture of 1 through 4,6,8,9
Pipe	
Pipe zone Bedding	1
Trench zone backfill –Unimproved Areas	2
Trench zone backfill–Improved Areas	3
Final backfill under roads areas	6
Final backfill unpaved areas	5
Trench and final backfill under structures	Same as pipe zone except where concrete encasement is required
Replace pipeline trench over excavation in soils	4 at structures, 14 with 6-inch top layer of 18, or non-woven filter fabric, or same as pipe zone backfill if trench is above water table.
Aggregate base materials	6
Aggregate subbase	6
Backfill around structures **	19
Under hydraulic or water retaining structures **	14,19
Under structures where ground water is removed to allow placement of concrete	by non-woven filter fabric
All other structures	19
Top 6-inches of embankment fills backfills around structures	5

**All fill and backfill against walls or under concrete slabs and footings can within 5 feet of same shall be considered as structural fill.

PART 3 - EXECUTION

3.01 EXCAVATION AND BACKFILLING - GENERAL

- A. General: Except when specifically provided to the contrary, excavation shall include the removal of materials, including obstructions, which would interfere with the proper execution and completion of the work. The removal of such materials shall conform to the lines and grades indicated or ordered. Unless otherwise indicated, all areas affected by the Work within the site shall be stripped of vegetation and debris and shall be grubbed, and such material shall be removed from the work area to the designated stockpile area prior to performing any excavation or placing any fill.
- B. The Contractor shall furnish, place, and maintain supports and shoring that may be required for the sides of excavations. Excavations shall be sloped or otherwise supported in a safe manner in accordance with the more stringent Washington State safety requirements and the requirements of 29 CFR 1926.
- C. Common Excavation includes all material other than rock as described below required for the construction of this project. It includes, but is not restricted to earth, gravel, hardpan, cemented gravel, soft or disintegrated rock, and boulders or detached pieces of solid rock not exceeding 1 cubic yard in volume.
- D. Rock excavation consists of rock boulders greater than 1 cubic yard in volume and bedrock. Rock excavation shall be approved by the Engineer and will be considered a change in the work.
- E. Excavated on-site materials may be used for fill and backfill applications required for construction of this project; provided the material meets the specifications for the intended use and has been properly protected from water conditions that would render it unsuitable. It should be anticipated that use of on-site materials will require screening and/or moisture conditioning to be suitable for backfill.
- F. Removal and Exclusion of Water: The Contractor shall remove and exclude water, including stormwater, groundwater, irrigation water, and wastewater, from excavations. Dewatering wells, wellpoints, sump pumps, or other means shall be used to remove water and continuously maintain groundwater at a level at least 2-feet below the bottom of excavations before the excavation work begins at each location. Water shall be removed and excluded until backfilling is complete and field soils testing has been completed. Care of water shall be in accordance with Section 2140.

3.02 OVER-EXCAVATION

- A. Indicated: Where areas are indicated to be over-excavated, excavation shall be to the depth indicated, and backfill shall be installed to the grade indicated.
- B. Not Indicated: When ordered to over-excavate areas deeper and/or wider than required by the Contract Documents, the Contractor shall over-excavate to the dimensions ordered and backfill to the indicated grade.
- C. Neither Indicated Nor Ordered: Any over-excavation carried below the grade ordered or indicated shall be backfilled and compacted to the required grade with the indicated material as part of the work

3.03 EXCAVATION IN VICINITY OF TREES

Except where trees are indicated to be removed, trees shall be protected from injury during construction operations. No tree roots larger than 2-inches diameter shall be cut without express permission of the Engineer. Trees shall be supported during excavation by any means previously reviewed and accepted by the Engineer.

3.04 DISPOSAL OF EXCESS EXCAVATED MATERIAL

- A. Excess excavated material shall be stockpiled in the Laydown Area/ Soil Stockpile Area or in a designated location. The material shall be seeded, covered or otherwise protected from erosion until completion and acceptance.
 - 1. All stockpile locations shall be approved by the Engineer and shall be located so as to not interfere with other work or disturb adjoining property owners.
 - 2. Stockpiles shall not exceed 10 feet in height at a maximum side slope 4H:1V slopes unless otherwise approved by the Engineer.
 - 3. Organic material shall be segregated from clean fill.

3.05 ROCK REMOVAL

- A. Large rocks greater than 1 cubic yard encountered within the excavation limits may be partially or entirely removed; however, the subsequent backfill for such over excavation shall be done at the Contractor's expense.
- B. No blasting will be allowed on this project.

3.06 BACKFILL

- A. Backfill shall not be dropped directly upon any structure or pipe. Backfill shall not be placed around or upon any structure until the concrete has attained sufficient strength to withstand the loads imposed. Backfill around water-retaining structures shall not be placed until the structures have been tested, and the structures shall be full of water while backfill is being placed.
- B. Except for drain-rock materials being placed in over-excavated areas or trenches, backfill shall be placed after water is removed from the excavation and the trench sidewalls and bottom have been dried to a moisture content suitable for compaction.
- C. Immediately prior to placement of backfill materials, the bottoms and sidewalls of trenches and structure excavations shall have loose, sloughing, or caving soil and rock materials removed. Trench sidewalls shall consist of excavated surfaces that are in a relatively undisturbed condition before placement of backfill materials.
- D. Backfill materials shall be placed and spread evenly in layers. When compaction is achieved using mechanical equipment, the layers shall be evenly spread so that when compacted each layer shall not exceed 6-inches in thickness.
- E. During spreading, each layer shall be thoroughly mixed as necessary to promote uniformity of material in each layer.
- F. Where the backfill material moisture content is below the optimum moisture content, water shall be added before or during spreading until the proper moisture content is achieved. Where the backfill material moisture content is too high to permit the indicated degree of compaction, the material shall be dried until the moisture content is satisfactory.

3.07 STRUCTURE, ROADWAY, AND EMBANKMENT EXCAVATION AND BACKFILL

A. Excavation Beneath Structures and Embankments:

1. Except where otherwise indicated for a particular structure or where ordered by the Engineer, excavation shall be carried to an elevation 12-inches below the bottom of the footing or slab and brought back to grade with compacted materials acceptable for placement beneath structures.
2. The area where a fill or embankment is to be constructed shall be cleared of vegetation, roots, and foreign material. The subgrade areas beneath embankments shall be excavated to remove not less than the top 6-inches of native material and where such subgrade is sloped, the native material shall be benched.
3. Where indicated or ordered, areas beneath structures or fills shall be over- excavated. When such over-excavation is indicated, both over-excavation and subsequent backfill to the required grade shall be performed by the Contractor at no additional cost to the State.
4. After the required excavation or over-excavation for fills and embankments has been completed, the exposed surface shall be scarified to a depth of 6-inches, brought to optimum moisture content, and rolled with heavy compaction equipment to obtain 95 percent of maximum density.

B. Excavation Beneath Concrete Structures: Excavation under concrete structures, beyond any required stripping, shall extend to the bottom of the crushed rock layer. After such excavation has been completed, the exposed surface shall be rolled with heavy compaction equipment to 95 percent of maximum density and then be graded to provide a reasonably smooth surface.

C. Excavation Beneath Paved Areas: Excavation under areas to be paved, beyond any required stripping, shall extend to the bottom of the crushed surfacing or gravel base, if such base is called for; otherwise, it shall extend to the paving thickness. After the required excavation has been completed, the top 12-inches of exposed surface shall be scarified, brought to optimum moisture content, and rolled with heavy compaction equipment to obtain 95 percent of maximum density. The finished subgrade shall be even, self-draining, and in conformance with the slope of the finished pavement. Areas that could accumulate standing water shall be regraded to provide a self-draining subgrade.

D. Notification of Engineer: The Contractor shall notify the Engineer at least three days in advance of completion of any structure or roadway excavation and shall allow the Engineer a review period of at least one day before the exposed foundation is scarified and compacted or is covered with backfill or with any construction materials.

E. Compaction of Fill, Backfill, and Embankment Materials:

1. Each layer backfill materials as defined herein, where the material is graded such that 10 percent or more passes a No. 4 sieve, shall be mechanically compacted to the indicated percentage of density. Equipment that is consistently capable of achieving the required degree of compaction shall be used, and each layer shall be compacted over its entire area while the material is at the required moisture content.
2. Each layer of coarse granular backfill materials with less than 10 percent passing the No. 4 sieve shall be compacted by means of at least two passes from a vibratory compactor that is capable of obtaining the required density in two passes.

3. When backfilling, extra care must be taken so that no damage will occur to foundations or related structures. Where backfill is to be placed against both sides of concrete walls, the backfill shall be brought up evenly on both sides of the wall.
4. Where backfill is to be placed against one side of concrete walls, backfill shall not be placed until the concrete has developed sufficient strength to resist the loading imposed by the backfill. Any abutting concrete walls or beams shall also have attained sufficient strength. In any case, the backfill placement shall not begin until 72 hours after concrete placement and shall not exceed the following schedule (unless high-early strength concrete has been approved for use):

Age of Concrete	Backfill Depth
72 hours	1/2 Wall Height
7 days	2/3 Wall Height
28 days	Full Wall Height

5. Equipment weighing more than 10,000 pounds shall not be used closer to walls than a horizontal distance equal to the vertical depth of the fill above undisturbed soil at that time. Hand operated power compaction equipment shall be used where use of heavier equipment is impractical or restricted due to weight limitations.
 6. Embankment and fill material shall be placed and spread evenly in approximately horizontal layers. Each layer shall be moistened or aerated as necessary. Unless otherwise approved by the Engineer, no layer shall exceed 6-inches of compacted thickness. The embankment and fill shall be compacted in accordance with 3.07.G below.
 7. When an embankment or fill is to be made and compacted against hillsides or fill slopes steeper than 4:1, the slopes of hillsides or fills shall be horizontally benched to key the embankment or fill to the underlying ground. A minimum of 12-inches perpendicular to the slope of the hillside or fill shall be removed and re-compacted as the embankment or fill is brought up in layers. Material thus cut shall be re-compacted along with the new material. Hillside or fill slopes 4:1 or flatter shall be prepared in accordance with PARAGRAPH A, above.
- F. Fill Beneath Structures: Either granular fill or controlled density fill (CDF) may be used as structural backfill beneath footings or floor slabs. Structural fill should meet the requirements of WSDOT Gravel Borrow (WSDOT 9-03.14(1)). Structural fill should be moisture conditioned to within about 3 percent of optimum moisture content, placed in loose, horizontal lifts with thickness less than 8 inches, and systematically compacted to a dense and relatively unyielding condition and to at least 95 percent of the materials maximum dry density as determined using ASTM test method D1557. Structural fill placed beneath footings should have a minimum thickness of 2 feet and extend a minimum of 1 foot beyond the edge of the footing.
- G. Compaction Requirements:
1. The following compaction requirements shall be in accordance with ASTM D1557 (56,000 ft - lbf/ft³) (2,700 kN-m/m³) where the material is graded such that 10 percent or more passes a No. 4 sieve and in accordance with ASTM D4253, and ASTM D4254, where the material is coarse granular backfill materials with less than 10 percent passing the No. 4 sieve.

2. Schedule:

Location or Use of Fill or Backfill	Percentage of Maximum Dry Density	Percentage of Relative Density
Embankments and fills not identified otherwise	90	55
Embankments and fills beneath paved areas or structures	95	70
Backfill beneath structures and hydraulic structures	95	70
Topsoil	80	NA
Aggregate base or subbase	95	NA

3.08 PIPELINE AND UTILITY TRENCH EXCAVATION AND BACKFILL

A. Exploratory Excavation:

1. The Contractor shall excavate and expose buried points of connection to existing utilities to verify existing materials, sizes and conditions. Excavation shall be performed prior to preparation of submittals for connection materials. The data obtained from excavation shall be used in preparing submittals.
2. Damage to utilities from excavation activities shall be repaired by the Contractor in accordance with the General Conditions.

B. General: Unless otherwise indicated or ordered, excavation for pipelines and utilities shall be open-cut trenches with minimum widths as indicated.

C. Trench Bottom: The bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe bedding. Excavations for pipe bells and welding shall be made as required.

D. Open Trench: The maximum amount of open trench permitted in any one location shall be 500-feet or the length necessary to accommodate the amount of pipe installed in a single Day, whichever is greater. Trenches shall be fully backfilled at the end of each day or, in lieu thereof, shall be covered by heavy steel plates adequately braced and capable of supporting vehicular traffic in those locations where it is impractical to backfill at the end of each day. These requirements for backfilling or use of steel plate will be waived in cases where the trench is located further than 100-feet from any traveled roadway or occupied structure. In such cases, however, barricades and warning lights meeting appropriate safety requirements shall be provided and maintained.

E. Where pipelines are to be installed in embankments, fills, or structure backfills, the fill shall be constructed to a level at least one-foot above the top of the pipe before the trench is excavated. Upon completion of the embankment or structural backfill, a trench conforming to the appropriate detail may be excavated and the pipe may be installed.

F. If a moveable trench shield is used during excavation operations, the trench width shall be wider than the shield so that the shield is free to be lifted and then moved horizontally without binding against the trench sidewalls and causing sloughing or caving of the trench walls. If the trench walls cave or slough, the trench shall be excavated as an open excavation with sloped sidewalls or with trench shoring, as indicated and as required by the pipe structural design.

G. If a moveable trench shield is used during excavation, pipe installation, and backfill operations, the shield shall be moved by lifting the shield free of the trench bottom or backfill and then moving the shield horizontally. The Contractor shall not drag trench shields along the trench causing damage or displacement to the trench sidewalls, the pipe, or the bedding and backfill.

H. Placing and Spreading of Backfill Materials

1. Each layer of coarse granular backfill materials with less than 10 percent passing the No. 4 sieve shall be compacted by means of at least two passes from a vibratory compactor that is capable of achieving the required density in two passes and that is acceptable to the Engineer. Where such materials are used for pipe zone backfill, vibratory compaction shall be used at vertical intervals of the lesser of one half the diameter of the pipe, or twenty-four inches, measured in the uncompacted state. In addition, these materials shall be subjected to vibratory compaction at the springline of the pipe and the top of the pipe zone backfill, regardless of whether that dimension is less than 24-inches or not.

2. Each layer of backfill material with greater than 10 percent passing the No. 4 sieve shall be compacted using mechanical compactors suitable for the work. The material shall be placed and compacted under the haunch of the pipe and up each side evenly so as not to move the pipe during the placement of the backfill. The material shall be placed in lifts that will not exceed 6-inches when compacted to the required density.

I. Backfill around and over pipelines that is mechanically compacted shall be compacted using light; hand operated vibratory compactors and rollers that do not damage the pipe. After completion of at least 2-feet of compacted backfill over the top of pipeline, compaction equipment weighing no more than 8,000 pounds may be used to complete the trench backfill.

J. Pipe And Utility Trench Backfill:

1. Pipe Zone Backfill:

a. Definitions: The pipe zone is defined as that portion of the vertical trench cross-section lying between a plane below the bottom surface of the pipe and a plane at a point above the top surface of the pipe as indicated. The bedding is defined as that portion of pipe zone backfill material between the trench subgrade and the bottom of the pipe. The embedment is defined as that portion of the pipe zone backfill material between the bedding and a level line as indicated.

b. After compacting the bedding, the Contractor shall perform a final trim using a stringline for establishing grade, such that each pipe section when first laid will be continually in contact with the bedding along the extreme bottom of the pipe. Excavation for pipe bells and welding shall be made as required.

c. The pipe zone shall be backfilled with Type 1 Pipe Zone Bedding Material. Pipe zone backfill materials shall be manually spread evenly around the pipe, maintaining the same height on both sides of the pipe so that when compacted the pipe zone backfill will provide uniform bearing and side support. The Contractor shall exercise care to prevent damage to the pipeline coating, cathodic bonds, and the pipe itself during the installation and backfill operations.

2. Trench Zone Backfill: After the pipe zone backfill has been placed, backfilling of the trench zone may proceed. The trench zone is defined as that portion of the vertical trench cross-section lying as indicated between a plane above the top surface of the pipe and a plane at a point 18-inches below the finished surface grade, or if the trench is under pavement, 18-inches below the roadway subgrade.

DIVISION 2 - SITE WORK

- a. The trench zone shall be backfilled with Type 2 Native Material for Trench Zone Backfill Material.
- 3. Final Backfill: Final backfill is defined as backfill in the trench cross-sectional area within 18-inches of finished grade, or if the trench is under pavement, backfill within 18-inches of the roadway subgrade.
 - a. In unimproved areas, the final backfill shall be Type 2 Native Material for Trench Zone Backfill Material.
 - b. In areas under pavement (gravel, asphalt, concrete, etc) the final backfill shall be Type 6 Crushed Surfacing.
- K. Identification Tape: Install identification tape as indicated.
- L. If a moveable trench shield is used during backfill operations, the shield shall be lifted to a location above each layer of backfill material prior to compaction of the layer. The Contractor shall not displace the pipe or backfill while the shield is being moved.
- M. Compaction Requirements: The following compaction test requirements shall be in accordance with ASTM D1557 (56,000 ft - lbf/ft³) (2,700 kN-m/m³) where the material is graded such that 10 percent or more passes a No. 4 sieve and in accordance with ASTM D4253, and ASTM D4254, where the material is coarse granular backfill materials with less than 10 percent passing the No. 4 sieve.

Location or Use of Fill or Backfill	Percentage of Maximum Dry Density	Percentage of Relative Density
Pipe embedment backfill for flexible pipe.	90	70
Pipe bedding and over-excavated zones under bedding for flexible pipe, including trench plugs.	90	70
Pipe zone backfill portion above embedment for flexible pipe	90	70
Pipe embedment backfill for rigid pipe	90	55
Pipe zone backfill portion above embedment for rigid pipe.	90	55
Pipe bedding and over-excavated zones under bedding for rigid pipe.	90	70
Final backfill, beneath paved areas or structures.	95	70
Final backfill, not beneath paved areas or structures.	85	55
Trench zone backfill, beneath paved areas and structures.	95	70
Trench zone backfill, not beneath paved areas or structures.	90	55

3.09 FIELD TESTING

- A. General: Field soils testing shall be done by a testing laboratory approved by the Engineer at the Contractor's expense. Additional testing may be performed by the Engineer at its expense.

- B. Where soil material is required to be compacted to a percentage of maximum density, the maximum density at optimum moisture content will be determined in accordance with Method C of ASTM D1557. Where cohesionless, free draining soil material is required to be compacted to a percentage of relative density, the calculation of relative density will be determined in accordance with ASTM D4253 and ASTM D4254. Field density in-place tests shall be performed in accordance with ASTM D1556, ASTM D2922, or by such other means acceptable to the Engineer.
- C. Moisture-density testing shall be performed for each 10,000 cubic yards of each material to establish a representative moisture-density relationship for that 10,000 cubic yards of material. Compaction testing shall be performed for each lift of material placed and each 2,500 square yards of surface area. Additional compaction testing shall be performed at 50-foot maximum intervals in each direction below structures. Compaction testing of pipe bedding and trench backfill shall be performed for each lift of material at 50-foot intervals.
- D. In lieu of compaction testing frequency described above the Contractor may propose to the Engineer a proven compaction pattern for each type of material. Contractor shall prove by testing that its proposed methods and pattern of compaction meets the compaction requirements. The Engineer may accept compaction patterns at its sole discretion, and may require continued testing to confirm compaction.
- E. In case the test of the fill or backfill show non-compliance with the required density, the Contractor shall accomplish such remedy as may be required to insure compliance. Subsequent testing to show compliance shall be paid for by the Contractor.

3.10 FIELD QUALITY CONTROL

- A. Fill Around Structures: The variation above or below the testing edge of a 10-foot straightedge between any two contacts with the finish surface shall not exceed 0.10-feet, nor form any ponding.
- B. Any area which has been shown or shown through testing as not meeting any of the requirements of these Specifications shall be reworked and retested at the Contractor's expense until it complies.

3.11 PRELOADING FOR NEW STRUCTURES

- A. In each location of a new building, borrow material shall be placed on settlement plates in an embankment that shall extend at least 5 feet above finish grade and 5 feet outside of the building footprint. Material placed within the building footprint and above the floor slab elevation shall be compacted to 92% maximum dry density.
- B. Elevations of settlement plates shall be surveyed on a weekly basis for 3 months or until such time that the engineer confirms that the readings may cease and that the embankment can be removed.

END OF SECTION 02200

**SECTION 02240
CONSTRUCTION GEOTEXTILE**

PART 1 - GENERAL

1.01 SECTION INCLUDES

Specifies minimum requirements for construction geotextile.

1.02 REFERENCES

WSDOT Washington State Department of Transportation Standard Specification for Road, Bridge and Municipal Construction M 41-10

1.03 SUBMITTALS

The Contractor shall submit to the Engineer one copy of the following information regarding each geotextile proposed for use:

- A. Manufacturer's name and current address.
- B. Full product name.
- C. Geotextile structure, including fiber/yarn type.
- D. Proposed geotextile uses(s).
- E. Manufacturer's Certificate of Compliance.

PART 2 - PRODUCTS

2.01 GEOTEXTILE

- A. The material shall be a woven/nonwoven/geogrid/other geotextile consisting only of long-chain polymeric filaments or yarns formed into a stable network such that the filaments or yarns retain their position relative to each other during handling, placement, and design-service life.
- B. At least 95% by weight of the long-chain polymers shall be polyolefins or polyesters.
- C. The material shall be free from defects or tears, and free of any treatment or coating that might adversely alter its physical properties after installation.
- D. The fabric shall be inert to biological degradation and resistant to alkaline and acids found in soils. The base plastic shall contain stabilizers and inhibitors to make the fabric resistant to ultraviolet radiation.
- E. The geotextile shall conform to the properties as indicated in WSDOT 9-33.2(1) for each specified use.
 - 1. Underground drainage; Tables 1 & 2.
 - 2. Separation or soil stabilization; Table 3.

2.02 SEAMS

- A. Thread used shall be high-strength polypropylene, polyester, or polyimide thread resistant to ultraviolet radiation. Nylon thread will not be allowed.
- B. If geotextile seams are to be sewn in the field or at the factory, the seams shall consist of two (2) parallel rows of stitching. The 2 rows of stitching shall be 0.5 inch apart with a tolerance of plus or minus 0.25 inch and shall not cross, except for re-stitching. The stitching shall be a lock-type stitch.
- C. The minimum seam allowance, i.e. the minimum distance from the geotextile edge to the stitch line nearest to that edge, shall be 1.5 inches if a flat or prayer seam, Type SSa-2, is used. The minimum seam allowance for all other seam types shall be 1 inch.
- D. The seam, stitch type, and the equipment used to perform the stitching shall be as recommended by the manufacturer of the geotextile and as approved by the Engineer.
- E. The seams shall be sewn in such a manner that the seam can be inspected readily by the Engineer. Thread used to sew seams shall be of contrasting color to the geotextile itself.

PART 3 - EXECUTION

3.01 SHIPMENT AND STORAGE

During periods of shipment and storage, the geotextile shall be kept dry at all times and stored off the ground. Under no circumstances shall the material be exposed to sunlight or other form of ultraviolet rays for more than five calendar days.

3.02 INSTALLATION

- A. The filter fabric shall be placed as shown on the Drawings. The surface to receive the fabric shall be prepared to a smooth, uniform condition free of obstructions, protrusions, depressions, and debris.
- B. The geotextile shall be spread immediately ahead of the covering operation.
- C. Under no circumstances shall the geotextile be dragged through mud or over sharp objects that could damage the geotextile.
- D. The fabric shall not be laid in a stretched condition but laid loosely and smoothly without excessive wrinkles.
- E. In trenches, the geotextile shall either be overlapped a minimum of 1 foot at all longitudinal and transverse joints, or the geotextile joints shall be sewn. In those cases where the trench width is less than 1 foot, the minimum overlap shall be the trench width.
- F. In all other applications, the geotextile shall be overlapped a minimum of 2 feet at all longitudinal and transverse joints or the geotextile joints shall be sewn together.
- G. Pegs, pins, or the manufacturer's recommended method shall be used as needed to hold the geotextile in place until the specified cover material is placed.
- H. The minimum initial lift thickness over the geotextile shall be 12 inches.

3.03 PROTECTION

- A. Gravel fill shall not be dropped on the fabric from a height greater than 3 feet. End-dumping the cover material directly on the geotextile will not be permitted.
- B. Compaction of the first lift above the geotextile shall be limited to routing of placement and spreading equipment only. No vibratory compaction will be allowed on the first lift.
- C. The cover material shall be placed on the geotextile in such a manner that a minimum of 12 to 18 inches of material, depending on the survivability of the geotextile, will be between the equipment tires or tracks and the geotextile at all times.
- D. Construction vehicles shall be limited in size and weight such that rutting in the initial lift above the geotextile is not greater than 3 inches deep to prevent overstressing the geotextile. Turning of vehicles on the first lift above the geotextile will not be permitted.

3.04 REPAIR AND RESTORATION

Fabric damaged or displaced or the overlaps or sewn joints disturbed, as evidenced by visible geotextile damage, subgrade pumping, intrusion, roadbed distortion, or other means before or during installation or during placement of overlying gravel layers shall be removed, and the damaged area replaced or repaired to the Engineer's satisfaction at the Contractor's expense. The repair shall consist of a patch of the same type of geotextile placed over the damaged area. The patch shall overlap the existing geotextile a minimum of 2 feet from the edge of any part of the damaged area.

END OF SECTION 02240

**SECTION 02260
TEMPORARY EROSION AND SEDIMENT CONTROL**

PART 1 - GENERAL

1.01 SECTION INCLUDES

The work under this Section includes providing all labor, materials, tools, and equipment necessary to prepare and maintain Erosion, Sediment, and Storm Water Pollution Control in accordance with the requirements of the Contract Documents and the most current edition of the King County Code and Stormwater regulations.

A. Contractor shall submit a Notice of Intent (NOI) to the Washington State Department of Ecology to comply with the terms of the National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit (General Permit). The General Permit regulates storm water discharges associated with construction activities.

1. The Contractor shall be responsible for complying with NPDES General Permit requirements over entire area affected by the project for the duration of construction.
2. If citations or fines occur the Contractor shall be liable for them and responsible for paying associated fines.

B. A Storm Water Pollution Prevention Plan (SWPPP) and an Erosion and Sediment Control Plan (ESCP) are required for this work to reduce pollutants in storm water discharges and soil erosion from the construction site.

1. The Contractor shall prepare and submit the SWPPP and ESCP for the project and obtain the Owner's approval prior to the beginning of any on-site construction activity.
2. Implement, monitor, maintain, and update the SWPPP and ESCP through all phases of the work and follow all reporting requirements.
3. Pay all costs and liabilities imposed by law as a result of the Contractor's failure to implement and maintain the SWPPP and ESCP.

C. Spill Prevention, Control and Countermeasures Plan (SPCCP): The Contractor shall develop and implement the project SPCCP.

1.02 RELATED SECTIONS

Section 01010 – Summary of Work
Permits and Reports listed in Division 1
Section 02010 – Subsurface Investigation
Section 02240 – Construction Geotextile
Section 02140 – Dewatering.

1.03 REFERENCES

ASTM D4595 – Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method

SWMMWW - Stormwater Management Manual for Western Washington, Washington State Department of Ecology, 2019 (Ecology Manual)

Washington Administrative Code (WAC) - WAC-173A-201A, Water Quality Standards for Surface Waters of the State of Washington.

Where measures in the Specification and the SWMMWW are in conflict, the more stringent measure shall apply.

1.04 SUBMITTALS

Prior to commencement of any land disturbing activity, submit and obtain Owner's approval for a project-specific documents.

- A. Storm Water Pollution Prevention Plan (SWPPP), see format and contents below.
- B. Spill Prevention, Control and Countermeasures Plan (SPCCP).

1.05 QUALITY ASSURANCE

The Contractor's SWPPP shall satisfy all the requirements specified in the General Permit. Define the type, location, and scheduled placement of stabilization practices that will be implemented to prevent soil erosion and off-site movement of sediment. Organize the SWPPP into the following sections:

- A. General Project Information.
- B. Site Description.
- C. Erosion and Sediment Control Plan: describe erosion and sediment control Best Management Practices (BMPs) to be employed. ESC Measures shall include the following:
 - 1. Clearing and Construction Limits.
 - 2. Cover Measures.
 - 3. Perimeter Protection.
 - 4. Traffic Area Stabilization.
 - 5. Sediment Retention.
 - 6. Surface Water Collection.
 - 7. Dewatering Control.
 - 8. Dust Control.
 - 9. Flow Control.
 - 10. Street Sweeping and Vacuum.
- D. Structural Practices.
- E. Storm Water Management: describe techniques and implementation schedule.
- F. Waste Disposal.
- G. Record Keeping: define record keeping practices.
- H. Other Controls: include Inventory of Materials and Non-Storm Water Discharges.

1.06 SITE DESCRIPTION

- A. Location, Topography and Surface Features: The Contract Drawings show the project location, existing site elevations, property description, and locations of proposed excavation, embankment, gravel, grass seeding and planting areas, and drainage structures. The Drawings also illustrate details of BMP locations and types during each phase of construction.
- B. Existing Drainage: PM: update description for project site The project site is generally grass covered, with varied topography as shown on the Contract Drawings. Drainage off the site is currently achieved by overland discharge to the nearby sloughs and then to Puget Sound.
- C. Site Geology: Site geology information is available in the geotechnical engineering report listed in Section 02010.
- D. Pollutant Source During Construction: During the project construction, the likely sources of storm water pollution include, but are not limited to, soil from excavation/backfill operations, soil from construction-related vehicles leaving the construction site, oil and fuel from construction equipment, detergents, metals, pesticides, fertilizers, sanitary wastes, concrete, paint, grease, adhesives, caulking and soil stabilization products.
- E. Contractor's Use of the Site: The Contractor's administration, laydown and storage area shall be as mutually agreed upon by the Contractor and Owner. The areas designated for Contractor's use will contain construction materials, equipment to be used during construction, and construction vehicles. Some control measures to prevent pollution of storm water runoff are described below.

1.07 EROSION AND SEDIMENT CONTROL

- A. Clearing and Construction Limits:
 - 1. Clearing limits shall be installed at the edges of all critical area buffers, sensitive features, and any other areas required to be left uncleared or undisturbed. The following measures are acceptable where appropriate as described in the SWMMWW:
 - a. Brightly Colored Survey Tape.
 - b. Plastic or Metal Fence.
 - c. Stake and Wire Fence.
 - 2. Clearing limits shall be installed per the SWMMWW over all disturbed areas to remain unworked for more than seven days during the dry season (May 1 to September 30) or more than two days during the wet season (October 1 to April 30).
- B. Cover Measures:
 - 1. Surface Roughening: The Contractor shall use heavy equipment to place tread or track grooves perpendicular to slope on all disturbed slopes.
 - 2. Mulch.
 - 3. Nets and Blankets.
 - 4. Plastic Covering.
 - 5. Straw Wattles: Wattles shall be placed in swales, channels, and other locations to create a check dam, slow water velocities, and settle out small solid particles.

6. Temporary Seeding and Sodding.
 7. Application of Soil Stabilizer.
 8. Compost Blankets.
- C. Perimeter Protection: Perimeter protection to filter sediment from sheetwash shall be located downslope of all disturbed areas and shall be installed prior to upslope grading, in accordance with the SWMMWW:
1. Silt Fencing.
 2. Brush Barriers.
 3. Vegetated Strips.
 4. Triangular Silt Dikes.
 5. Compost Berms.
 6. Compost Socks.
- D. Traffic Area Stabilization: Unpaved entrances, roads and parking areas shall be stabilized to minimize erosion and transfer of sediment from the site. The following measures shall be used:
1. Stabilized Construction Entrance: All site access points shall be stabilized to prevent the removal of sediment from the construction site. The stabilized construction access shall be constructed as shown, and in accordance with County requirements. The construction access shall be wide enough to handle the anticipated truck traffic to and from the construction site.
 2. Construction Road & Parking Area Stabilization: Stabilize roads and parking areas immediately after grading per the SWMMWW.
- E. Sediment Retention: Surface water runoff from disturbed areas of the site shall be routed through a sediment pond or trap meeting SWMMWW requirements. The following shall be used, where applicable:
1. Sediment Trap.
 2. Sediment Pond.
 3. Storm Drain Inlet Protection.
- F. Surface Water Collection: Surface water runoff from disturbed areas of the site shall be collected and conveyed. The following shall be used, where applicable:
1. Interceptor Dike and Swale.
 2. Pipe Slope Drains.
 3. Subsurface Drains.
 4. Ditches.
 5. Outlet Protection.
 6. Level Spreader.

G. Dewatering Control:

1. The Contractor shall dewater the site to facilitate construction and to protect the work, as described in Section 02140 - Dewatering. Dewatering discharges shall be handled as though they are stormwater discharges.
2. Water from dewatering shall be routed through sediment retention measures.
3. Water that has come into contact with new concrete shall be monitored for pH and neutralized as appropriate.

H. Dust Control Abatement: The Contractor shall provide dust control to minimize wind transfer of dust to water bodies or to properties adjacent to the site. Dust control measures may include water, salts, or other measures approved by the County and described in SWMMWW. The Contractor shall be responsible for any damage resulting from dust originating from its operations. Dust abatement measures shall be continued until the Contractor is relieved of further responsibility by the Engineer.

1. **Storage Piles:** Enclose, cover, water (as needed), or apply non-toxic soil binders according to manufacturer's specifications on material piles (i.e., gravel, sand, dirt) with a silt content of 5 percent or greater.
2. **Active Areas of Site:** Water active construction areas and unpaved roads as needed and as requested by Engineer.
3. **Inactive Areas of Site:** Apply non-toxic soil stabilizers according to manufacturer's specifications to inactive construction areas, or water as needed to maintain adequate dust control.
4. **Vehicle Loads:** Cover or maintain at least 2-feet of freeboard vertical distance between the top of the load and the top of the trailer sides on trucks hauling dirt, sand, soil, or other loose materials off of the site.
5. **Roads:** When there is visible track-out onto a paved public road, install wheel washers where the vehicles exit and enter onto the paved roads and wash the undercarriage of trucks and any equipment leaving the site on each trip. Sweep the paved street at the end of each shift with a Mobil Athey or similar water spray pick-up broom-type street sweeper as necessary or as directed.

1.08 STORMWATER MANAGEMENT

- A. Install and maintain stormwater management measures prior to final stabilization of the site. The Contractor is not responsible for maintenance after storm water discharges associated with construction activity have been eliminated from the site. Storm water BMP's may include but are not limited to: storm water detention structures (including ponds), storm water retention structures, flow attenuation by use of open vegetated swales and natural depressions, infiltration of runoff onsite, and sequential systems (which combine several practices).
- B. Construct temporary sediment ponds and any other necessary BMPs prior to any construction activities. Direct all temporary drainage swales and/or berms collecting water from disturbed areas to the sediment ponds.
- C. Place velocity dissipation devices at discharge locations and along the length of any outfall channel to provide a non-erosive flow velocity from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected.

- D. Install silt protection per Contract Drawings on all slopes where storm water runoff could potentially mix with surface water.

1.09 WASTE DISPOSAL

- A. Construction Waste: Waste disposal from the construction site for construction wastes, sanitary wastes and hazardous wastes shall be conducted per the requirements of the General Conditions, and the requirements specified herein. All construction wastes shall be disposed of in a proper manner via the use of an onsite dumpster supplied by the Contractor. The Contractor shall provide removal services by a licensed solid waste management firm. The dumpster shall be emptied a minimum of once per week and more often if necessary. The dumpster shall be covered during rain event. Burial of construction wastes onsite is not allowed. The Contractor shall ensure that the Contractor's onsite work crews and Subcontractors are trained and knowledgeable in the proper manner of disposal for construction wastes. Disposal of solid waste from the construction site shall meet all applicable Federal, State, and local codes.
- B. Sanitary Wastes: The Contractor shall provide fixed or portable chemical toilets for use by onsite work crews and Subcontractors. The Contractor shall hire a properly licensed sanitary waste management firm for the disposal of the sanitary waste from the construction site, including the Contractor's trailers and the Owner's trailers. Disposal of sanitary waste from the construction site shall meet all applicable Federal, State, and local codes.
- C. Hazardous Wastes: All hazardous materials used for the construction shall be stored, handled and applied per the manufacturer's printed instructions and per all applicable Federal, State, and local codes. The Contractor shall ensure that the Contractor's onsite work crews and Subcontractors are trained and knowledgeable in the proper manner of disposal for hazardous wastes. The disposal of hazardous wastes from the construction site shall be in the responsibility of the Contractor and be performed by a licensed hazardous waste management firm.

1.10 RECORD KEEPING

The Contractor shall maintain the following records onsite at all times throughout construction:

- A. Records of Construction Activities: Dates shall be recorded when major grading activities occur, construction activities temporarily cease on a portion of the site, construction activities permanently cease on a portion of the site, and when stabilization measures are initiated and completed on the site.
- B. Maintenance and Inspection Reports: The Contractor shall record maintenance performed to repair or correct any implemented storm water or erosion control BMPs. The Contractor shall have on staff someone who is knowledgeable of the proper construction of the controls, be aware of the requirements of the SWPPP, be aware of spill control practices and notification requirements, and maintain clear and accurate inspection reports. The inspection reports will be maintained with the latest version of the SWPPP in the Contractor's construction trailer. Also, when an onsite inspection occurs by a regulatory agency, the Contractor shall record the following: Name of inspector, qualifications of inspector, measures/areas inspected, observed conditions, changes necessary to the SWPPP.
- C. Releases in Excess of Reportable Quantities of Oil or Hazardous Materials (if they occur): The Contractor shall perform the following: shall notify National Response Center (1-800-424-8802) immediately, notify permitting authority in writing within 14 Days, modify the

pollution prevention plan to include: the dates of release, circumstances leading to the release, and steps taken to prevent reoccurrence of the release.

- D. Modifications to the SWPPP: The Contractor shall record any modifications made to the SWPPP throughout construction to comply with minimum permit requirements. In addition, the Contractor shall also record any change in design, construction operation, or maintenance that has an effect on the potential for discharge of pollutants.
- E. Waste Disposal Records: Records of the type and quantity of waste materials disposed from the site, the disposal firm, and other information required by Federal, State, and local regulations. These records shall be maintained in the Contractor's construction trailer during the entire construction period and available for inspection. A copy of the records shall be transferred to the Owner at the end of the construction period.
- F. Weekly Monitoring and Compliance Report: The Contractor shall be responsible to fill out the weekly compliance reports for the King County Grading Permit. The Owner's Resident Project Representative shall be required to review this report for accuracy and sign and date the report by no later than end of workday on Monday of each week. The Owner's Resident Project Representative is responsible to file a report with King County once a month during the dry season and weekly during the wet season.

1.11 INVENTORY OF MATERIALS

The following materials are expected to be present onsite during construction:

- A. Concrete.
- B. Caulking and sealants.
- C. Petroleum-based products such as diesel.
- D. Electrical supplies.
- E. Metallic and plastic piping.
- F. Paints.
- G. Wood for building construction (to include treated wood).
- H. Metal for building construction.
- I. Metal fencing materials.
- J. Masonry and grout.
- K. Insulation.
- L. Rock for riprap.
- M. Fertilizers.
- N. Roofing materials.
- O. Adhesives.
- P. Miscellaneous plastic and paper wrappings.

1.12 NON-STORMWATER DISCHARGES

- A. Non-storm water discharges will result from this construction activity, and each flow shall be handled differently. These activities, as described below, shall not be performed until the proper Storm Water Pollution Controls described above have been installed and are functioning properly.
- B. Flushing of Pipelines: Gravity and pressure raw water pipelines shall be flushed and hydraulically tested after installation. The Contractor shall direct flushing water to the appropriate locations approved by the Engineer, de-chlorinate the water, and lawfully discharge to Soos Creek per permit conditions. The Contractor shall maintain siltation protection during flushing of the pipelines. If the flushing water is contaminated or, if the water is suspected of having been contaminated by a regulated compound, testing may be ordered by the Engineer to determine contamination. Contamination is defined as either having a pH less than 6.0 or greater than 8.0 or evidence of hydrocarbon contamination.
- C. If testing is ordered, the State shall pay for the testing. If the testing indicates the water is contaminated and this occurred due to construction activities under the control of the Contractor, the Contractor shall reimburse the State for all costs associated with the testing. The Owner will be the sole judge on whether the flushing water is contaminated.
- D. Dewatering of Uncontaminated Groundwater: The Contractor shall comply with all requirements in the dewatering specification section herein.
- E. The Contractor shall maintain siltation protection during disposal of water from dewatering activities, including groundwater from micro-tunneling dewatering activities.
- F. The Contractor shall manage and dispose of groundwater separately from storm water runoff.
- G. Miscellaneous Washdown Water for Buildings and Pavement: Washdown of structures and pavement shall only occur in areas having no sign of contamination of hazardous substances, such as vehicle oil or fuel. Washdown water shall be directed to the storm drain system via proper grading of the site, particularly in the area of the washdown. Any contamination shall be removed in accordance with appropriate regulations.
- H. Equipment Testing: Water from equipment testing and plant start-up shall be discharged to an onsite retention pond if the water is uncontaminated (as defined above). The method of disposal shall be as approved by the Owner prior to commencement of equipment testing or plant testing.

PART 2 - PRODUCTS

2.01 ORANGE SAFETY FENCE

- A. Fence material shall be composed of high-density polyethylene material with a tensile strength of 360 lbs./ft using ASTM D4595 testing method. The fence color shall be high visibility orange.
- B. Posts shall be 2-inch x2-inch wood posts, standard or better, or metal T-posts.

2.02 TEMPORARY SILT FENCE

- A. Filter fabric shall be Mirafi "Envirofence 100x" or approved equal meeting the following requirements:
 - 1. Provide filter fabric composed of strong rot-proof woven or non-woven polymeric fibers oriented into a stable network such that the fibers retain their relative positions with respect to each other.
 - 2. Provide filter fabric free of any chemical treatment or coating which may significantly reduce permeability and flaws and defects which could significantly alter its physical properties.
 - 3. Provide filter fabric with ultraviolet ray inhibitors and stabilizers.
 - 4. Provide filter fabric that meets the requirements described in Part 2.03 for Geotextile for Temporary Silt Fence.
- B. Posts: 2-inch x 4-inch wood posts, standard or better; or steel T- posts.
- C. Wire Mesh Fabric: 2-inch x 2-inch x 14 gauge.

2.03 GEOTEXTILE FOR TEMPORARY SILT FENCE

General Properties for Geotextile and Thread for Sewing:

- A. The material shall be a geotextile consisting only of long chain polymeric fibers or yarns formed into a stable network such that the fibers or yarns retain their position relative to each other during handling, placement, and design service life.
- B. At least 95 percent by weight of the material shall be polyolefins or polyesters.
- C. The material shall be free from defects or tears.
- D. The geotextile shall be free of any treatment or coating which might adversely alter its hydraulic or physical properties after installation.
- E. Thread used for sewing shall consist of high strength polypropylene, polyester, or polyamide. Nylon threads will not be allowed. The thread used to sew permanent erosion control geotextiles shall be resistant to ultraviolet radiation. The thread shall be of contrasting color to that of the geotextile itself.
- F. All geotextile properties are minimum average roll values (i.e., the test result for any sampled roll in a lot shall meet or exceed the values shown in the table).
- G. The test procedures used are essentially in conformance with the most recently approved ASTM geotextile test procedures, except for geotextile sampling and specimen conditioning, which are in accordance with WSDOT Test Methods 914 and 915, respectively.
- H. The seam breaking strength tests are with seam located in the center of 8-inch long specimen oriented parallel to grip faces.

Table 02260 – 2.03 H Geotextile for Silt Fence	
Property	Value
Grab	200 pounds
Mullen burst	450 pounds per square inch (psi)
Trapezoidal tear	75 pounds
Grab elongation	15 percent
U.V. stability	90 percent strength retained
Permeability coefficient	0.004 centimeters per second
A.O.S.	40
Slurry flow rate	0.35 gallons per minute per square foot
Slit retention	75 percent
Vertical water flow rate	6 gallons per minute per square foot

2.04 TEMPORARY PLASTIC COVER MEASURES

Plastic sheeting shall be minimum 6-mil thick, polyethylene film meeting the requirements of the NIST Voluntary Product Standard, PS 17-69, for polyethylene sheeting having a minimum thickness of 6 mils.

2.05 TEMPORARY STRAW MULCH COVERS

Straw mulch shall meet the requirements of WSDOT Standard Specifications Section 9-14.4(1). All straw mulch material shall be in an air-dried condition free of noxious weeds and other materials detrimental to plant life. Straw shall be seasoned before baling or loading and shall be suitable for spreading with mulch blower equipment.

2.06 EROSION CONTROL MATTING

- A. Jute matting shall be of a uniform open plain weave of unbleached, single jute yarn treated with a fire retardant chemical. The yarn shall be of a loosely twisted construction and shall not vary in thickness by more than half of its nominal diameter. Jute matting shall be furnished in rolled strips approximately 50 yards in length. Matting width shall be 48 inches with an average weight of 0.92 pound per square yard. A tolerance of *1 inch in roll width and *5 percent in weight per square yard will be allowed.
- B. Stakes for securing erosion control matting to earth surfaces shall be a minimum 12 inches in length, and shall have sufficient strength to withstand pounding the stakes into soil flush with the surface. Stake materials may be one or more of wire staples, steel pins, steel spikes, and wooden stakes.

2.07 CATCH BASIN

Acceptable catch basin filters include:

- A. Siltsack by Atlantic Construction Fabrics Inc., 800/448-3636
- B. StreamGuard by Foss Environmental, 800/909-3677
- C. Emcon Insert by Emcon NW, 425/462-1280
- D. Beaver Dam or Dandy Bag by Dandy Products Inc., 800/591-2284
- E. Envirodrain by Drain Warden, or
- F. Approved equal.

2.08 OTHER EROSION AND SEDIMENT CONTROL MATERIALS

As submitted by the Contractor and approved by the Owner.

PART 3 - EXECUTION

3.01 GENERAL

Keep a copy of the General Permit and Owner-approved SWPPP and ESCP on site at all times.

3.02 ESC SUPERVISOR

The Contractor shall designate an ESC Supervisor who shall be responsible for the performance, maintenance, and review of ESC measures and for compliance with all permit conditions relating to ESC as described in the SWMMWW and applicable permits. The ESC Supervisor shall be a Certified Professional in Erosion and Sediment Control, or a Certified Erosion and Sediment Control Lead recognized in King County, WA.

3.03 MAINTENANCE/INSPECTION PROCEDURES

- A. Any and all erosion control structures, and stabilization practices will be inspected by the Owner on a weekly basis at a minimum and before, during, and after any rain event of 0.5 inches or greater.
- B. The SWPPP shall be jointly modified by the Contractor and Owner as necessary to include additional or modified BMPs designed to correct problems and ensure compliance with regulations. Written revisions to the SWPPP shall be made by the Contractor within 7 calendar days following any identified corrections. Copies of the revised SWPPP shall be provided to all parties and to the Owner.
- C. Inspect all areas that undergo temporary and final stabilization with seeding or sodding and erosion control blanket; reseed areas that have lack of growth and bare spots to ensure healthy growth.
- D. All erosion control structures, and stabilization practices shall be maintained in good working condition throughout the duration of the construction project.
- E. Repair of the damage to any erosion control structure or erosion control blanket shall be completed by the Contractor within 24 hours of discovery of the damage.
- F. In locations where silt fences or wattles are used around catch basins, remove trapped sediment when one-third of the height of the silt fence or wattle is covered by sediment.
- G. Conduct water quality sampling in the event of accidental discharge that affects the nearby receiving water. The sampling protocol for visible and non-visible pollutants shall be developed and approved by the Owner.

3.04 SPILL PREVENTION

- A. Material Best Management Practices: Utilize the following good housekeeping techniques when construction materials are onsite:

DIVISION 2 - SITE WORK

1. Only materials used for this construction project shall be stored onsite. These materials shall be stored in quantities reasonable for use on this project.
 2. Materials shall be stored in a neat and orderly fashion in their original containers. The materials shall be protected from the elements as specified by the manufacturer.
 3. The handling and storage of all materials shall follow the manufacturer's written instructions, the project specifications, or applicable governmental codes; whichever is most stringent.
 4. Construction materials storage containers shall be disposed in a proper manner and, if possible, only after all the contents have been used.
 5. The Contractor shall maintain on file, at the Contractor's construction trailer, all manufacturer's printed recommendations for the storage, handling, use, and disposal of construction materials.
 6. The Contractor shall inspect the materials storage area on a daily basis and ensure that proper housekeeping practices are utilized for materials storage.
 7. The Contractor shall maintain an inventory of construction materials stored onsite. The inventory shall be kept in the Contractor's construction trailer and be available for inspection by the Owner.
 8. During adverse weather, as described in the General Conditions of the Contract Documents, and against the possibility thereof, the Contractor shall take all necessary precautions to insure the protection of the construction materials storage areas.
- B. Hazardous Materials. The following additional housekeeping practices shall be followed for hazardous construction materials:
1. Hazardous materials shall be stored separately from non-hazardous materials onsite.
 2. Products shall remain in their original containers with the original legible product label attached to the container.
 3. All products shall be used before disposal of the container.
 4. The handling and storage of all hazardous materials shall follow the manufacturer's written instructions, the project specifications, or applicable governmental codes, whichever is most stringent.
 5. Hazardous materials, including diesel fuel, must be stored in contained areas which are able to contain 150 percent of the volume of the largest container's contents. If the area is not exposed to storm water, the volume of the containment area shall be 110 percent of the volume of the largest container's contents. Each hazardous material shall be stored in its own containment area. Under no circumstances shall hazardous materials be used or stored within 100 feet of any water supply well, unless specifically permitted by the Owner and governing Federal, State, or local agency.
 6. At the minimum, the containment area shall be constructed with dikes and lined with a material resistant to the properties of the hazardous material being contained. Before removal of any storm water from the containment area, a representative sample of the water shall be tested for contamination by the hazardous material stored in that containment area. For example, if the hazardous material is an acid, the pH of the rainwater shall be measured prior to disposal. Disposal of non-contaminated storm water shall be directed to the nearest storm drain system component. If the storm water is found to be contaminated, as defined above, the Contractor shall follow the spill control measures for this hazardous material.

DIVISION 2 - SITE WORK

7. The Contractor shall maintain all manufacturer's storage, handling, use, and disposal recommendations and Material Safety Data Sheets of all hazardous materials at the Contractor's construction trailer.
 8. The Contractor shall inspect the hazardous materials storage area on a daily basis and ensure proper storage of the hazardous materials.
 9. The Contractor shall maintain an inventory of hazardous materials stored onsite. The inventory shall be kept in the Contractor's construction trailer and be available for inspection by the Owner.
 10. When transferring or unloading hazardous materials, the Contractor shall ensure that the area is protected from stormwater and that the materials transfer operation shall not cause contamination (as defined above) to stormwater. The hazardous materials handling operation shall occur in a contained area of the construction site.
 11. During adverse weather and against the possibility of damage thereof, the Contractor shall take all necessary precautions to insure the protection of the hazardous materials storage areas.
- C. Product Specific Practices: Special storm water management specific practices shall be utilized for specific products. These products are discussed in the following paragraphs.
1. Petroleum-Based Products: All onsite vehicles shall be properly maintained and checked for any leaks of fluids or petroleum-based products. If a leak is found, the vehicle shall be repaired immediately or removed from the site. Diesel fuel shall be considered a hazardous material and stored in a containment area as indicated above.
 2. Acid and Base Chemicals: All acid and base chemicals are considered hazardous materials and shall be stored in containment areas as described above. Disposal of acid or base chemicals shall, under no circumstances occur via the storm drain system, but instead through proper hazardous materials disposal procedures.
 3. Fertilizers and Pesticides: Fertilizers and pesticides shall be applied at the minimum rate recommended by the manufacturer. Pesticides shall be applied by a certified pesticide applicator. Fertilizers shall be protected from exposure to stormwater. Contents of partially used bags of fertilizer shall be transferred to sealable containers to prevent spillage and exposure to stormwater and rain. Fertilizer shall be worked into the soil upon application in all areas to be seeded and landscaped.
 4. Concrete Trucks: The washdown of concrete trucks or the disposal of unused or unacceptable concrete from a concrete truck will be permitted onsite only if the Contractor has set aside a specific area for this purpose, with dikes to prevent contact between the washdown water or excess concrete and stormwater. Once the solids in the area have hardened, the Contractor shall dispose of the solids off-site in an approved manner.
 5. Paints, Thinners, and Solvents: Paints, thinners, and solvents shall be stored in their original containers. Unused paints, thinners, and solvents shall not be dumped onsite or disposed through the sanitary or storm sewer system. Disposal of unused paints, thinners, and solvents shall be through proper hazardous materials disposal procedures.
 6. Asphalt Cement Paving: The Contractor shall avoid paving operations during a rain event.

DIVISION 2 - SITE WORK

- D. Spill Control Practices: In addition to good housekeeping practices, hazardous materials practices, and the product specific practices as described above, the following practices shall be followed for spill prevention, control, cleanup, and notification:
1. Any and all spills shall be contained and cleaned immediately.
 2. The Contractor shall notify the Owner and all applicable governmental agencies if a spill occurs.
 3. Manufacturer's printed instructions for the cleanup of a spill shall be kept onsite by the Contractor at all times. The Contractor's work crews and Subcontractors shall be required to be familiar with the requirements and procedures for spill cleanup. Equipment necessary for spill cleanup, such as gloves, metal containers, mops, etc., shall be maintained onsite by the Contractor. The cleanup instructions and the location of the cleanup equipment shall be maintained at the Contractor's construction trailer during construction activities.
 4. Workers involved in the cleanup of a spill shall be properly protected by protective suits, ventilation masks, goggles, and other necessary equipment, prior to contact with the spilled material.
 5. The Contractor shall name an employee who will be onsite full-time throughout the duration of the project as the spill cleanup coordinator. The spill cleanup coordinator will be responsible for notifying the proper personnel and agencies of a spill and obtaining the proper equipment and personnel to clean up the spill. The name and phone number where the spill cleanup coordinator can be reached at all times shall be posted on the construction site. The spill cleanup coordinator shall be properly trained in spill cleanup procedures.
 6. The Contractor shall maintain material data safety sheets for all hazardous materials in the Contractor's trailer. The spill cleanup coordinator shall have access to the material data safety sheets at all times during construction.
 7. After a spill is contained and cleanup, a spill occurrence report shall be completed by the Contractor. The SWPPP shall be modified to prevent a reoccurrence of a type of spill.
 8. Spills that affect surface water will require water quality sampling.

END OF SECTION 02260

**SECTION 02510
HOT MIX ASPHALT**

PART 1 - GENERAL

1.01 SECTION INCLUDES

This section consists of hot mix asphalt paving, including preparation, soil residual herbicide, striping, curbing, and related items.

1.02 RELATED SECTIONS

Crushed surfacing base course (CSBC) shall consist of 1 1/4 inch minus crushed rock per SECTION 02200 – EARTHWORK

Crushed surfacing top course (CSTC) shall consist of 3/4 inch minus crushed rock per SECTION 02200 – EARTHWORK

1.03 REFERENCES

Washington State Department of Transportation – Standard Specifications for Roads, Bridges, and Municipal Construction (M41-10), latest edition.

WSDOT 5-04.3(4)B - Soil Residual Herbicide

WSDOT 9-02.1(4) - Performance Graded (PG) Asphalt Binder

WSDOT 9-34.2 - Paint

WSDOT 8-04.3(1) - Cement Concrete Curbs, Gutters, and Spillways

WSDOT 8-22 – Pavement Marking

WSDOT Standard Plan F-10.42-00 – Extruded Curb

AASHTO T355 - Standard Method of Test for In-Place Density of Asphalt Mixtures by Nuclear Methods

AASHTO T166 - Standard Method of Test for Bulk Specific Gravity (G mb) of Compacted Asphalt Mixtures Using Saturated Surface-Dry Specimens

1.04 SUBMITTALS

A. HMA Mix Design and material certifications stating conformance with the requirements of this Section. Mix design must be currently approved on the WSDOT Qualified Products List (QPL).

B. Herbicide and the proposed rate of application. Include the following information in the request for approval of the material:

1. Brand Name of the Material

2. Manufacturer

3. Environmental Protection Agency (EPA) Registration Number
4. Safety Data Sheet
5. Proposed Rate of Application

- C. Crushed rock
- D. Striping Paint

1.05 SEQUENCING

Contractor shall notify Engineer at least 72 hours prior to work layout. During Engineer's inspection of the site, arrangements will be made for the beginning of paving.

1.06 ESTABLISHMENT OF GRADES AND LAYOUT

- A. Finished grades shall be as shown on Drawings or as determined by the Engineer, slope to drain as shown. Contractor is responsible for all layout subject to Engineer's approval.
- B. Maintain all survey benchmarks, monuments, and other reference points. If disturbed or destroyed, replace without cost to the State. Protect existing objects designated to remain.

1.07 TRAFFIC CONTROL

The Contractor will be responsible for establishing and maintaining traffic control (flagmen, signs, etc.). Site closures shall be approved two weeks in advance by Engineer. Include all costs in Schedule I – Base Bid.

PART 2 - PRODUCTS

2.01 CRUSHED SURFACING

CSBC and CSTC shall meet the requirements of SECTION 02220 – EARTHWORK.

2.02 SOIL RESIDUAL HERBICIDE

- A. Soil residual herbicide shall be nonselective, wettable, powder herbicide approved for use under pavement by the Washington State Department of Agriculture shall be applied to all areas to be paved. A recommended soil sterilant for treatment of paved areas is a non-organic water-soluble herbicide "Polyborchlorate" by Chemtura, Casoron G-4, or approved equal.
- B. Materials shall be specifically approved by the Owner prior to application.

2.03 HOT MIX ASPHALT

Hot mix asphalt aggregate shall meet the requirements of WSDOT 9-03.8(6) HMA Class 1/2 inch. Hot mix asphalt binder shall be PG 58H-22 for Western Washington.

2.04 PERFORMANCE GRADED ASPHALT BINDER

Binder shall meet the specification requirements listed in WSDOT 9-02.1(4).

2.05 TACK COAT

A tack coat shall be applied between any existing asphalt pavement and new asphalt pavement. Polymerized Cationic Emulsified Asphalt shall be CRS-1 and meet the requirements of WSDOT Section 9-02.1(6).

2.06 JOINT SEALER

The joint sealer shall meet the requirements of WSDOT Specification 9-04.2 for rubberized sealant. A sand-slurry mixture shall be placed on any exposed portion of the joint sealer material.

2.07 SAMPLING AND TESTING

Not Used.

2.08 STRIPING PAINT

All striping paint shall meet WSDOT 9-34.2 for solvent based paint and be on the current WSDOT QPL for Paint Pavement Marking or Engineer approved equal.

2.09 CONCRETE CURBING

- A. Extruded curbing shall meet WSDOT 8-04.3(1), and shall be Type 6 as detailed in WSDOT Standard Plan F-10 42-00.
- B. Precast reinforced bumper curbing shall be 6 inches high, 10 inches wide, 6 feet in length, and located as shown on the Drawings.

PART 3 - EXECUTION

3.01 EQUIPMENT

All equipment, tools, and machines used in performance of the work are subject to approval of the Engineer and shall be maintained in satisfactory working condition at all times.

3.02 PREPARATION OF PAVING SURFACE

- A. Contractor shall over excavate and remove any subgrade material deemed unsuitable by Engineer. Once suitable bearing is reached (as determined by Engineer), the Contractor shall proceed in placing additional CSBC and compacting in 6 inch lifts until final subgrade elevation is reached.
- B. Compact surfacing material to at least 95 percent of standard density. Determination of in-place density may be made by the Nuclear Gauge or Washington Densimeter methods as outlined by WSDOT.

- C. Vibratory compactors and/or rollers shall be adequate in design and number to provide required compaction. A mist spray of water shall be applied during compaction effort as needed to replace moisture in crushed rock lost by evaporation. The completed surfacing layer shall be smooth, tight, and uniform and reasonably true to line, grade, and depth as shown on the Drawings.
- D. Any areas that do not have a minimum thickness of 2 inches of compacted CSTC after fine grading and compacting shall be brought up to the required depth with new material as directed by the Engineer.

3.03 SOIL RESIDUE HERBICIDE

- A. Contractor shall apply one application of an approved soil residual herbicide to all crushed rock areas to receive pavement. Application shall be in accordance with the manufacturer's recommendations.
- B. Applications shall comply with WSDOT 5-04.3(4)B.

Use herbicide registered with the Washington State Department of Agriculture for use under pavement. Before use, obtain the Engineer's approval of the soil residual herbicide. Application of chemical herbicides shall be by an experienced applicator licensed by the Washington State, Department of Agriculture for the class of herbicide used.

3.04 HOT MIX ASPHALT

- A. All asphalt concrete shall achieve a uniform compacted thickness. Compact HMA to at least 90 percent of theoretical maximum density. Determination of in-place density may be made by the Nuclear Density Gauge per WSDOT FOP for AASHTO T355 or by core testing per WSDOT SOP 734 and FOP for AASHTO T166.
- B. Care shall be taken to ensure no bituminous materials enter surface water body during placing. Do not place asphalt when ground temperature is below 45°F or upon a wet surface without Engineer's permission. Place in accordance with applicable requirements of WSDOT 5-04.
- C. Surface of completed work when tested with a 10 foot straightedge shall contain no irregularities in excess of 1/4 inch. All surface deficiencies shall be corrected to the satisfaction of the Engineer. All costs for correcting deficiencies shall be paid by the Contractor.

3.05 SHOULDER ROCK

- A. After the asphalt surface has been rolled and compacted, apply CSTC against all exposed asphalt edges to prevent distortion of the pavement edge from the specified line and grade.
- B. Shoulder rock shall be flush with top of pavement for a minimum width of 12 inches unless otherwise shown on the Drawings. Grade and compact materials to 95 percent maximum density.
- C. Provide an even grade at locations with vehicle transition from pavement to gravel. Extend CSTC 10 feet into gravel or as approved by Engineer. Grade and compact materials to 95 percent.

3.06 PAVEMENT MARKING

- A. Lay out and mark parking area as indicated on the Drawings with 4 inch wide white stripe. Pavement marking shall conform to WSDOT 8-22.
- B. Handicapped accessible parking stall symbol shall be painted, white in color, 2 feet tall, of standard design, with blue square background and centered in the bottom of the stall not at curb.
- C. Directional arrows shall be painted and 4 feet long, 18 inches wide at the flare, and placed where shown on the Drawings.
- D. Apply 2 coats of pavement marking conforming to the requirements of WSDOT 8-22.

3.07 CONCRETE CURBING

- A. Replace any existing curbing that is impacted as part of the construction activities. Curbing shall be placed so that a uniform cross section and grade are maintained. No surface irregularities shall be permitted. Joints in curb shall be spaced at 10 foot intervals.
- B. Manufactured Wheel Stop: Install precast bumper curbing in locations shown on the Drawings. Bumper curbing shall be pinned at each end of curbing. Recess pins 1 inch below top of curb and then grout anchor pin hole. Anchor pins shall consist of No. 4 rebar driven a minimum of 2 feet into the ground surface.
- C. Any damage incurred to the curbing prior to acceptance by the State shall be removed and replaced at the Contractor's expense.

3.08 DAMAGE TO EXISTING FACILITIES

The Contractor shall protect existing facilities from spills or over spray. Any damage to existing facilities caused by the Contractor shall be repaired to the satisfaction of Engineer at no additional cost to the State.

3.09 CLEANUP

- A. Contractor is responsible for leaving construction area in a clean condition free of construction material and debris. All paving shall be reasonably free of gravel and/or dirt prior to final inspection.
- B. All spilled and sprayed bituminous products on existing facilities shall be removed and the surface cleaned as directed by the Engineer.

3.10 TRAFFIC CONTROL

When paving roadways or road approaches, the Contractor shall be responsible for establishing and maintaining traffic control (signs, flag person(s), etc.) as required by Engineer or local governmental authorities. Include all costs in the Base Bid.

END OF SECTION 02510

**SECTION 02601
MANHOLES AND VAULTS**

PART 1 - GENERAL

1.01 SECTION INCLUDES

Provide precast concrete manholes, vaults, and box culvert complete and in place, in accordance with the Contract Documents.

1.02 RELATED SECTIONS

Section 01300 – Contractor Submittals
Section 02200 – Earthwork
Section 03300 – Cast in Place Concrete
Section 05500 – Miscellaneous Metals
Section 10426 – Signs and Identifying Devices

1.03 REFERENCES

AASHTO H-20
ACI 318 – Building Code Requirements
ASTM A48 - Gray Iron Castings
ASTM C150 - Portland Cement
ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
ASTM C478 - Precast Reinforced Concrete Manhole Sections
ASTM C798 - Precast Reinforced Concrete Box Sections for Culvert, Storm Drains and Sewers
ASTM C923 - Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals

1.04 SUBMITTALS

A. Shop Drawings:

1. Show dimensions, locations, lifting inserts, reinforcement, and joints.
2. Structural design calculations for vaults, signed by a registered engineer in the State of Washington.

B. Manufacturer's Certification for Vaults: Written certification that the vault complies with the requirements of this Section.

C. Manufacturer's Test Results: Pull out force for manhole steps.

1.05 QUALITY ASSURANCE

Inspection: After installation, the Contractor shall demonstrate that manholes and vaults have been properly installed, level, with tight joints, at the correct elevations and orientations, and that the backfilling has been carried out in accordance with the Contract Documents.

PART 2 - PRODUCTS

2.01 MANHOLES

- A. The Contractor shall provide precast manhole sections and conical sections conforming to ASTM C 478 and the requirements of this Section. Adjusting rings shall be standard items from the manufacturer of the manhole sections. Minimum wall thickness of rings shall be 4-inches if steel reinforced and 6-inches if not reinforced.
- B. Axial length of sections shall be selected to provide the correct total height with the fewest joints.
- C. Conical sections shall be designed to support cast iron frames and covers under an H-20 loading, unless indicated otherwise.
- D. Where the manhole barrel diameter is greater than 48-inches, a flat slab-transition, either concentric or eccentric, shall be used to transition to 48-inch diameter riser sections. Underside of the transition shall be at least 7-feet above the top of the bench.
- E. Design Criteria: Manhole walls, transitions, conical sections, and base shall be designed per ASTM C 478 for the depths indicated and the following:
 - 1. AASHTO H-20 loading applied to the cover.
 - 2. Unit weight of soil of 120 pcf located above all portions of the manhole.
 - 3. Lateral soil pressure based on saturated soil producing 100 pcf acting on an empty manhole.
 - 4. Internal fluid pressure based on unit weight of 63 pcf with manhole filled from invert to cover with no balancing external soil pressure.
 - 5. Dead load of manhole sections fully supported by the base and transition.
 - 6. Additional reinforcing steel in walls to transfer stresses at openings.
 - 7. The minimum clear distance between the edges of any 2 wall penetrations shall be 12-inches or one-half of the diameter of the smaller penetration, whichever is greater.
- F. Joints shall be sealed with o-ring gaskets conforming to ASTM C443.
- G. Where joints are designed in pre-cast concrete manholes, such joints shall be interlocking to secure proper alignment between members and prevent migration of soil through the joint. Structural sections at joints shall be sized sufficiently to reinforce the section against localized distress during transportation and handling and against excess contact bearing pressures through the joint.

DIVISION 2 – SITE WORK

- H. Concrete for base and channel formation shall be 4000 psi concrete conforming to Section 03300 Cast-In-Place Concrete.
- I. Barrel section to sewer pipe connections shall be sealed with resilient connectors complying with ASTM C923. Mechanical devices shall be stainless steel.
- J. Manhole ladders shall meet OSHA requirements and requirements of Section 05500.
- K. Manhole Manufacturers, or Equal
 - 1. Granite Precasting & Concrete, Inc., Bellingham, WA
 - 2. Hanson Concrete Products, Inc., Tacoma, WA
 - 3. Oldcastle/AMCOR Precast, Nampa, ID

2.02 FRAMES AND COVERS

- A. Castings: Castings for manhole frames and covers shall be non-rocking and shall conform to the requirements of ASTM A48, Class 30. Unless otherwise indicated, cast iron covers and frames shall be heavy traffic type, 24 inches in diameter, with embossed lettering to meet the requirements of the City. Frame and cover shall be designed for H-20 traffic loading.
- B. Castings Manufacturers, or Equal
 - 1. Alhambra Foundry Co., Ltd.
 - 2. Neenah Foundry Co.
 - 3. Vulcan Foundry, Inc.
- C. Where indicated hatches conforming to Section 05500 shall be provided instead of frames and covers.

2.03 VAULTS

- A. The Contractor shall provide precast vaults designed for the indicated applications and of the sizes indicated.
- B. The minimum structural member thickness for vaults shall be 5-inches. Cement shall be Type V Portland cement as specified in ASTM C150. The minimum 28-day concrete compressive strength shall be 4,000 psi. All reinforcing steel shall be embedded in the concrete with a minimum clear cover as recommended by ACI 318.
- C. Design Loading: Vaults in areas subject to vehicular traffic shall be designed for H-20 traffic loading. Vaults in other areas shall be designed for a vertical live load of 300 psf. Lateral loads on vaults in all areas shall be calculated from:

$$L = 90 h, \text{ plus surcharge of } 240 \text{ psf in areas of vehicular traffic}$$

Where:

$$L = \text{loading in psf}$$

$$h = \text{depth of fill in feet}$$

- D. Groundwater Uplift: Vaults shall be designed to resist groundwater uplift assuming that the groundwater table is at the ground surface. Provide additional thickness in the base slab as required.
- E. Where joints are designed in pre-cast concrete vaults, such joints shall be interlocking to secure proper alignment between members and prevent migration of soil through the joint. Structural sections at joints shall be sized sufficiently to reinforce the section against localized distress during transportation and handling and against excess contact bearing pressures through the joint.
- F. Where openings for access to the vault are required, the full clear space opening indicated shall be provided, without obstructions from brackets or supports. For large openings where brackets or supports are designed to protrude into the opening for support of required covers, such brackets or supports shall be designed to be easily removed and replaced with a minimum of effort and without cutting or welding.
- G. Covers for access openings shall be provided. Frames for covers shall be fabricated from steel, galvanized after fabrication, and shall be integrally cast into the vault concrete sections. All covers shall be tight fitting to prevent the entrance of dirt and debris. Where edge seams are permitted, no gaps greater than 1/16-inch between edges will be accepted. All covers, except round, heavy-weight, cast iron manhole covers, shall have securing mechanisms to hold the covers firmly in place against the effects of repetitious live loads such as pedestrian or vehicle traffic.
- H. Where penetration of the pre-cast concrete vault is required for piping, conduit, or ducts, such penetrations shall be accommodated through pre-cast openings or thin-wall knock-out sections. All openings for penetrations shall be smooth and free of surface irregularities and without exposed steel reinforcing. Vaults need not be designed to resist thrust from piping passing through the vault.
- I. Warning Signs:
 - 1. The entrance to every manhole and vault shall be fitted with a permanently affixed, plastic warning sign, located above and centered on the top step. Each sign shall be in accordance with Section 10426.
 - 2. Sign Manufacturer, or Equal
 - a. W. H. Brady Company
 - b. Seton Nameplate Corporation

PART 3 - EXECUTION

3.01 GENERAL

- A. Pre-cast concrete sections shall be transported and handled with care in accordance with the manufacturer's written recommendations. Where lifting devices are provided in pre-cast sections, such lifting devices shall be used as intended. Where no lifting devices are provided, the Contractor shall follow the manufacturer's recommendations for lifting procedures to provide proper support during lifting

DIVISION 2 – SITE WORK

- B. Buried pre-cast concrete vaults shall be assembled and placed in excavations on properly compacted soil foundations as indicated. Pre-cast concrete vaults shall be set to grade and oriented to provide the required dimensions and clearances from pipes and other structures
- C. Prior to backfilling, all cracks and voids in pre-cast concrete vaults shall be filled with non-shrink grout or polyurethane sealant, or both. Around pipe and conduit penetrations, openings shall be sealed with polyurethane sealant. With the authorization of the Engineer, grout or a closed-cell flexible insulation may be used as filler material prior to placing a final bed of polyurethane sealant. See pipe specifications for additional manhole penetration requirements.
- D. Steps shall be driven into tapered holes formed in the concrete by inserts from the step manufacturer or 1-inch holes drilled 3-3/4-inches deep into the manhole wall in the field. No more than 6-1/8 inches of plastic arm, measured on the inside of the step, shall be exposed outside the concrete.
- E. Steps shall be installed 12-inches on centers vertically, not more than 1/2 inch out of plumb. The top step shall be no more than 12-inches below the manhole cover.
- F. The Contractor shall be responsible for selecting the appropriate precast concrete manhole components, allowing for a maximum height of 2 foot 2 inch from the top of the cone section or top slab to the finished surface grade for installation of the manhole frame and cover including 8 inches minimum for leveling or adjustment brick, or concrete collar. The surface grade for frame and cover on unimproved roadways shall match the adjacent existing roadway surface. On Projects calling for regrading and pavement improvements, the grade sheet furnished by the Engineer will show the approximate top grade for manhole within plus or minus 0.2 feet. The final grade will be set by the Engineer.
- G. Final elevation and slope of the frame and cover shall conform to the restored and adjacent Street or finish surface. No warping of grades in lieu of manhole frame adjustment will be allowed. All joints in the brick or ring adjustment shall be filled with mortar, and the casting shall be seated in mortar placed on the top brick course. A 3/8-inch thick mortar lining shall be installed inside and outside the adjustment section to provide a smooth, watertight finish.

END OF SECTION 02601

**SECTION 03000
GENERAL CONCRETE PROVISIONS**

PART 1 - GENERAL

1.01 SECTION INCLUDES

This section specifies general requirements for all sections of DIVISION 3 - CONCRETE.

1.02 RELATED SECTIONS

Provisions of the GENERAL CONDITIONS, SUPPLEMENTAL CONDITIONS, and DIVISION 1 of the Contract are by this reference a part of this division and shall govern work under this division where applicable.

1.03 REFERENCES

References listed in DIVISION 3 are from the following organizations' latest editions of their publications and reference standards (unless indicated otherwise):

AASHTO American Association of State Highway and Transportation Officials
(LRFD Bridge Design Specifications, 9th Edition)

ACI American Concrete Institute (ACI 318-14)

APA American Plywood Association

ASTM American Society for Testing and Materials

AWS American Welding Society

CRSI Concrete Reinforcing Steel Institute

IBC International Building Code, Latest Washington State Approved Edition

WSDOT Washington State Department of Transportation (Standard Specification
for Road, Bridge, and Municipal Construction)

1.04 SUBMITTALS

Submit shop drawings in all sections of DIVISION 3 in accordance with the GENERAL CONDITIONS.

- A. Product Data: Submit manufacturer's data for all items in Division 3 indicating shapes, sizes, and chemical, physical, and structural properties.
- B. Shop Drawings: Submit shop drawings including complete plan and profiles, size, details, spacings, splicing details, supporting and spacing devices, schedules for fabrication, and assembly of members, and other pertinent data. Indicate welds by AWS symbols and show size, length, and type of weld. Identify details by reference to sheet and detail number on the Drawings.

1.05 QUALITY ASSURANCE

All installation and product use shall be in accordance with the manufacturer's written instructions.

PART 2 - PRODUCTS

2.01 MATERIALS

See other sections of DIVISION 3.

PART 3 - EXECUTION

3.01 See other sections of DIVISION 3.

END OF SECTION 03000

**SECTION 03100
CONCRETE FORMWORK**

PART 1 - GENERAL

1.01 SECTION INCLUDES

This section specifies formwork for cast-in-place concrete, with shoring, bracing, and anchorage. Also included are openings, form accessories, and stripping of forms.

1.02 RELATED SECTIONS

Section 03300 – Cast Concrete
Section 03370 – Concrete Curing

1.03 REFERENCES

ACI 301 – Specifications for Concrete Construction
ACI 347 – Guide to Formwork for Concrete

1.04 QUALITY ASSURANCE

Construct and erect concrete formwork in accordance with ACI 301 and 347. Design, engineer, and construct formwork, shoring, and bracing to meet design and code requirements so that resultant concrete conforms to required shapes, lines, and dimensions.

PART 2 - PRODUCTS

2.01 FORM MATERIALS

- A. All materials shall conform to ACI 301.
- B. Fillets for chamfered corners shall be of wood strips or rigid plastic in maximum lengths.
- C. Forms for all concrete exposed to view shall be APA PS-1 B-B Plyform Class I Exterior or as approved by the Engineer.

2.02 FORM DESIGN

- A. As a minimum, all forms shall be 3/4 inch plyform with all edges supported, except for special locations as approved by the Engineer.
- B. As a minimum, forms shall have double 2 inch by 4 inch walers at 24 inches o.c. and a maximum snap tie spacing of 24 inches o.c., or single wale camlock-style forms where approved by the Engineer. For exposed surfaces, deflection of plywood, studs, or walers shall be limited to L/400 of the span (or L/360 of the span for unexposed surfaces).

- C. For narrow walls, etc. where the bottom of the form is inaccessible, lower form boards shall be left loose so that they may be removed for cleaning out extraneous material immediately before placing the concrete.
- D. The Contractor shall be responsible for ensuring the adequacy of all formwork to produce in the finished structure the lines, grades, and tolerances indicated on the Contract Drawings.

2.03 FORMWORK ACCESSORIES

- A. Form-Release Agent: Nontoxic, colorless material compatible with concrete tints, non-residual, and which will not stain concrete, absorb moisture, or impair subsequent applications. L&M Construction Chemicals "Debond" or approved equal. Form-release agents for concrete in contact with process water shall be certified by the U.S. Department of Agriculture. The agent shall have VOC loss of 350 grams/liter or less.
- B. Form Ties: Bolts and rods may be used for internal ties.
 - 1. Form ties for water-holding structures and on walls exposed to weather or earth shall have conical or spherical-type inserts, and be so constructed that when the forms are removed, no metal shall be within 5/8 inch of any surface. Plastic or rubber inserts shall be used with flat bar ties for panel forms, be a minimum of 1 inch in depth, and of sufficient dimensions to permit proper grouting of the tie hole. All form ties shall provide adequate and positive spacing of the forms before and during the placing and processing of the concrete. Wire form ties will not be allowed.
 - 2. For non-water holding structures, form ties shall be metal, factory fabricated, removable or snap-off, that will leave holes no greater than 1/2 inch to 1 inch in diameter, not less than 1½ inches deep in surfaces to be exposed or painted, and shall not project beyond the concrete elsewhere.

PART 3 - EXECUTION

3.01 INSPECTION

Verify lines, levels, and measurements before proceeding with formwork.

3.02 PREPARATION

- A. Hand trim sides and bottoms of earth forms, and remove any loose materials prior to placing concrete.
- B. Minimize form joints. Symmetrically align joints and make watertight to prevent leakage of mortar.
- C. Arrange and assemble formwork to permit stripping, so that concrete is not damaged during its removal.
- D. Arrange forms to allow stripping without removal of principal shores, where shores are required to remain in place.

3.03 ERECTION

- A. All forms shall be built mortar tight and of sufficient rigidity to prevent distortion due to pressure of the concrete and other incidental construction loads, including the effects of vibration of concrete.
- B. The Contractor shall provide bracing to ensure stability of formwork. Strengthen formwork liable to be overstressed by construction loads.
- C. The Contractor shall construct formwork to maintain tolerances in accordance with SECTION 03300.
- D. Provide 3/4 inch by 3/4 inch chamfer strips at all exposed edges or corners of concrete.

3.04 APPLICATION OF FORM-RELEASE AGENT

- A. The Contractor shall apply form-release agent on formwork in accordance with manufacturer's instructions. Apply prior to placing reinforcing steel, anchoring devices, and embedded items.
- B. Do not apply form-release agent where concrete surfaces are scheduled to receive applied coverings or special finishes which may be affected by agent. Soak contact surfaces of untreated forms with clean water and maintain in wet condition until concrete is placed.

3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. The Contractor shall provide formed openings where required for work embedded in or passing through concrete.
- B. The Contractor shall coordinate work of other Specifications sections in forming and setting openings, slots, recesses, chases, sleeves, plates, bolts, anchors, and other inserts.
- C. The Contractor shall install accessories in accordance with manufacturer's instructions, level and plumb, and ensure items are not disturbed during concrete placement.

3.06 FORM REMOVAL

- A. The Contractor shall not remove forms and shoring until concrete has sufficient strength to support its own weight and construction and design loads which may be imposed upon it. Remove load-supporting forms when concrete has attained 75 percent of required 28 day compressive strength, provided construction is re-shored.
- B. The removal of forms as stipulated herein shall in no case relieve the Contractor of responsibility for the final acceptability or appearance of the work. In general, forms shall remain in place a minimum length of time as follows where average temperature is 40°F or higher:
 - 1. Columns, wall faces, footings, piers, and abutments where forms do not support the load of concrete: 72 hours (3 days).
 - 2. Crossbeams, caps, inclined walls, and columns where forms support the load of concrete: 120 hours (5 days).

DIVISION 3 - CONCRETE

3. Side forms of footings may be removed 24 hours after concrete placement if a curing compound is applied immediately.
 4. Forms for walls not yet supporting loads may be removed 48 hours after concrete placement, immediately finished according to SECTION 03300 and cured as required in SECTION 03370.
- C. Where lower temperatures or other conditions warrant, the Engineer shall decide, on the basis of post-placement conditions, the exact number of days that shall elapse before form removal.
- D. Remove formwork progressively so no unbalanced loads are imposed on structures.
- E. Any concrete surfaces damaged during form removal shall be repaired in accordance with SECTION 03300.
- F. All form tie holes shall be patched with a dry-pack cement mortar fill as specified in SECTION 03300.
- G. Forms shall not be stripped from concrete which has been placed at a temperature under 50°F without first determining if the concrete has properly set, regardless of the time element. If, in the opinion of the Engineer, stripping of forms on the basis of the specified schedule results in damage to the concrete, the schedule shall be modified to prevent such damage.

END OF SECTION 03100

**SECTION 03210
REINFORCING STEEL**

PART 1 - GENERAL

1.01 SECTION INCLUDES

This section specifies reinforcing steel and accessories for concrete work.

1.02 RELATED SECTIONS

Not Used.

1.03 REFERENCES

ACI 318 – Building Code Requirements for Structural Concrete

ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A493 - Standard Specification for Stainless Steel Wire and Wire Rods for Cold Heading and Cold Forging

ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

ASTM A706 - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement

ASTM A775 - Standard Specification for Epoxy-Coated Steel Reinforcing Bars

AWS D1.4 – Structural Welding Code – Steel Reinforcing Bars

1.03 SUBMITTALS

A. Contractor shall submit mill test certificates of supplied concrete reinforcing, indicating physical and chemical composition.

B. Contractor shall indicate on the shop drawings sizes, spacings, locations, and quantities of reinforcing steel, bending and cutting schedules, splicing, stirrup spacing, and supporting and spacing devices.

1.04 QUALITY ASSURANCE

Contractor shall perform concrete reinforcement work in accordance with the current ACI 318.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Uncoated-finish steel reinforcing bars shall consist of Grade 60 (unless noted otherwise) round, deformed bars. Deformed reinforcing bars for concrete reinforcement shall conform to the requirements of ASTM A615. Reinforcing bars requiring welding as shown on the Drawings shall conform to ASTM A706.
- B. Epoxy-coated reinforcing bars, when specified by the Engineer, shall be coated in accordance with ASTM A775. Epoxy-coated bar supports, form ties, and nylon, epoxy, or plastic-coated tie wire shall be used when epoxy-coated reinforcing bars are specified.
- C. Reinforcing steel shall be protected at all times from injury, and when placed in the formwork be free from dirt, loose mill scale, rust scale, paint, oil, or any other foreign substance.

2.02 ACCESSORY MATERIALS

- A. General: Chairs, bolsters, bar supports, and spacers shall be sized and shaped for strength and support of reinforcement during installation and placement of concrete. Materials shall be manufactured from standard bright basic wire.
- B. Bar Supports:
 - 1. Girder and slab reinforcement steel shall be supported on mortar blocks not more than 1 1/2 inches square. The blocks shall be constructed of mortar mixed in the same proportions of sand and cement as used in the concrete.
 - 2. Mortar blocks shall have a tie wire embedded, and the protruding ends shall be tied to the reinforcing steel to hold the mortar blocks in place. Mortar blocks with a grooved top may be used for supporting steel in slabs. If metal chair supports are used as steel supports for reinforcing bars, all surfaces of the chair supports not covered by at least 1/2 inch of concrete shall be treated by one of the following methods:
 - a. Hot-dip galvanized after fabrication in accordance with ASTM A153 Class D.
 - b. Plastic coating, provided that the plastic is firmly bonded to the metal, has a minimum thickness of 3/32 inch at point of contact with the form and is not chemically reactive with the concrete. The plastic shall not shatter or crack at temperatures down to -5°F, nor will it deform sufficiently to expose the metal at a temperature of 200°F. Plastic coatings that have shattered, cracked, or deformed enough to expose the metal will be rejected.
 - c. Stainless steel conforming to the requirements of ASTM A493 Type 302.
- C. Tie Wire:
 - 1. Ties shall be made with a minimum 16 gauge, annealed-type tie wire.
 - 2. Use epoxy-coated tie wire when using epoxy-coated reinforcement.

2.03 FABRICATION AND BENDING

- A. All bars shall be bent cold. If approved by the Engineer, welding shall be performed by certified welders in accordance with AWS D1.4.
- B. Unless otherwise shown on the Drawings, the Contractor shall fabricate reinforcing to provide clearances as listed under Minimum Cover.
- C. Reinforcement partially embedded in concrete shall not be field bent, except as permitted by the Engineer, or as shown on the Drawings.

2.04 HOOKS AND BENDS

Hooks and bends of steel reinforcing bars shall be bent to the inside diameters specified in ACI 318, as shown below.

TABLE 03210 - 2.04	
Stirrups and Ties:	
Sizes No. 5 and Smaller	4 Bar Diameters
Sizes No. 6 through No. 8	6 Bar Diameters
Sizes No. 9 through No. 11	8 Bar Diameters
Sizes No. 14 and No. 18	10 Bar Diameters
Other than for Stirrups and Ties:	
Sizes No. 3 through No. 8	6 Bar Diameters
Sizes No. 9 through No. 11	8 Bar Diameters
Sizes No. 14 and No. 18	10 Bar Diameters

2.05 SPLICING

- A. General: All steel bars used for concrete reinforcement shall be furnished in the full lengths where possible. Splices that are permitted or shown on the Drawings shall be well distributed or located at points of low tensile stress. Locate reinforcing lap splices not indicated on the Drawings at points of minimum stress. Indicate location of splices on shop drawings. No splices will be permitted at points where the section is not sufficient to provide a minimum distance of 2 inches between the splice and the nearest adjacent bar or the surface of the concrete. The bars shall be rigidly clamped or wired at all splices. Bars that are lapped for splicing shall be placed in contact for the length of the splice and tied together. Splices shall be staggered where possible.
- B. Seismic: (for regions of low, moderate or high seismic risk) see the Drawings for specific seismic detailing requirements.
- C. Unless otherwise detailed on the Drawings, the minimum splice lengths shall be as follows:

TABLE 03210 - 2.05C				
BAR#	GRADE 60 PLAIN		GRADE 60 EPOXY COATED	
	Concrete Compressive Strength		Concrete Compressive Strength	
	3000 psi	4500 psi	3000 psi	4500 psi
3 & under	2'	2'	2'-3"	2'-3"
4	2'	2'	2'-3"	2'-3"
5	2'-4"	2'-4"	2'-10"	2'-10"
6	3'	2'-9"	3'-7"	3'-4"
7	4'	3'-6"	4'-11"	4'-3"
8	5'-3"	4'-7"	6'-5"	5'-7"
9	6'-8"	5'-9"	8'-1"	7'

PART 3 - EXECUTION

3.01 INSTALLATION

A. Placing Reinforcing Steel:

1. Reinforcing steel shall be accurately placed in the positions shown on the Drawings and held securely during the pouring of the concrete. In general, all reinforcement shall be put in proper position and securely wired and blocked before concrete is poured in any section. Stirrups and ties shall always pass around and be securely tied to the main flexural/tension steel members. Girder and slab reinforcing steel shall be supported on mortar blocks or other approved means of support. Tack welding of reinforcing bars shall not be allowed. If approved by the Engineer, welding shall be performed by certified welders in accordance with AWS D1.4.
2. Before placing concrete, clean reinforcement of foreign particles, loose scale, or coatings. The Contractor shall place, support, and secure reinforcement against displacement. Do not deviate from alignment or measurement.
3. At all openings in structural slabs and walls, provide a minimum of 1 No. 4 bar at each of the top and bottom of slab or faces of wall or slab at 45 degrees on all 4 corners, in addition to a minimum of 1 No. 4 bar on all sides of square or rectangular openings, and hoops at each face for each round opening, unless otherwise shown on the Drawings.
4. The Contractor shall notify the Engineer when reinforcing is in place for inspection of reinforcement prior to placement of concrete. No concrete shall be placed until the Owner or Owner's representative has inspected the placing of the reinforcing steel and has given permission to pour concrete. All concrete placed in violation of this provision may be rejected and removal required.

B. Minimum Cover:

1. The minimum clear space between reinforcing bars shall be as follows (unless otherwise shown on the Drawings):

TABLE 03210 - 3.01 - B1	
Between parallel bars in a layer	Bar Diameter (1 inch minimum)
Between adjacent layers	1 inch

2. Except as otherwise shown on the Drawings, the minimum thickness of concrete cover over reinforcing bars shall be as shown in the following tables:

TABLE 03210 - 3.01 - B2 CAST IN PLACE CONCRETE (NON-PRESTRESSED)	
Concrete cast against and permanently exposed to earth	3 inches
Concrete exposed to earth or weather: No. 6 through No. 18 bar No. 5 bar, W31 or D31 wire, and smaller	2 inches 1 1/2 inches
Concrete not exposed to weather or in contact with ground: Slabs, walls, joists: No. 11 bar and smaller Beams, columns: Primary reinforcement, ties, stirrups, spirals Shells, folded plate members: No. 6 bar and larger No. 5 bar, W31 or D31 wire, and smaller	3/4 inch 1 1/2 inches 3/4 inch 1/2 inch

TABLE 03210 - 3.01 - B3 CAST-IN-PLACE CONCRETE (PRESTRESSED CONCRETE) Minimum Cover 1"	
Concrete cast against and permanently exposed to earth	3 inches
Concrete exposed to earth or weather: Walls, panels, slabs, joists Other members	1 inch 1 1/2 inches
Concrete not exposed to weather or in contact with ground:	
Slabs, walls, joists	3/4 inch
Beams, columns:	
Primary reinforcement Ties, stirrups, spirals	1 1/2 inches 1 inch
Shells, folded plate members:	3/8 inch
No. 5 bar, W31 or D31 wire, and smaller Other reinforcement	d _b , but not less than 3/4 inch

TABLE 03210 - 3.01 – B4 PRECAST CONCRETE (Manufactured under plant control conditions)	
Concrete exposed to earth or weather:	
Wall panels:	
No. 14 and No. 18 bars, pre-stressing tendons larger than 1 1/2 inch diameter	1 1/2
No. 11 bar and smaller, pre-stressing tendons 1/2 inch diameter and smaller W31 and D31 wire and smaller	3/4
Other members:	
No. 14 and No. 18 bars, pre-stressing tendons larger than 1 1/2 inch diameter	2
No. 6 through No. 11 bars, pre-stressing tendons larger than 5/8 inch diameter through 1 1/2 inch diameter	1 1/2
No. 5 bar and smaller, pre-stressing tendons 5/8 inch diameter and smaller, W31 and D31 wire, and smaller	1 1/4
Concrete not exposed to weather or in contact with ground:	
Slabs, Walls, Joists:	
No. 14 and No. 18 bars, pre-stressing tendons larger than 1 1/2 inch diameter	1 1/4
Pre-stressing tendons 1 1/2 inch diameter and smaller	3/4
No. 11 bar and smaller, W31 or D31 wire, and smaller	5/8
Beams, columns:	
Primary reinforcement d_b but not less than 5/8 and need no exceed	1 1/2
Ties, stirrups, spirals	3/8
Shells, folded plate members:	
Pre-stressing tendons	3/4
No. 6 bar and larger	5/8
No. 5 bar and smaller, W31 or D31 wire, and smaller	3/8

C. Bar Placement Tolerances:

1. Between bars: 1/4 inch, plus or minus
2. Vertical position of bars in slabs and beams:
 - a. Members 8 inches deep or less: 3/8 inch, plus or minus
 - b. Members over 8 inches deep: 1/2 inch, plus or minus

DIVISION 3 - CONCRETE

3. Bars may be moved to avoid interference with other reinforcing steel, conduits, or embedded items. If moved more than 1 bar diameter or stipulated tolerances, consult with the Engineer to determine final placement.
- D. Tie Wire: At a minimum, 50 percent of reinforcing steel intersections shall be connected with tie wire.
- E. Welding: Welding of reinforcing shall be prohibited unless explicitly allowed by the Engineer in writing or as shown on the Drawings. If approved by the Engineer, welding shall be performed by certified welders in accordance with AWS D1.4.

END OF SECTION 03210

**SECTION 03300
CAST-IN-PLACE CONCRETE**

PART 1 - GENERAL

1.01 SECTION INCLUDES

Cast-in-place concrete slabs, walls, footings, grade beams, columns, beams, and piers.

1.02 RELATED SECTIONS

Not Used.

1.03 REFERENCES

AASHTO T-23 – Standard Method of Test for Making and Curing Concrete Test Specimens in the Field

ACI 301 – Specifications for Concrete Construction

ACI 305R – Guide to Hot Weather Concreting

ACI 306R – Guide to Cold Weather Concreting

ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

ASTM C94 – Standard Specification for Ready-Mixed Concrete

ASTM C150 - Standard Specification for Portland Cement

ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete

ASTM C494 - Standard Specification for Chemical Admixtures for Concrete

ASTM C595 - Standard Specification for Blended Hydraulic Cements

ASTM C719 - Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)

ASTM C881 - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete

ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)

ASTM D1752 - Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction

WSDOT Standard Specifications

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301.
- B. Obtain materials from same source throughout the work.

1.05 TESTING

- A. Testing and analysis of concrete shall be performed by the contractor under provisions of ACI 301 and/or WSDOT Standard Specifications. Concrete testing and analysis shall include, at a minimum, compressive strength cylinders, temperature, slump, and air entrainment.
- B. The Engineer's representative may also perform tests at will in accordance with the above standards. The cost of tests conducted by the State shall be paid by the State. Additional testing costs resulting from substandard concrete as indicated by the State's tests, shall be paid by the Contractor at no additional cost to the State.
- C. During placement of concrete, the Contractors testing agency shall prepare standard test cylinders in accordance with AASHTO T-23, which shall represent concrete poured during the job. Concrete testing and analysis shall occur at a minimum at the following frequencies:
 - 1. For placement of one class of concrete, 50 cubic yards or less:
 - a. Sample each truck, after 1/2 cy has been discharged from truck, until one truck meets all applicable acceptance test requirements.
 - b. After one truck meets the acceptance test requirements, the remaining concrete may be visually inspected.
 - 2. For placement of one class of concrete greater than 50 cubic yards:
 - a. Sample initial truck after 1/2 cy has been discharged from the truck (this material may not be placed in the forms).
 - b. Sample each truck until two successive loads meet all applicable acceptance tests requirements. Once two loads meet the acceptable standard, the sampling and testing frequency may decrease to one for every five truck loads.
 - c. For all trucks, after the initial truck, sample the concrete after a minimum of 1/2 yd³ (1/2 m³) of concrete has been discharged into the forms.
- D. Two cylinders shall be tested for strength at the end of 28 days in accordance with ASTM C39 or WSDOT Standard Test Methods as set forth in the WSDOT Materials Manual. Additional cylinders may be taken in sets of two, to verify concrete strength prior to 28 days at the contractor's discretion and cost.
- E. During cold or hot weather, one additional test cylinder shall be taken and cured at the site under the same conditions as the concrete pour from which it was taken.
- F. Concrete not conforming to the Specifications, concrete damaged from any cause, or concrete found to be defective for any reason shall be replaced by the Contractor with acceptable concrete at no additional cost to the State. Any concrete test that shows concrete in place that is below the specified requirements shall be reason for removal of the entire pour, and any subsequent concrete deposited will also be jeopardized. The concrete shall be removed and replaced by the Contractor at no additional cost to the State.

1.06 SUBMITTALS

- A. **Manufacturer's Data - Concrete Work:** Submit manufacturer's data with application and installation instructions for proprietary materials and items, including admixtures, patching compounds, water stops, joint systems, dry-shake finish materials, grout, and others as requested by the Engineer.
- B. **Placement Schedule:** Prepare a placement schedule and submit it for review prior to start of concrete placement operations.
- C. **Delivery Tickets:** Furnish copies of delivery tickets for each load of concrete delivered to the site. Provide items of information to the Engineer as specified under ASTM C94.
- D. **Proposed mix design** to the Engineer for review and acceptance prior to commencement of work.
- E. **Results of tests certifying conformance** made by a recognized testing laboratory acceptable to the Engineer.

PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS

- A. **Cement:**
 - 1. Cement shall be classified as Portland Cement or blended hydraulic cement.
 - 2. Portland cement shall conform to ASTM C150 Type I or II (low alkali), gray color.
 - 3. Blended hydraulic cement shall conform to ASTM C595, Type IP(X) or Type IS(X).
 - a. For Type IP(X), X shall be a maximum 35% fly ash, or 50% ground granulated blast furnace slag.
 - b. For Type IS(X), X shall be a maximum of 50% ground granulated blast furnace slag.
 - 4. All cement used in this work shall be taken from stock bins at the place of manufacture.
 - 5. Cement delivered to the site of the work shall at all times be suitably stored or protected from exposure to the atmosphere. If the cement shows signs of deterioration, it shall be removed from the work site unless additional tests show that it conforms to the requirements stated above.
- B. **Fine and Coarse Aggregates:**
 - 1. **Fine Aggregate:** Fine aggregate shall conform to WSDOT Standard Specifications 9-03.1(2)B and shall consist of sand or other inert materials or combinations thereof having hard, strong, durable particles free from adherent coating. Fine aggregate shall be washed thoroughly to remove clay, loam, alkali, organic matter, or other deleterious matter.
 - 2. **Coarse Aggregate:** Coarse aggregate shall conform to WSDOT Standard Specifications 9-03.1(4)C , AASHTO Grading No. 67 or 57 and shall consist of gravel, crushed stone, or other inert material or combinations thereof having hard, strong, durable pieces free from adherent coatings. It shall be washed thoroughly to remove clay, silt, bark, sticks, alkali, organic matter, or other deleterious material. Use of pit or bank-run gravel is not permitted.

3. Combined Aggregate Gradation: As an option to using coarse and fine graded aggregates, aggregate gradation may consist of a combined gradation with a nominal maximum size of 1 inch or 3/4 inch per WSDOT Standard Specifications 9-03.1(5)B.
 4. Approved aggregates shall be so stored as to prevent deterioration, segregation, or intrusion of foreign matter. Improper storage will be considered a reason for rejection of affected aggregate.
- C. Water: Water shall be any potable water, clean and free of injurious amounts of oil, acid, alkali, and organic material. Water containing 2 percent or more common salt shall not be used.

2.02 ADMIXTURES

- A. Air Entrainment: An air-entraining admixture meeting ASTM C260 shall be used when specified in PARAGRAPH 2.05 - CONCRETE MIX.
- B. Chemical Admixture: Water-reducing, retarding, and/or accelerating admixtures shall be used when specified in PARAGRAPH 2.05 - CONCRETE MIX, meeting ASTM C494 or as approved by the Engineer.
- C. Calcium chloride shall not be used.

2.03 GROUT

- A. Nonshrink grout shall consist of a hydraulic cementitious system conforming to ASTM C 1107 (Grade C), specially graded and composed of processed natural fine aggregate and additives as required. The material shall meet all of the following requirements:
 1. 28 day compressive strength: $f'_c = 7500$ psi.
 2. Nonmetallic.
 3. Free of gas-producing or releasing agents.
 4. Free of oxidizing catalysts.
 5. Free of inorganic accelerators, including chlorides.
 6. SikaGrout 212, or approved equal.
- B. Epoxy grout for embedding rebar, brick ties, and bolts shall be a two-component mixture conforming to IBC seismic requirements, Hilti HIT-RE 500-SD or Engineer approved equal. Application of all epoxy grout shall be in accordance with the manufacturer's specifications or instructions.
- C. General-purpose grout for grout fills shall consist of one part Portland cement, one part fine aggregate, and two parts coarse aggregate by volume. The aggregate in the nominal mix may be varied slightly to give the most workable mix, but in no case shall the volume of the coarse material be less than 1 1/2 times the volume of the fine. No more than 5 gallons of mixing water, including moisture in the aggregate, shall be used for each sack of Portland cement. The consistency shall be the driest consistency possible.

- D. Grout used for anchoring reinforcing bars into rock shall be cementitious with Sika Intraplast-N grouting aid as an expansion/fluidifying water-reducing admixture, or Engineer approved equal. The grout mix design shall be in accordance with the admixture manufacturer's recommendations for the intended use. Contractor shall submit mix design for Engineer's approval.

2.04 MORTAR

Mortar for build-up at various surfaces and hand-sack rubbing shall be composed of approximately one part Type II Portland Cement, 1 1/2 to 2 parts Silica Sand (for sack finishing) or sand passing No. 16 sieve (for build-up), an amount of air-entraining admixture per sack of cement to produce an air content of 9 percent by volume, and sufficient water to make a workable mix with consistency like thick cream. Masonry Sand shall not substitute for Silica Sand for sack finishing. Thicker mix is required for filling voids. Sand, cement, water, and air-entraining admixture shall be as specified for concrete.

2.05 CONCRETE MIX

- A. Mix concrete in accordance with ASTM C94. The specified compressive strength at 28 days are listed below. The Contractor shall ensure that the water/cement ratio does not exceed the specified amount. Refer to PARAGRAPH 3.03.G for slump requirements.

FOR THIS PROJECT, USE MIX # 2.

TABLE 03300 - 2.05- A				
	Mix Design			
	1	2	3	4
Specified Compressive Strength at 28 days, minimum psi.	4500	4500	3000	3000
Air Entrainment	None ¹	4.5-7.5%	None ¹	4.5-7.5%
Cementitious, pounds per cubic yard, minimum pounds	564	564	540	540
Water/cement by weight, maximum	0.44 0.38 ²	0.44 0.38²	0.50 0.45 ²	0.50 0.45 ²

¹No entrained-air content entrapped air only.

²Reduced water/cement ratio applies to concrete for underwater placement (4000W) or low-shrink concrete (LS) requirements. Use of a water-reducing admixture is mandatory for these applications. Increase coarse and fine aggregate weights to adjust the yield.

³Aggregate weights listed are based on a specific gravity of 2.67. The concrete plant shall adjust aggregate proportions for the specific gravity of the aggregates used and note the changes on the Submittal.

- B. Use accelerating admixtures in cold weather only when reviewed and accepted by the Engineer. Use of admixtures will not relax cold weather placement requirements.
- C. Use set-retarding admixtures during hot weather only when reviewed and accepted by the Engineer.
- D. Use water-reducing admixtures as reviewed and accepted by the Engineer.
- E. Contractor may use fly ash or ground granulated blast furnace slag (GGBFS) as a constituent of the concrete. A mix design shall be provided for Engineer's approval before usage.

DIVISION 3 - CONCRETE

- F. Failure of any concrete to meet the specified 28 day strength in place as determined by test cylinders shall be reason for removal of the entire pour, and any subsequently placed concrete will be thereby jeopardized. All work necessary for correction will be at the Contractor's expense.
- G. Should the concrete not meet the 28 day test strength, the Contractor may at his option and expense make test corings and tests to the satisfaction of the Engineer.

2.06 BONDING AGENT

- A. Bonding agent for bonding new concrete to hardened concrete shall conform to ASTM C881.
- B. Bonding agent shall be Symons Rescon Epoxy Bonder MV, or Engineer approved equal.

2.07 WATER STOP

Waterstop shall be 4 inches wide, PVC, 4 inch x 3/16 inch Ribbed Center Bulb, manufactured by Sika/Greenstreak Group, Inc. – Model Number 702 – Type CH2M Hill; or Engineer approved equal. Corners shall be miter, shop manufactured. Splices shall be welded in accordance with manufacturer's requirements and recommendations.

2.08 EXPANSION JOINT MATERIAL

- A. Pre-formed expansion joint material shall be rubber compound, conforming to ASTM D1752, Type 1, and be full depth of the joint, less expansion joint sealant and backer rod, 1/2 inch thick. A.P.S., Rubber Expansion Joint Filler or Engineer approved equal.
- B. Pre-formed expansion joint material for driveways, sidewalks, etc. shall be asphalt impregnated fiber, conforming to ASTM D994, full depth of joint, 1/2 inch thick. A.P.S. Fiber Board or Engineer approved equal.

2.09 EXPANSION JOINT SEALANT

Sealant shall be one part cold applied, non-sagging silicone. Color shall be gray. Movement capability shall be +100% / -50% per ASTM C719. Dow Corning NS Parking Structure Sealant or Engineer approved equal. Depth of sealant shall be 1/2 the joint width, utilizing closed-cell foam back rod under the sealant.

PART 3 - EXECUTION

3.01 INSPECTION

Verify anchors, seats, plates, reinforcements, and other items to be cast into concrete are accurately placed, held securely, and will not be detrimental in placing concrete.

3.02 EMBEDMENTS

- A. Embedded items shall be installed where shown on the Drawings or as described in these Specifications. Expansion anchors shall not be acceptable substitution for anchor bolts.
- B. Any embedded items shall be accurately positioned prior to concrete placement and firmly held in place until concrete has set.

- C. Waterstops shall be installed in required joints as close to the center of the joint as possible, on the water side of the reinforcing. Flexible-type waterstop should be firmly tied and/or fixed in position to prevent movement during placement of concrete. Install waterstop in accordance with manufacturer's recommended forming procedures.
- D. All waterstops shall be heat-welded at all joints.

3.03 BATCHING AND MIXING

- A. Except for hand-mixed concrete, all concrete shall be batched in a prequalified manual, semi-automatic, or automatic plant. The prequalification shall consist of a current, annual certification inspection by WSDOT or as approved by the Engineer. If the plant has not been prequalified, the Contractor shall provide written notification to the Engineer two weeks prior to the anticipated use of the batch plant to allow for the necessary prequalification. The Engineer is not responsible for any delays to the Contractor due to problems in getting the plant certified.
- B. The Contractor has the option to site mix, transit mix, or plant mix the concrete. In all cases, concrete shall be mixed until a uniform distribution of the materials produces a homogeneous batch.
- C. Site-mixed concrete operations larger than 5 cubic yards total shall be subject to the prior approval of the Engineer.
- D. Transit-mixed concrete may be used provided it complies with these Specifications and ASTM C94 or WSDOT Standard Specifications. The concrete supplier shall have adequate equipment to ensure weight and quality control.
- E. Concrete shall only be mixed in the quantities required for immediate use. The concrete shall be used while fresh before initial set has taken place. Any concrete that has developed initial set shall not be used. Partially hardened concrete shall not be retempered or remixed. One batch of mixed concrete shall be entirely discharged before the following batch is charged.
- F. Temperature and Time for placement (WSDOT Standard Specification 6-02.3(4) D).

Concrete temperature shall remain between 55 F and 90 F while it is being placed.

The batch of concrete shall be discharged:

1. Not later than 1 1/2 hour after the cement is added to the concrete.
 2. Not later than 1 3/4 hour if the temperature of the concrete being placed is less than 75 F.
 3. Not later than 2 hours with the approval of the Engineer if the concrete being placed is below 75 F.
 4. Dry batch mix procedures may be used, but only as approved by the Engineer.
- G. The maximum slump for vibrated concrete shall be 4 1/2 inches. When a high range water reducer is used, the slump may be increased an additional 2 inches. Minimum slump is that required for proper placement and compaction. The maximum slump for non-vibrated concrete shall be 7 inches.

H. Conformance to Mix Design:

Weights of the mix components shall be within the following tolerances of the mix design:

Cement; +5%, -1%

Fly Ash, Ground Granulated Blast Furnace Slag; +5%, -5%

Aggregates; +5%, -1% for batch volumes greater than 4 cubic yards

Aggregates; +10%, -2% for batch volumes equal to or less than 4 cubic yards

Water; +0%

3.04 CONCRETE JOINTS

A. Waterstop shall be installed in all joints for outside walls of ponds, raceways, and other water-holding or containing structures.

B. Expansion Joints:

1. Expansion (isolation) joints shall be placed and constructed as shown on the Drawings.
2. The length of a joint material shall match the required length in the Drawings without splicing or stretching.
3. Open joints shall be formed with a template made of wood, metal, or other suitable material. Insertion and removal of the template shall be done without chipping or breaking the edges, or otherwise injuring the concrete.
4. Any part of an expansion joint running parallel to the direction of expansion shall provide a clearance of at least 1/2 inch (produced by inserting and removing a spacer strip) between the 2 surfaces. The Contractor shall ensure that the surfaces are precisely parallel to prevent any wedging from expansion and contraction.

C. Crack-Control Joints:

1. Crack-control joints shall be installed as shown on the Drawings or where designated by the Engineer. Crack control joints are intended to have cracking occur in the joints to prevent uncontrolled transverse cracks from occurring in walls and slabs.
2. Crack-control joints shall be straight and true. Crack-control joints shall have a formed crack a minimum depth of 1/4 of the concrete thickness (for walls, half from each side of the section) and may be formed using a plastic strip anchored to the form or other method approved by the Engineer. Slabs may be sawcut 1/4 of the concrete thickness before curing. Contractor shall inform Engineer of his cutting schedule.
3. The Contractor may use a construction (stop pour) joint in place of the crack-control joint when approved by the Engineer.

D. Construction Joints:

1. Construction joints are stopping places in the process of concrete placement and shall be made only where shown on the Drawings or as approved by the Engineer.

DIVISION 3 - CONCRETE

2. All construction joints shall be neatly formed as shown on the Drawings. Irregular or undulating joint lines shall not be allowed. All construction joints shall be either horizontal or vertical, or if the main reinforcement is inclined, the joints shall be normal to the direction of the main reinforcement.
3. When the Drawings call for a construction joint with roughened surface, the surface shall be struck off to leave surface irregularities approximately 1/2 inch wide and 1/4 inch deep. Surface irregularities shall not exceed 1/2 inch in depth. If the desired roughness is not obtained by the initial strike-off, the surface shall be roughened prior to the concrete reaching its initial set in such a manner as to leave grooves approximately 1/4 inch deep at 1/2 to 1 inch centers in both transverse and longitudinal directions. The rough surface shall be clean and free of laitance and loose material. Shear keys are required where shown on the Drawings.
4. Waterstops shall be installed in all outside walls and slab construction joints in ponds, raceways, and other water-holding or containing structures.

3.05 PLACING CONCRETE - GENERAL

- A. Notify the Engineer a minimum of 48 hours prior to commencement of concreting operations. Placement of concrete shall occur only after the forms and reinforcing bar placement have been inspected and approved by the Engineer or his representative. The Contractor shall place concrete only when the Engineer or his representative is present.
- B. All building slabs, floor slabs, and pond floor slabs shall be placed over a 6-mil clear polyethylene vapor barrier (unless noted otherwise).
- C. Concrete shall be placed as soon as possible after mixing and shall be plastic and readily workable when placed in the forms. See Division 03300 3.03F. The method and manner of placing concrete shall avoid segregation of the aggregates or displacement of reinforcement.
- D. Immediately before concrete placement against existing hardened concrete, bonding agent shall be applied to existing clean concrete surface. New concrete shall be placed while agent is still tacky.
- E. Concrete shall not be placed if other work in the area, such as driving piles or sheets, causes vibrations that adversely affect the initial set or strength of the concrete.
- F. Aluminum conduits shall not be used in the pumping or placing of concrete.
- G. Ensure reinforcement, inserts, embedded parts, and formed joints are not disturbed during concrete placement.
- H. Place crack-control joints prior to initial set.
- I. Excessive honeycomb or embedded debris in concrete is not acceptable.

3.06 PLACING CONCRETE INTO FORMS

- A. Before placement of concrete, forms shall be cleaned and free of all debris and ice. The foundations and forms shall be dampened prior to placing concrete. Care must be taken to see there is no standing water on the foundation or in the forms when the concrete is placed. Where possible, all foundation excavations shall be pumped dry, and concrete deposited in the dry. If it is not possible to proceed in this manner, a seal of concrete of sufficient thickness to resist any possible uplift shall be deposited underwater in accordance with the requirements specified in PARAGRAPH 3.08 - PLACING CONCRETE IN WATER.
- B. Deposit concrete in forms in continuous horizontal layers not deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints. Insert vibrator into previous layer to ensure homogeneous concrete placement.
- C. Remove temporary spreaders in forms when concrete being placed has reached the elevation of such spreaders.
- D. Concrete shall not be dropped more than 3 feet. This is to avoid material segregation. When placing operations would involve dropping the concrete more than 3 feet, it shall be deposited through sheet metal or other approved conduit. In sloping forms where concrete, if dropped, will tend to slide down one side of the form as it is placed, the concrete shall be placed through approved conduit without dropping. After initial set of the concrete, the forms shall not be jarred, and no strain shall be placed on the ends of the projecting reinforcement bars.
- E. The method of depositing and consolidating concrete shall be conducted so as to form a compact, dense, and impervious concrete that will show smooth faces on exposed surfaces. If any section of concrete is found to be defective, it shall be removed by the Contractor at no additional expense to the State. Plastering will not be permitted.

3.07 PLACING CONCRETE SLABS

- A. Deposit and consolidate concrete slabs in a continuous operation within the limits of construction joints until the placing of a panel or section is completed. When concrete is in place has sufficiently set up (at least 24 hours), an alternate section shall be placed. The edges of all sections shall be tooled with a minimum radius edging tool.
- B. Slope all exterior concrete slabs and interior slabs with floor drains in a manner to prevent the collection of water.
- C. Bring slab surfaces to the correct level with a straightedge and strike off. Use bullfloats or derbies to smooth the surface, leaving it free from humps or hollows. Do not sprinkle water on the plastic surface. Do not disturb the slab surfaces prior to beginning finishing operations.
- D. Maintain reinforcing steel in the proper position continuously during concrete placement operations.

3.08 PLACING CONCRETE IN WATER

- A. In no case shall concrete be placed in running water. Whenever permission is given to place concrete underwater, it shall be so placed within the confines of a watertight compartment such as a cofferdam, tube, or caisson.
- B. Concrete placed underwater shall include a water-reducing admixture within the manufacturer's recommended dose range as approved by the Engineer. Concrete placed in still water inside an open crib or cofferdam shall be placed by means of a tremie. The width of section of footing being poured shall not exceed 18 feet for each tremie or bucket used.
- C. When the concrete is to be placed by a tremie, the methods of construction shall comply with the following requirements:
 - 1. All tremies shall consist of a tube having a diameter not less than 10 inches and a hopper adequate to perform the work, or a method using a straight tremie tube on the end of a concrete pumper hose may be developed provided prior approval of the proposed method and procedure is obtained from the Engineer.
 - 2. A satisfactory method of expelling the water and first filling the tremie shall be used.
 - 3. The end of the tremie tube shall be kept deep enough into the seal concrete, and the concrete maintained in the tube at the elevation required to prevent water from entering the tremie tube at any time during the concrete placement. In placing concrete through a tremie, two distinct handling devices shall be used: one to raise, lower, and place the tremie, and the other to deliver concrete to the tremie. When a batch is dumped into the hopper at the top, the tremie shall be raised slightly (but not out of the concrete at the bottom) until the batch discharges to the bottom of the hopper or the top of the tremie tube. The flow shall then be stopped by lowering the tremie.
 - 4. The seal shall be completed by placing full thickness as the seal advances from one end of the placement to the other, keeping the finished surface of the concrete as level as possible.
 - 5. The concrete shall be placed continuously until the required seal is placed. If for any unavoidable reason it becomes necessary to discontinue the placing before the required seal is completed, the Contractor may be required to remove all concrete placed in the seal at no cost to the State.
- D. When concrete is placed underwater, the Contractor may use methods whereby the aggregates are preplaced within the cofferdam before the introduction of the cement grout, provided prior approval of the proposed method and procedure is obtained from the Engineer.

3.09 PLACING CONCRETE IN HOT WEATHER

- A. Concrete shall be placed when anticipated 24 hour range will exceed 89°F and shall conform to ACI 305R. Contractor shall submit a hot weather plan to the Engineer for review and approval prior to commencement of any work.
- B. The temperature of the concrete equipment and ingredients shall be maintained at such a level that the temperature of the concrete at the time it is placed shall not exceed 85°F.

- C. Water-reducing admixtures shall be used so that the maximum amount of water or slump shall not be exceeded. The mixing of the concrete and the time between mixing and placing shall be kept to a minimum. Mixer trucks shall not be exposed to the sun while waiting to be unloaded. Chutes, conveyors, and pump lines shall be shaded. To keep the forms and reinforcing steel cool prior to placing the concrete, the top layer of reinforcing steel shall be completely covered with clean, wet burlap and the forms and reinforcing steel shall be sprinkled with cool water immediately prior to placing the concrete or as ordered by the Engineer. The concrete shall be finished without delays. Equipment for applying a water-fog spray shall be available in case it is needed to prevent plastic cracks.
- D. When the combination of air temperature, humidity, temperature of the surface of the concrete, and the wind velocity produces an evaporation of 0.2 or more pounds per hour per square foot of surface as determined by the Engineer, the Contractor shall provide a windbreaker enclosure to protect the concrete from winds blowing over the surface of the concrete until the curing compound is applied.

3.10 PLACING CONCRETE IN COLD WEATHER

- A. When air temperature is expected to fall below 37°F during placement or within 7 days thereafter, the Contractor shall place and cure concrete in accordance with ACI 306R. Contractor shall submit a cold weather concreting plan to the Engineer for review and approval no less than 7 days prior to the proposed cold weather concreting.
- B. The following provisions shall govern cold weather concreting:
 - 1. Concrete shall not be mixed or placed while the atmospheric temperature is below 37°F.
 - 2. Concrete shall not be placed on frozen ground or against frozen forms.
- C. Frozen concrete shall be immediately removed when Contractor is directed to do so by the Engineer and replaced with new work at no cost to the State.

3.11 VIBRATION OF CONCRETE

- A. The Contractor shall provide suitable internal vibrating tampers for use in placing and compacting all concrete except that which is placed underwater. The vibrators shall be of the type designed to be placed directly in the concrete, and the vibrator's frequency of vibration shall be not less than 7,000 impulses per minute when in actual operation. The type of vibrator and its method of use shall be subject to the approval of the Engineer.
- B. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than the visible effectiveness of the machine (between 2 to 3 feet). Place vibrators to rapidly penetrate the layer of concrete and at least 6 inches into the preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit the duration of vibration to the time necessary for consolidation around reinforcement and other embedded items without causing segregation of the mix. Generally, this will be from 5 to 15 seconds in accordance with ACI 301. Do not use vibrators to transport concrete inside of forms.
- C. Vibrators shall not be applied directly to steel that extends into partially hardened concrete.
- D. Vibration shall not continue in any one spot to the extent that pools of grout are formed. When vibrating and finishing top surfaces that are exposed to weather or wear, extreme care shall be exercised to avoid drawing water or latency to the surface. For relatively high lifts, the top layer shall be comparatively shallow, and the concrete mix shall be as stiff as can be effectively vibrated into place and properly finished.

- E. The Contractor shall supply a sufficient number of vibrating tampers to effectively vibrate all of the concrete placed. Hand tamping shall be required wherever necessary to secure a smooth and dense concrete on the outside surfaces.
- F. Vibration of forms and reinforcing will not be allowed.

3.12 FINISHING CONCRETE SURFACES - GENERAL

- A. Forms on walls shall be removed not more than 72 hours after placing concrete.
- B. After removal of the forms, all concrete shall show a smooth, dense face. Any concrete that is porous shall be removed by the Contractor and replaced at no additional cost to the State.
- C. At the discretion of the Engineer, cracks in concrete work not covered by PARAGRAPH 3.16 - DEFECTIVE CONCRETE AND REPAIR OF CONCRETE and 0.010 inch wide and wider shall be repaired at the Contractor's expense by an ACI-recommended method as approved by the Engineer. Criteria for an acceptable method of repair will be based on the following elements:
 - 1. Structural or nonstructural crack.
 - 2. Exposure level/conditions of structures.
 - 3. Appearance.
 - 4. Cause of cracking.
- D. Unsightly stains and coloring caused by the Contractor's operations, equipment, or materials, or resulting because of unfinished construction either before or after a surface has been finished in accordance with this section shall be cleaned and refinished prior to final acceptance of the project and at no additional cost to the State.

3.13 FINISH OF SLABS

- A. Screed all slabs.
- B. Trowel by hand or machine to hard, dense, and mark-free surface. Do not absorb wet spots with neat cement or mixture of cement and sand. Wait until surfaces are dry enough for proper troweling. Chemical dryers not permitted.
- C. Interior concrete slabs to receive flooring materials or carpet shall be steel troweled. Slabs not receiving flooring materials shall also be light-broom finished across the direction of slope or flow to achieve a nonslip surface or as otherwise shown on the Drawings.
- D. Slabs in hatchery trough rooms shall be light-broom finished in the direction of floor slope.
- E. Exterior slabs and slabs in contact with fish rearing water, shall receive a light-broom finish.

3.14 FINISH OF FORMED SURFACES

A. Surfaces Not Exposed to View, Not in Contact with Water:

1. This includes formed concrete surfaces not exposed to view in the finish work or covered by other construction unless otherwise shown or specified.
2. Provide as-cast rough form finish.
3. Standard rough-form finish shall be the concrete surface having the texture imparted by the form-facing material used with tie holes and defective areas repaired and patched, and all fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.

B. Surfaces Exposed to View or in Contact with Fish-Bearing Water:

1. This includes concrete surfaces that are visible but not in contact with water and all concrete water contacting surfaces that may come in contact with fish rearing water.
2. Grind entire surface of all interior and exterior walls with a rotary grinder to expose all air pockets, voids, and other imperfections to create a smooth wall surface.
3. Immediately after all required patching, grinding, and correction of major imperfections have been completed, hand sack-rub all vertical surfaces. The sacking process and desired finish quality shall conform to WSDOT Class 1 Surface Finish (WSDOT 6-02.3 (14) (A)). The sack finish process shall be accomplished immediately after the 7 day cure period or as approved in writing by the Engineer. No other methods/finishes will be accepted.
4. All pits, after being filled, that shows signs of air pockets or still show an indentation in the wall, shall be reopened (as necessary), refilled, and finished by repeating the hand-sacking process. The intent of the finish is to be very smooth and nonabrasive with no pinholes visible.
5. Top of walls in contact with fish bearing water shall be steel troweled, edged and light broom finished.

3.15 FINISHED CONCRETE TOLERANCES

A. Formed concrete tolerances shall conform to the following requirements:

TABLE 03300 - 3.15A	
1. Variation from plumb: <ol style="list-style-type: none"> a. In lines and surfaces of columns, piers, walls: b. For exposed corner columns, crack control joint grooves, and other conspicuous lines: 	1/8 inch in any 10 feet 1/2 inch maximum for the entire length/height 1/4 inch in any 20-foot length 1/2 inch maximum for the entire length
2. Variation from the level or the grades: <ol style="list-style-type: none"> a. In slabs and beams soffits: b. In exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines: 	1/4 inch in any 10-foot length 3/8 inch in any bay or in any 20-foot length 3/4 inch maximum for the entire length 1/4 inch in any bay or in any 20-foot length 1/2 inch maximum for the entire length

DIVISION 3 - CONCRETE

3. Variation of the linear building lines from established position in plan and related position of columns, walls, and partitions:	1/2 inch in any bay 1/2 inch in any 20-foot length 1 inch maximum for the entire length
4. Variation in the sizes and location of sleeves, floor openings, and wall openings:	1/4 inch plus or minus
5. Variation in cross-sectional dimensions of columns and beams and in the thickness of slabs and walls:	1/4 inch minus 1/2 inch plus
6. Footings: a. Variation in dimension in plan: b. Misplacement or eccentricity: c. Thickness: 1. Decrease in specified thickness: 2. Increase in specified thickness:	1/2 inch minus 2 inches plus 2 percent of the footing width in the direction of misplacement, 2 inches maximum 5 percent No limit
7. Variation in steps: a. In a flight of stairs: 1. Rise: 2. Tread: b. In consecutive steps: 1. Rise: 2. Tread:	1/8 inch plus or minus 1/4 inch plus or minus 1/16 inch plus or minus 1/8 inch plus or minus

B. Tolerances apply to concrete dimensions only, not to positioning of vertical reinforcing steel, dowels, or embedded items.

3.16 DEFECTIVE CONCRETE AND REPAIR OF CONCRETE

A. Concrete that is not formed as shown on the Drawings, or for any reason is out of alignment, level, tolerances, or shows a defective surface shall be removed from the job at the Contractor's expense, unless the Engineer grants permission to patch the defective area. Permission to patch in such an area shall not be considered a waiver of the Engineer's right to require complete removal of defective work if patching does not, in his opinion, satisfactorily restore quality and appearance of the surface.

B. Repair or replace concrete not properly placed or of the specified type.

C. All concrete shall be inspected, and all pour joints, rough sections, cracks, and honeycombed areas shall be repaired by cutting back to solid concrete. Apply cement mortar fill after coating surface with bonding agent.

D. Fill all tie holes and small imperfections with cement mortar fill.

3.17 PLACING ANCHOR BOLTS AND EMBEDDED METALWORK

A. Cast-in-place anchor bolts and embedded metalwork shall be accurately placed as shown on the Drawings. The Contractor shall secure the cast-in-place anchor bolts and metalwork to the forms or reinforcing steel to prevent misalignment of these items while placing the concrete.

- B. Conduits, pipes, and other fabrications made of aluminum shall not be embedded in concrete unless effectively coated or covered to prevent aluminum-concrete reaction

3.18 WATER-HOLDING STRUCTURE TEST

- A. Description: All concrete structures that are designed to hold, treat, or pass water or wastewater shall be constructed to be watertight. All structures shall be hydraulically tested for pressure and leakage after concrete has cured and obtained design strength. Leakage testing shall be performed at the expense of the Contractor prior to backfilling the structure.
- B. Testing Procedure:
 - 1. The structure shall be filled with water to the normal operating static level and maintained at that level for seven days to allow for absorption and stabilization. For testing purposes, all inlets and outlets shall be closed or plugged. At the end of the seven day period, the change in the volume shall be measured after 24 hours without any water flowing into or out of the structure. Acceptable water leakage criteria are as follows:
 - a. No visible leakage or visibly damp areas.
 - b. A leakage rate no greater than .001 of total tank volume in a 24 hour period.
 - 2. Failure to meet these criteria will require repairs of the structure at the Contractor's expense by a method approved by the Engineer. The structure shall be tested after repairs. This process will be repeated until the leakage volume criteria are met.

END OF SECTION 03300

**SECTION 03310
CONTROLLED LOW STRENGTH MATERIAL**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Provide Controlled Low Strength Material (CLSM), complete and in place.
- B. CLSM shall be placed where indicated and may be used, if the Engineer approves, for the following purposes:
 - 1. Normal CLSM with high slump, non-segregating consistency that readily flows and fills voids and difficult to reach places: pipe zone fill, trench zone fill, pipe abandonment, structure backfill, and structure cavity fill.
 - 2. Foundation CLSM is used where higher early strengths are required and future excavation is not likely to be required.

1.02 RELATED SECTIONS

Section 02200 – Earthwork

1.03 REFERENCES

ASTM C33 - Concrete Aggregate

ASTM C94 - Ready Mixed Concrete

ASTM C138 - Unit Weight, Yield and Air Content (Gravimetric) of Concrete

ASTM C150 - Portland Cement

ASTM C260 - Air-Entraining Admixtures for Concrete

ASTM C403 - Time of Setting of Concrete Mixtures by Penetration Resistance

ASTM C494 - Chemical Admixtures for Concrete

ASTM C618 - Flyash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete

ASTM C803 - Standard Test Method for Penetration Resistance of Hardened Concrete

ASTM D4318 - Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

ASTM D4832 - Preparation and Testing of Soil-Cement Slurry Test Cylinders

1.04 SUBMITTALS

A. Shop Drawings:

- 1. CLSM mix designs which show the proportions and gradations of materials proposed for each type of CLSM indicated. Each mix design shall be accompanied by independent laboratory test results of the indicated properties.

2. If the Contractor proposes to provide lower strength CLSM with aggregates that do not conform to ASTM C33, Shop Drawings shall include a testing program that will be used to control the variability of the aggregates. The testing program shall be acceptable to the Engineer.
3. Placement location and volume of proposed CLSM to be used.

1.05 QUALITY ASSURANCE

- A. Testing will be performed by a testing laboratory selected by the Owner at the Owner's expense, except as otherwise indicated.
- B. If tests of the CLSM show non-compliance with the specifications, the Contractor shall make changes as may be required to achieve compliance. Performing and paying for subsequent testing to show compliance shall be the Contractor's responsibility.
- C. Correlation Tests
 1. The Contractor shall perform a field correlation test for each mix of CLSM used in pipe zone, trench zone, or backfill used in amounts greater than 100 cubic yards or when CLSM is required to support traffic or other live loads on the fill less than seven days after placing CLSM.
 2. Field correlation tests shall be performed in a test pit similar in cross section to the work and at least 10-feet long at a location near the work. The proposed location shall be acceptable to the Engineer.
 3. Laboratory and field tests shall be performed on samples taken from the same CLSM batch mix. Tests shall be performed by a laboratory at the Contractor's expense.
 4. Testing shall be performed once each 2 hours during the first 8 hours, once each 8 hours during the first week, and once each 24 hours until the CLSM mix reaches the maximum design strength.
 - a. Compression testing shall be in accordance with ASTM D4832.
 - b. Setting test shall be in accordance with ASTM C403.
 - c. Density tests shall be in accordance with ASTM C138.

PART 2 - PRODUCTS

2.01 CONTROLLED LOW STRENGTH MATERIAL

- A. CLSM shall be a mixture of cement, pozzolan, coarse and fine aggregate, admixtures, and water, mixed in accordance with ASTM C94.
- B. Composition: The following parameters shall be within the indicated limits and as necessary to produce the indicated compressive strengths.
 1. Mix proportions as necessary

2. Entrained air content shall be between 0 percent minimum and 6 percent maximum.
3. Water reducing agent content as necessary

C. Properties:

1. Density shall be between 120 PCF minimum and 145 PCF maximum
2. Slump shall be as required by the Contractor's methods, but shall not promote segregation nor shall slump exceed 9 inches.
3. Compressive strength at 28 days:
 - a. Normal CLSM: Between 100 psi minimum and 300 psi maximum. Unless specifically indicated otherwise, CLSM shall be Normal CLSM.
 - b. Foundation CLSM: 1,000 psi minimum.

2.02 CEMENT

Cement shall be Type II in accordance with ASTM C 150.

2.03 POZZOLAN

Pozzolan shall be Type F or C in accordance with ASTM C618. Pozzolon content, by weight, in Normal CLSM shall not be greater than cement content.

2.04 AGGREGATE

Aggregate shall consist of a well graded mixture of crushed rock, soil, or sand, with a nominal maximum size of 3/8-inch. One hundred percent shall pass the 1/2-inch sieve; no more than 30 percent shall be retained on the 3/8-inch sieve; and no more than 12 percent shall pass the number 200 sieve. If more than 5 percent of the aggregate passes the number 200 sieve, the material passing the number 200 sieve shall have a plasticity index of less than 0.73 (liquid limit-20), when tested in accordance with ASTM D4318. Aggregate shall be free from organic matter and shall not contain more alkali, sulfates, or salts than the native materials at the site.

2.05 ADMIXTURES

- A. Air entraining admixtures shall be in accordance with ASTM C260.
- B. Water reducing admixtures shall be in accordance with ASTM C494.

2.06 WATER

Water shall be potable, clean, free from objectionable quantities of silt, organic matter, alkali, salt, and other impurities.

PART 3 - EXECUTION

3.01 PREPARATION

Subgrade and compacted fill to receive CLSM shall be prepared according to Section 02200.

3.02 BATCHING, MIXING AND DELIVERY

Batching, mixing, and delivery of CLSM shall conform to ASTM C94. CLSM shall be mixed at a batch plant acceptable to the Engineer and shall be delivered in standard transit mix trucks.

3.03 PLACEMENT

- A. CLSM shall be placed by tailgate discharge, conveyor belts, pumped, or other means. CLSM shall be directed in place by vibrator, shovel, or rod to fill crevices and pockets. Avoid over-consolidation which causes separation of aggregate sizes.
- B. CLSM shall be continuously placed against fresh material unless otherwise approved by the Engineer. When new material is placed against existing CLSM, the placement area shall be free from loose and foreign material. The surface of the existing material shall be soaked a minimum of one hour before placement of fresh material, but no standing water shall be allowed when placement begins.
- C. Temperature of the CLSM shall be between 50 and 90 degrees F, when placed. CLSM shall not be placed when the air temperature is below 40 degrees F. No CLSM shall be placed against frozen subgrade or other materials having temperature less than 32 degrees F.

3.04 FINISHING

The finish surface shall be smooth and to the grade indicated or directed by the Engineer. Surfaces shall be free from fins, bulges, ridges, offsets, and honeycombing. Finishing by wood float, steel trowel, or similar methods is not required.

3.05 CURING

CLSM shall be kept damp for a minimum of seven days or until final backfill is placed.

3.06 PROTECTION

- A. CLSM shall be protected from freezing for 72 hours after placement.
- B. No fill or loading shall be placed on CLSM until probe penetration resistance, as measured in accordance with ASTM C803, exceeds 650 psi.
- C. CLSM shall be protected from running water, rain, and other damage until the material has been accepted and final fill completed.

END OF SECTION 03310

**SECTION 03315
GROUT**

PART 1 - GENERAL

1.01 SECTION INCLUDES

The Contractor shall provide grout, complete and in place. The following types of grout are covered in this section:

A. Cement Grout:

1. Non-Shrink Grout - Class I (cement-based)
2. Non-Shrink Grout – Class II (cement based)
3. Non-Shrink Epoxy Grout
4. Epoxy Anchor Grout for Post Installed Adhesive Anchors

1.02 RELATED SECTIONS

SECTION 03300 CAST CONCRETE

1.03 REFERENCES

ACI 318 - Building Code Requirements for Structural Concrete

ASTM C307 -- Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing

ASTM C496 - Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens

ASTM C531 – Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.

ASTM C579 – Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes

ASTM C580 - Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes

ASTM D648 – Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position

ASTM D695 – Standard Test Method for Compressive Properties of Rigid Plastics

ASTM C827 – Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures

ASTM C881 – Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete

ASTM C882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear

ASTM C1090 – Standard Test Method for Measuring Changes in Height of Cylindrical Specimens from Hydraulic-Cement Grout

ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

ASTM C1339 – Standard Test Method for Flowability and Bearing Area of Chemical-Resistant Polymer Machinery Grouts, for bearing area and flow

ICC-ES AC308 - Acceptance Criteria for Post-installed Adhesive Anchors in Concrete Elements

1.04 SUBMITTALS

- A. Certified testing lab reports for tests indicated herein.
- B. Test results and service report from the field tests and the demonstration and training session verifying the requirements indicated herein.
- C. Certifications that grouts used on the project contain no chlorides or other chemicals that cause corrosion.
- D. Manufacturer's literature containing instructions and recommendations on the mixing, handling, placement, curing, and appropriate uses for each type of grout used in the work, and location of use. The current ICC-ES or IAPMO-UES report shall be submitted for all epoxy anchor grouts for adhesive anchors.
- E. Manufacturer's certification that its non-shrink grout does not contain aluminum, zinc, or magnesium powders as a method of expansion.
- F. Submit manufacturer's written warranty as indicated herein.
- G. Name and telephone number of grout manufacturer's representative who will give onsite service. The representative shall have at least one year of experience with the indicated grouts.

1.05 QUALITY ASSURANCE

- A. Field Tests:
 - 1. Compression test specimens will be taken from the first placement of each type of grout, and at intervals thereafter selected by the Engineer. The specimens will be made by the Engineer or its representative.
 - 2. Compression tests and fabrication of specimens for cement grout and cement based non-shrink grout will be performed in accordance with ASTM C1107 –, at intervals during construction selected by the Engineer. As a minimum, a set of 3 specimens will be made for testing at seven days, 28 days, and each additional time period as appropriate.
 - 3. Compression tests and fabrication of specimens for epoxy grouts will be performed in accordance with ASTM C579, Method B, at intervals during construction selected by the Engineer. A set of three specimens will be made for testing at seven days and each earlier time period as appropriate.

DIVISION 3 – CONCRETE

4. The cost of laboratory tests on grout will be paid by the Owner except where test results show the grout to be defective. In such case, the Contractor shall pay for the tests, removal and replacement of Defective Work, and re-testing, all as part of the work.
 5. The Contractor shall assist the Engineer in obtaining specimens for testing and shall furnish materials necessary for fabricating the test specimens.
- B. Construction Tolerances: Construction tolerances shall be as indicated in Section 03300 unless indicated otherwise.
- C. Pre-Installation Demonstration and Training:
1. Cement and Epoxy-Based Non-Shrink Grouts:
 - a. The grout manufacturer shall give a demonstration and training session for the cement based non-shrink and epoxy grouts to be used on the project before any installation of grout is allowed.
 - b. Training session shall use a minimum of five bags of cement-based non-shrink Class I grout mixed to fluid consistency. Tests shall be conducted for flow cone and bleed tests. Six cubes for testing at 1, 3, and 28 days shall be made. The remaining grout shall be placed, and curing may be initiated on actual project placements such as baseplates and tie holes to provide on-the-job training for the Contractor and Engineer. The Contractor employees who will be doing the grouting shall participate in this training and demonstration session. The training session shall include methods for curing the grout.
 - c. If the project includes patching, through-bolt holes, epoxy anchors, and/or blockouts, the manufacturer shall also train the Contractor's employees in the mixing and curing of the epoxy grouts for each of these applications.
 - d. The Contractor shall transport the test cubes to an independent test laboratory, obtain the test reports, and report these demonstration and training test cube strengths to the Engineer.
 2. Epoxy Anchor Grout for Adhesive Anchors:
 - a. Special inspection for all adhesive anchor installations shall be provided:
 - 1) As recommended or required by the ICC-ES or IAPMO-UES report.
 - 2) As required by the enforceable building code.
 - 3) As otherwise indicated in the Contract Documents.
 - b. The most stringent of the above requirements shall be used. The cost of special inspection of adhesive anchors shall be paid for by the Owner.
 - c. Before installing adhesive anchors in the work, adhesive anchor installers shall be trained and qualified at the site by the manufacturer's representative. Training and qualification for each installer shall include at least:

DIVISION 3 – CONCRETE

- 1) Hole drilling procedure, hole preparation and cleaning techniques, adhesive injection technique and dispenser training/maintenance, rebar dowel preparation and installation, and proof loading/ torquing.
- 2) Anchors installed in both the vertical and horizontal positions in a mock-up concrete panel of adequate size and thickness. Anchors shall be tested in tension. A minimum of 3 anchors shall be tested for each installation position.
- 3) Anchors shall be tested at 2 times the published allowable tension load or 1-1/4 times the maximum design strength of the anchors in tension as indicated in the ICC-ES or IAPMO-UES report. The test load need not exceed 80 percent of the nominal yield strength of the anchor, based on steel strength, as determined by ACI 318-14 Chapter 17.
- 4) If any of the three test bolts in any installation position fail to reach the test loads, the installer shall be re-tested with the same procedure. Re-testing is required only for the failed installation position.
- 5) An installer who has three consecutive successful bolt tests in the first or second trial is considered qualified for adhesive anchor installation for this project. The manufacturer's representative shall issue a certificate to the qualified installer, and a copy of the certificate shall be filed with the Contractor and be submitted to the Engineer.
- 6) The test anchor size shall be the largest size adhesive anchor used on the project. The anchor embedment length and edge distances shall be adequate to resist the test loads listed above.
- 7) Each installer shall be re-qualified every 6 months for the duration of the project by the same qualifying procedure.
- 8) The certification of each qualified installer shall be available for verification at the Special Inspector's request.
- 9) Defective anchors noted by the Special Inspector shall be replaced and re-installed by the Contractor without any additional compensation.

1.06 SPECIAL CORRECTION OF DEFECTS PROVISIONS

Manufacturer's Warranty:

- A. Furnish one year warranty for work provided under this section.
- B. Manufacturer's warranty shall not contain a disclaimer limiting responsibility to the purchase price of products or materials.

PART 2 - PRODUCTS

2.01 APPLICATION

Unless indicated otherwise, grouts shall be provided as listed below whether indicated on the Drawings or not.

Application	Type of Grout
Anchor bolts, anchor rods and reinforcing steel required to be set in grout in which the average working or operating temperature will be over 100 degrees F or in high fire risk areas.	Non-Shrink - Class I
Anchor bolts, anchor rods and reinforcing steel required to be set in grout that is not in high temperature or high fire risk areas.	Epoxy Anchor Grout
Beam and column (1 or 2 story) base plates less than 16-inches in the least dimension.	Non-Shrink - Class I
Filling blockout spaces for embedded items such as railing posts, gate guide frames, etc.	Non-Shrink - Class I
Surface repairs	Cement Grout
Repair of holes and defects in concrete members which are not water bearing and not in contact with soil or other fill material	Non-Shrink - Class I
Repair of holes and defects in concrete members which are water bearing or in contact with soil or other fill materials	Non-Shrink - Class II
Any application not listed above, where grout is indicated	Non-Shrink Class I, unless specifically indicated otherwise

2.02 CEMENT GROUT

- A. Cement grout shall be composed of one part cement, three parts sand, and the minimum amount of water necessary to obtain the desired consistency. Where needed to match the color of adjacent concrete, white Portland cement shall be blended with regular cement as needed. The minimum compressive strength at 28 days shall be 4500 psi.
- B. Cement grout materials shall be as indicated in Section 03300.

2.03 NON-SHRINK GROUTS (CEMENT-BASED)

- A. General:
 - 1. Cement-based non-shrink grout shall be a prepackaged, inorganic, fluid, non-gas liberating, non-metallic, cement type grout requiring only the addition of water. Cement from kilns burning metal-rich hazardous waste fuel shall not be used.

DIVISION 3 – CONCRETE

2. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each class of non-shrink grout shall be as recommended by the manufacturer for the particular application.
3. Grout shall not contain chlorides or additives that may contribute to corrosion.
4. Grout shall be formulated to be used at any consistency from fluid to plastic.
5. Cement-based non-shrink grout shall have the following minimum properties when tested at a fluid consistency, at 28 days:
 - a. Minimum tensile splitting strength of 500 psi per ASTM C496.
 - b. Minimum flexural strength of 1000 psi per ASTM C580 - Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
 - c. Minimum bond strength (concrete to grout) of 1900 psi per modified ASTM C882.
 - d. Grout shall be certified for use in a marine environment.
 - e. Grout shall be certified for use in freeze/thaw environments.

B. Non-Shrink Grout – Class I:

1. Non-Shrink Grout – Class I shall have a minimum 28 day compressive strength of 5000 psi when mixed at a fluid consistency.
2. Non-Shrink Grout – Class I shall meet the requirements of ASTM C1107, *Grade B or C*, when mixed to fluid, flowable, and plastic consistencies.
3. Non-Shrink Grout – Class I shall have a maximum early age height change of 4.0 percent expansion, and shall have no shrinkage (0.0 percent) in accordance with ASTM C827. The grout when tested shall not bleed or segregate at maximum allowed water.
4. Non-Shrink Grout – Class I shall have no shrinkage (0.0 percent) and a maximum of 0.3 percent expansion in the hardened state when tested in accordance with ASTM C1090.
5. Furnish certification that the non-shrink property of grout is not based on gas production or gypsum expansion.
6. Non-Shrink Grout – Class I shall be Masterflow 713 Plus by BASF, Five Star Grout by Five Star Products, Sikagrout 212 by Sika Corporation, Duragrout by L&M Construction Chemicals; High-Flow Grout by Euclid Chemical Company, CG 200 PC by Hilti, or equal.

C. Non-Shrink Grout – Class II

1. Non-Shrink Grout – Class II shall be a high precision, fluid, extended working time, grout. The minimum 28-Day compressive strength shall be 7500 psi, when mixed at a fluid consistency.
2. Non-Shrink Grout – Class II shall have a maximum early age height change of 4.0 percent expansion, and shall have no shrinkage (0.0 percent) in accordance with ASTM C827.

DIVISION 3 – CONCRETE

3. Non-Shrink Grout – Class II shall have no shrinkage (0.0 percent) and a maximum of 0.3 percent expansion in the hardened state when tested in accordance with ASTM C1090.
4. Non-Shrink Grout – Class II shall have an extended working time of 30 minutes minimum when mixed to a fluid consistency as defined in ASTM C827 at temperature extremes of 45 to 90 degrees F in accordance with ASTM C1107.
5. Non-Shrink Grout – Class II shall meet the requirements of ASTM C1107, *Grade B or C* when tested using the amount of water needed to achieve fluid consistency per ASTM C939.
6. The grout when tested shall not bleed or segregate at maximum allowed water content.
7. Provide certification that its non-shrink property is not based on gas production or gypsum expansion.
8. Non-Shrink Grout – Class II shall be Masterflow 928 by BASF, Five Star Fluid Grout 100 by Five Star Products, Crystex by L&M Construction Chemicals, or equal.

2.04 NON-SHRINK EPOXY GROUT

- A. Non-shrink epoxy grout shall be a flowable, non-shrink, 100 percent solids system. The epoxy grout system shall have 3 components: resin, hardener, and specially blended aggregate, each premeasured and prepackaged. The resin component shall not contain any non-reactive diluents. Resins containing butyl glycidyl ether (BGE) or other highly volatile and hazardous reactive diluents are not acceptable. Variation of component ratios is not permitted unless specifically recommended by the manufacturer. Manufacturer's instructions shall be printed on each container in which the materials are packaged.
- B. Epoxy grout shall have a maximum early age height change of 4.0 percent expansion, and shall have no shrinkage (0.0 percent) in accordance with ASTM C827, (modified for epoxy grouts by using an indicator ball with a specific gravity between 0.9 and 1.1).
- C. Epoxy grout shall have a negligible (less than 0.0006 in/in) length change after hardening, and a coefficient of thermal expansion less than 0.00003 in/in F when tested according to *ASTM C*.
- D. The epoxy grout shall develop a minimum compressive strength of 9000 psi in 24 hours and 13,000 psi in seven days when tested in accordance with ASTM C579, *method B*.
- E. The mixed epoxy grout shall have a minimum working life of 90 to 120 minutes at 70 degrees F.
- F. The effective bearing area shall be a minimum of 95 percent EBA in accordance with ASTM C1339.
- G. The chemical formulation of the epoxy grout shall be that recommended by the manufacturer for the particular application. Do not reduce aggregate loading or add solvents to increase flowability.
- H. Non-shrink epoxy grout shall have the following minimum properties when tested at 7 days:
 1. Minimum bond strength to concrete of 3000 psi per ASTM C882 modified.

2. Minimum bond strength to steel of 1700 psi per ASTM C882 modified.
 3. Minimum flexural strength of 2500 psi per ASTM C580.
 4. Minimum tensile strength of 2000 psi per ASTM C307 -- Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing.
- I. Non-shrink epoxy grout shall be Five Star DP Epoxy Grout by Five Star Products, Inc., Masterflow 648 CP Plus by BASF, Sikadur 42 Grout-Pak by Sika Corporation, or equal.

2.05 EPOXY ANCHOR GROUT

- A. Epoxy anchor grout for use in concrete shall be certified for use in resisting seismic loads in cracked concrete applications in accordance with *ICC-ES AC 308*.
- B. Epoxy anchor grout shall conform to ASTM C881, *Type IV, Class A, B and C, Grade 3* with the exception of gel time.
- C. Heat deflection temperature per ASTM D648 shall be a minimum 120 degrees F.
- D. Manufacturer shall certify that the epoxy anchor grout will maintain 100 percent of its capacity up to a short term temperature of 110 degrees F and 50 percent of its capacity up to a short term temperature of 150 degrees F.
- E. Grout shall come in a two chambered cartridge with a metering system that provides the proper ratio of hardener and resin. The grout shall also come with a static mixer nozzle to thoroughly mix the hardener and resin together.
- F. Epoxy anchor grout shall be capable of being used in submerged applications once cured.
- G. Compressive strength per ASTM D695 shall be 10,000 psi minimum.
- H. Whenever possible, overhead anchors subject to vibration, anchors in fire-resistive construction or high fire risk areas, and anchors subject to working or operating temperatures above 100 degrees F shall be cast-in-place anchors. Whenever cast-in-place anchors cannot be used in these applications, use cement based non-shrink grout and oversized holes.
- I. Embedment of adhesive anchors/rebar shall be deep enough to develop the anchor/rebar unless otherwise noted on the Contract Documents. Embedment shall not exceed 67 percent of the member depth.
- J. Epoxy anchor grout shall be PE1000+ by Powers Fasteners; HIT-RE 500-SD by Hilti, SET-XP by Simpson Strong-Tie, or equal.

2.06 CURING MATERIALS

Curing materials shall be in accordance with Section 03300 and as recommended by the manufacturer of prepackaged grouts.

2.07 CONSISTENCY

- A. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is defined such that the grout is plastic and moldable but will not flow. Where "dry pack" is called for in the Contract Documents, it shall mean a grout of that consistency; the type of grout to be used shall be as indicated herein for the particular application.
- B. The slump for topping grout and concrete/grout fill shall be adjusted to match placement and finishing conditions but shall not exceed 4-inches.

2.08 MEASUREMENT OF INGREDIENTS

- A. Measurements for cement grout shall be made accurately by volume using containers. Shovel measurements shall not be allowed.
- B. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

PART 3 - EXECUTION

3.01 PRODUCT DELIVERY, STORAGE AND HANDLING

Grout shall be stored in accordance with manufacturer's recommendations.

3.02 GENERAL

- A. Contractor shall arrange for the manufacturer of prepackaged grouts to provide onsite technical assistance within 72 hours of request, as part of the work.
- B. Grout shall not be placed until base concrete or masonry has attained its design strength, unless authorized otherwise by the Engineer.
- C. When cementitious grouts are used on concrete surfaces, the concrete surface shall be saturated with water for 24 hours prior to placement. Upon completion of the saturation period, excess water shall be removed with clean, oil free compressed air prior to grouting. Concrete substrate shall not be wet prior to placement of epoxy grouts.
- D. Surface preparation, curing, and protection of cement grout shall be in accordance with Section 03300. The finish of the grout surface shall match that of the adjacent concrete unless otherwise indicated.
- E. Surfaces that will be in contact with grout shall be free of dirt, loose rust, oil, wax, grease, curing compounds, laitance, loose concrete, and other deleterious materials.
- F. Shade the work from sunlight for at least 24 hours before and 48 hours after grouting.
- G. Contact the grout manufacturer's representative for assistance on hot and cold weather grouting techniques and precautions if applicable.

3.03 GROUTING PROCEDURES

- A. General: Mixing, surface preparation, handling, placing, consolidation, curing, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.
- B. Structural, equipment, tank, and piping support bases shall be grouted, unless indicated otherwise.
 - 1. The original concrete shall be blocked out or finished off a sufficient distance below the plate to provide for a minimum one-inch thickness of grout or other thickness if indicated.
 - 2. After the base plate has been set in position at the proper elevation by steel wedges or double nuts on the anchor bolts, the space between the bottom of the plate and the original pour of concrete shall be filled with non-shrink-type grout through a headbox of appropriate size. The mixture shall be of a fluid consistency and poured continuously into the space between the plate and the base concrete. Forms for grout shall be tight against retaining surfaces, and joints shall be sealed as recommended by the grout manufacturer to be liquid-tight. Forms shall be coated as recommended by the grout manufacturer for easy form release. Where this method of placement is not practical or where required by the Engineer, alternate grouting methods shall be submitted by the Contractor for acceptance by the Engineer.
 - 3. Concrete equipment pads for equipment bases that will be epoxy-grouted shall be sized so that, when the equipment base is fully grouted, the epoxy grout is stopped not less than 4-inches from the edge of the pad.
 - 4. Epoxy Adhesive Anchors:
 - a. Grout shall be proportioned and mixed per the manufacturer's instructions.
 - b. Unless otherwise indicated, embedment shall be sufficient to develop the ultimate tensile strength of the anchor or reinforcing bar per the manufacturer's ICC-ES or IAPMO-UES report, but shall not be less than 8 diameters for threaded rod or 12 diameters for reinforcing or smooth bars.
 - c. Holes shall be dry.

3.04 CONSOLIDATION

Grout shall be placed in such a manner, for the consistency necessary for each application, to assure that the space to be grouted is completely filled.

3.05 CURING

Cement based grouts shall be cured per 03300 and per the manufacturer's recommendations.

END OF SECTION 03315

**SECTION 03370
CONCRETE CURING**

PART 1 - GENERAL

1.01 SECTION INCLUDES

Concrete curing materials and methods.

1.02 RELATED SECTIONS

SECTION 03100 – Concrete Formwork
SECTION 03300 – Cast Concrete

1.03 REFERENCES

ACI 301 - Specifications for Concrete Construction

ACI 306R – Guide to Design of Slabs on Ground

ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting

1.04 ENVIRONMENTAL CONDITIONS

When the air temperature is expected to fall below 37°F during the seven day initial cure period, the Contractor shall submit a written cold weather concreting plan conforming with ACI 306R to the Engineer for approval prior to the commencement of any concrete work.

1.05 QUALITY ASSURANCE

Contractor shall conform to requirements of ACI 301.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Water shall be clean, potable and not detrimental to concrete.

B. Absorptive mat shall be burlap-polyethylene, 8 ounces per square yard, bonded to prevent separation during use.

C. Concrete curing compound shall be of a standard and uniform quality, ready for use as shipped by the manufacturer. Contractor shall verify curing compound compatibility with required concrete surface finishes as specified in SECTION 03300 and as noted on the Drawings. The curing compound shall conform to ASTM C309, Type 1, Class A or B, and shall be clear with no discoloring. Curing compounds shall be certified nontoxic to fish, or approved by the engineer.

- D. Curing compound for interior slabs and interior walls shall be WR Meadows 1300 Clear or Engineer approved equal.
- E. Polyethylene Film shall conform to ASTM D2103 and shall be 6 millimeter thick and white in color.

PART 3 - EXECUTION

3.01 CURING METHODS

- A. All concrete surfaces shall be cured by one of the following methods for not less than seven days after the concrete is placed.
- B. Using one of the methods listed below, the Contractor shall determine the best method for the project, as approved by the Engineer:
 - 1. Walls:
 - a. General: Where walls are to receive coating, painting, cementitious material, or other similar finishes or where curing compound is not permitted, do not use curing compounds. Use only water-curing procedures.
 - b. Method 1: Leave concrete forms in place and keep entire exposed surfaces wet at all times.
 - c. Method 2: Apply curing compound as specified, where allowed, immediately after finishing of surfaces. Concrete shall be kept moist while finishing is accomplished.
 - d. Method 3: Continuously sprinkle 100 percent of all exposed surfaces.
 - e. Method 4: Leave concrete forms in place and apply curing compound to top of wall.
 - 2. Slabs and Curbs:
 - a. Method 1: Cover surface by water ponding.
 - b. Method 2: Cover with absorptive mats and keep continuously wet.
 - c. Method 3: Continuously sprinkle exposed surface.
 - d. Method 4: Apply specified curing compound to exposed surfaces.
 - e. Other agreed upon method that will provide moisture to be present and uniform at all times on all surface of slabs.
- C. Onset of Curing:
 - 1. Slabs-on-Grade: Apply curing compound, if used, as soon as free water has disappeared from concrete surface after placing and finishing.

2. Formed Concrete: Remove forms as specified in SECTION 03100, and patch and finish immediately. Apply curing method immediately to finished sections of the work.

3.02 MEMBRANE CURING COMPOUND

- A. Apply immediately after finishing of slabs and walls, etc. in accordance with manufacturer's instructions.
- B. Surfaces that have their forms removed after concrete has reached two-thirds of its design strength by test will not require curing compound applied.

3.03 ABSORPTIVE MAT

Contractor shall saturate burlap side of absorptive mat, place over slab areas burlap side down, lap edges and ends 12 inches, and maintain in place for duration of curing period.

3.04 POLYETHYLENE FILM

- A. Contractor shall spread polyethylene film over slab areas, lap edges and ends 3 inches, and seal with pressure-sensitive polyester tape.
- B. Contractor shall maintain polyethylene film in place with plywood sheets for duration of curing period.

END OF SECTION 03370

**SECTION 03900
CONCRETE REPAIR AND REHABILITATION**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Remove, repair, or rehabilitate new and existing concrete members and surfaces as indicated.
- B. Provide all materials and equipment necessary to accomplish the work.
- C. Repair damage to concrete and concrete surfaces which results from the removal of embedded items, from construction activities, or which existed previously in structures indicated to be repaired.

1.02 RELATED SECTIONS

SECTION 03100 – Concrete Formwork
SECTION 03210 – Reinforcing Steel
SECTION 03290 – Joints in Concrete
SECTION 03300 – Cast Concrete
SECTION 03315 – Grout

1.03 REFERENCES

ACI 201.1R-08 - Guide for Conducting a Visual Inspection of Concrete in Service

ACI 546R-14 - Guide to Concrete Repair

ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)

NSF/ANSI Standard 61 – Drinking Water System Components

1.04 SUBMITTALS

A. Shop Drawings

- 1. Submit Shop Drawings for strengthening required around new openings.
- 2. Submit detailed drawings showing proposed methods for supporting existing structures, equipment, and piping during demolition and repair activities.

B. Concrete Repair Products and Procedures

- 1. Submit a comprehensive plan for each repair method indicated within this Section, the plan shall include the following:
 - a. Manufacturer's literature containing instructions and recommendations on the mixing, handling, placement, curing, and appropriate uses for each product.

- b. Curing products and procedures for each repair method for which curing is recommended by the manufacturer.

1.05 QUALIFICATIONS OF CONCRETE RESTORATION FIRMS

- A. The concrete restoration work shall be performed by an experienced firm customarily engaged in performing similar repair work on cast-in-place concrete structures.
- B. The restoration firm shall have completed at least five similar projects in the last five years.
- C. The restoration firm shall be certified by the manufacturer of the repair materials.

1.06 QUALITY ASSURANCE

A. General

- 1. Any material, already placed, which fails to meet the indicated performance requirements is subject to removal and replacement as part of the work.
- 2. The Contractor shall supply all necessary materials for fabricating the test specimens.

B. Repair Mortar

- 1. The Contractor's approved agency per 2018 IBC Section 1704 shall take compression test specimens during construction from the first placement of each type of repair mortar.
- 2. The cost of laboratory tests on repair mortar shall be paid by the Contractor, and the Contractor shall be responsible for the cost of any additional tests and investigation on the work that does not meet the indicated requirements.
- 3. The compression tests and fabrication of specimens for repair mortar shall be performed as specified in ASTM C109.
 - a. A set of three specimens shall be made for testing at seven days and 28 days, and an additional two specimens shall be made and held in reserve.

C. Non-Shrink Grout: Non-shrink grout shall be tested as required in Section 03315.

D. Repair Concrete: Repair concrete shall be tested as required in Section 03300.

E. Epoxy Grout: Epoxy grout shall be tested as required in Section 03315.

F. Construction Tolerances: Construction tolerances shall comply with the requirements of Section 03300, except as otherwise indicated.

PART 2 - PRODUCTS

2.01 REPAIR MORTAR

- A. Provide repair mortar as a pre-packaged, two-component, polymer-modified, cementitious, non-sag mortar, specifically formulated for the repair of surface defects.

- B. Provide the mortar with a penetrating corrosion inhibitor.
- C. Repair mortar shall have the following properties:

Physical Property	Value	ASTM Standard
Compressive Strength (min.)		C109
at 7 days	6000 psi	
at 28 days	7000 psi	
Bond Strength (min.)		C882 (modified)
at 28 days	2200 psi	
Freeze/Thaw resistance (min.)		C666
300 cycles	98 percent	

- D. Provide a minimum repair thickness of 1/4 inch, unless otherwise indicated.
- E. Repair Mortar shall be SikaTop 123 Plus, by Sika Corporation, or equal.

2.02 NON-SHRINK GROUT

Provide non-shrink grout conforming to the requirements of Section 03315.

2.03 CONCRETE MATERIALS

A. Cement

1. Use Type II Portland cement unless otherwise indicated.
2. Where repairs are to be made on wall surfaces open to view and above normal water surface elevations, blend white Portland cement with the Type II cement as needed in order to match the color of the adjacent existing concrete surface.

B. Structural Repair Grout

1. Where required, provide structural repair grout meeting the requirements of Section 03315.
2. Provide a minimum repair thickness of 3 inches.

C. Cement Grout

1. Provide cement grout that meets the requirements of Section 03315.
2. Provide a minimum repair thickness of 1 inch.

D. Miscellaneous Materials: For concrete construction materials not covered specifically in this Section, conform to the requirements of Section 03300.

2.04 AGGREGATE

- A. Obtain the written permission of the manufacturer and Engineer before using aggregate to extend repair mortar and grout products.

- B. If allowed and unless otherwise indicated, provide aggregate consisting of 3/8-inch clean, washed gravel or crushed stone as required in Section 03300.

2.05 BONDING AGENT AND ANTI-CORROSION COATING

- A. Provide a bonding agent that is a solvent-free, moisture-tolerant, epoxy-modified, cementitious product, specifically formulated as a bonding agent and anti-corrosion coating.
- B. Bonding Agent shall be Armatec 110 EpoCem, by Sika Corporation, or equal.

2.06 EPOXY GROUT

Provide an epoxy grout conforming to the requirements of Section 03315 .

2.07 EPOXY RESIN

- A. Use epoxy resin for structural crack repair.
- B. For crack injection, provide a 2-component, moisture-tolerant, low-viscosity, high-strength epoxy resin adhesive that is specially formulated for that usage.
- C. Provide a minimum bond strength of 2900 psi when tested per ASTM C882 at 14 days, moist cured.
- D. Epoxy Resin shall be Sikadur 35, Hi-Mod LV, by Sika Corporation, KEMKO 068 LoVis IR, by ChemCo Systems, Inc., or equal.

2.08 FORMwork

Where needed, provide formwork that meets the requirements of Section 03100.

2.09 REINFORCEMENT STEEL

Where required, provide reinforcing steel that meets the requirements of Section 03210.

2.010 POLYURETHANE SEALANT

- A. Provide a two-part polyurethane, gun-grade sealant.
- B. Polyurethane Sealant shall be Sikaflex – 2C, by Sika Corporation, or equal.

2.011 POLYURETHANE CHEMICAL GROUT

- A. Use polyurethane chemical grout for non-structural crack repair.
- B. Polyurethane Chemical Grout shall be SikaFix HH, by Sika Corporation, Flex LV PRe, by WR Grace/De Neef, Flex SLV PRe, by WR Grace/De Neef, or equal.

2.012 EXPANSION JOINTS

- A. Provide an expansion joint system for repair of the existing expansion joints, consisting of a Hypalon sealing strip and an epoxy adhesive in order to provide a watertight seal.

- B. Expansion Joint System shall be Sikadur Combiflex, by Sika Corporation, or equal.

2.013 HYDROPHILIC WATERSTOP

- A. Provide hydrophilic waterstop of the type which expands in the presence of water to form a watertight joint seal without damaging the concrete in which it is cast.
- B. Provide hydrophilic waterstop that is bentonite-free and manufactured from chloroprene rubber and modified chloroprene rubber with hydrophilic properties.
- C. Hydrophilic Waterstop shall be Hydrotite RSS-040 P, by Greenstreak Group, Inc., KM 4mm String, by Adeka Ultra Seal, or equal.

2.014 HIGH STRENGTH EPOXY GEL

High-Strength Epoxy Gel for crack surface sealing shall be Denepox Rapidgel, by WR Grace/De Neef, or equal.

PART 3 - EXECUTION

3.01 GENERAL

A. Repairs

1. Repair techniques will be reviewed during the pre-construction meeting between the Contractor, Owner or Engineer.
2. The Contractor shall be familiar with the cause of deteriorated concrete and shall choose the right equipment, repair materials and techniques to be used for each particular repair.
3. Choose repair materials to match the adjacent concrete surface in color and texture.
4. Apply repair materials in strict accordance with the manufacturer's printed instructions, including temperature and moisture requirements throughout application and curing.
5. Protect adjacent portions of the structure, including all valves, pipes, mechanical equipment, and filter media from debris generated by repair activities.
6. For portions of the structure that are not identified to be repaired, maintain in their original condition.

B. Structural Stability

1. Use caution not to weaken the structural capacity of a beam, column, wall, slab, walkway, or other concrete member during concrete removal.
2. For severely deteriorated concrete members, consult with the Engineer before removing a major portion of any structural member.
3. Shoring may be required in order to support the structure and to protect workers.

- C. Provide off-site disposal of debris generated as a result of repair procedures.

- D. Provide concrete construction procedures not specifically addressed in this Section in accordance with the requirements of Section 03300 .

3.02 REPAIR SEQUENCING

- A. Unless otherwise indicated, perform concrete repairs in the following sequence, with no activity in an area being started until previous activities in that area have been completed, including curing, cleanup, and the like:
 1. Removal of equipment, miscellaneous metals, and other surface features that would interfere with the repair.
 2. Removal of concrete sections which require complete replacement.
 3. Surface preparation hydroblasting over the entire area to be repaired.
 4. Embedded metal repair.
 5. Crack repair.
 6. Filter trough to wall connection repair.
 7. Spalled and delaminated concrete repair.
 8. Scaled concrete.
 9. Pop-out repair, and repair of other surface damage, deterioration, or defects.
 10. Patching of holes in concrete.
 11. Replacement of concrete sections which require complete replacement.
 12. New construction.
 13. Application of protective coatings.
 14. Expansion joint repair.
 15. Installation of traffic topping.
- B. For areas which require combinations of spalled and delaminated concrete repair, scaled concrete, and pop-out repair, perform these repairs at the same time.
- C. Limit the size of the repair area in order to permit the repairs to be performed together, without sacrificing the quality of the individual repairs.

3.03 EMBEDDED METAL REPAIR

- A. Unless otherwise indicated, repair anchor bolts and other embedded metal, except rebar, that are exposed at the concrete surface and are showing signs of corrosion, as follows:
 1. Cut off or otherwise remove corroded metal fastened at the surface;

2. Burn back embedded metals to a depth of at least 1.5 inches beyond the surface of sound concrete;
 3. Chip away unsound concrete around the embedded metal.
 4. Apply epoxy grout to the repair area until level with the surface of the surrounding sound concrete.
- B. Unless otherwise indicated, repair embedded rebar that is exposed at the concrete surface following the procedures outlined in the appropriate concrete repair subsection, below.

3.04 CRACK REPAIR

- A. Structural Cracks - Structural Cracks are defined as follows:
1. All cracks where reinforcing steel is passing across the crack, including erratic cracks, and cracks at construction joints.
 2. Repair structural cracks with epoxy resin.
- B. Non Structural Cracks - Non Structural Cracks are defined as follows:
1. Cracks occurring at flexible joints, contraction joints or expansion joints.
 2. Repair non-structural cracks with polyurethane chemical grout.
- C. Efflorescence
1. Prior to the crack repair, clean efflorescence from the cracks and the surrounding area.
 2. Clean the efflorescence by light hydro-blasting or scrubbing.
- D. Pressure Injection: Pressure Injection to be performed prior to leak testing and roof membrane installation.
1. General
 - a. The indicated repair materials have been selected to minimize the loss of material during the injection process. The areas selected for crack repair are to be identified by the Contractor, Engineer or Construction Manager and be determined prior to leak tests and roof membrane installation. The injection of cracks may also be required as a result of the leak test.
 - b. In order to avoid excessive loss of injected material at the lower exposed portions of the cracks, space the injection ports a distance no greater than the thickness of the wall being repaired.
 2. Open through thickness structural cracks are to be repaired to deliver a water tight hydraulic structure passing the specified leakage test. All 3 foot long minimum or greater through thickness cracks greater than a minimum 15 mil thickness in the walls are to be injected unless they do not accept grout. All 2 foot long minimum through thickness cracks greater than 10 mil thickness in the foundation, water conduits, floor slabs and roof are to be injected unless they do not accept grout. Perform structural crack repairs by pressure injection in accordance with the manufacturer's directions, and in accordance with the following basic procedure:
 - a. Remove unsound and foreign materials from the crack in a manner that does not trap debris in the crack and prevent the flow of repair materials.

DIVISION 3 - CONCRETE

- b. Remove any contamination by flushing with water or solvent, allowing adequate time for air-drying or blow out the solvent with compressed air. For potable water applications, any solvents must be fully flushed from the joint unless NSF/ANSI Standard 61 approved.
 - c. Install the injection ports in accordance with the manufacturer's directions.
 - d. Sealing
 - 1) Seal the surface in order to keep the pressure injecting materials from leaking out before it has set or gelled.
 - 2) Seal a surface by brushing an epoxy over the surface of the crack and allowing it to harden, or use high injection pressures to cut-out the cracks in a 'V' shape, fill with an epoxy, and strike off flush with the surface.
 - 3) Surface patching or sealant shall be performed where needed to provide for complete penetration of the injected polyurethane grout and to prevent wastage. Seal surface of crack with fast setting hydraulic cement or high strength epoxy gel. The floor surface along the cracks shall be cleaned and all wasted grout and surface seal material shall be completely removed from the concrete surface following completion of the repair work
 - e. Inject the repair materials, with consideration of the following items:
 - 1) Carefully select the pressure of the hydraulic pump or other device, because too much pressure can extend the existing cracks and cause more damage.
 - 2) For vertical cracks, start by pumping material into the entry port at the lowest elevation until the material level reaches the entry port above, then cap the lower injection port and repeat the process at successively higher ports until the crack has been completely filled.
 - 3) For horizontal cracks, start at one end of the crack and work to the other end, filling the crack until the pressure can be maintained.
 - 4) For very fine cracks, start the injection of repair material at the widest end and proceed toward the thinner end, using low-viscosity repair material.
 - f. Cleanup
 - 1) Remove the surface seal by grinding or other appropriate means.
 - 2) Coat fittings and holes at injection ports with an epoxy patching compound.
 - 3) If crack repairs are part of repair for surface defects, painting with epoxy is not necessary and surface preparation may be started after crack repairs have been completed.
3. Open through thickness non-structural cracks are to be repaired to deliver a water tight hydraulic structure passing the specified leakage test. Open through thickness cracks with lengths of at least 3 feet on each side of the wall and roof, at least 2 feet of length on the foundation or floor slab are to be injected unless they do not accept grout. All 3 foot long minimum or greater through thickness cracks greater than a minimum 15 mil thickness in the walls are to be injected unless they do not accept grout. All 2 foot long through thickness cracks greater than 10 mil thickness in the floors and roof are to be injected unless they do not accept grout. Perform non-structural crack repairs in accordance with the manufacturer's directions, and in accordance with the following basic procedure:

- a. Remove unsound and foreign materials from the crack in a manner that does not trap debris in the crack and prevent the flow of repair materials.
- b. Remove contamination by flushing with water or solvent, allowing adequate time for air-drying or blow out the solvent with compressed air. Any solvents must be fully flushed from the joint unless NSF/ANSI Standard 61 approved.
- c. Install the injection ports in accordance with the manufacturer's directions.
- d. Moisture
 - 1) For non-structural cracks, moisture must be present for the chemical grout to react.
 - 2) Prior to injecting the repair materials, inject the crack with a small amount of water in order to completely moisten the crack.
- e. Inject the repair materials, with consideration of the following items:
 - 1) Carefully select the pressure of the hydraulic pump or other device, because too much pressure can extend the existing cracks and cause more damage.
 - 2) For vertical cracks, start by pumping material into the entry port at the lowest elevation until the material level reaches the entry port above, cap the lower injection port and repeat the process at successively higher ports until the crack has been completely filled, and then, starting again at the lowest port, re-inject into all ports in order to ensure that all voids are properly sealed off.
 - 3) For horizontal cracks, start at one end of the crack and work to the other end, filling the crack until the pressure can be maintained.
 - 4) For very fine cracks, start the injection of repair material at the widest end and proceed toward the thinner end.
- f. Cleanup
 - 1) Remove excess surface material by grinding or other appropriate means.
 - 2) Coat fittings and holes at injection ports with an epoxy patching compound.
 - 3) If crack repairs are part of repair for surface defects, painting with epoxy is not necessary and surface preparation may be started after crack repairs have been completed.

3.05 SPALLED AND DELAMINATED CONCRETE REPAIR

A. Repair spalls and delaminated concrete using repair mortar.

B. Surface Preparation

1. Remove all delaminated concrete and all unsound concrete beyond the spalled or delaminated area.
2. Boundaries
 - a. Determine the boundaries of the patch by sawcuts to a depth of at least 1/4 inch up to one inch deep.
 - b. Refer to the Structural Drawings for sawcut locations.
 - c. Where the sawcut locations are not shown on the Drawings, the boundaries shall be layouts designed to reduce boundary edge length.
 - d. Avoid excessive or complex edge conditions.

3. Sawcuts

- a. Perform sawcuts perpendicular to the surface or slightly undercut.
- b. Construct sawcuts in maximum 1/4-inch increments.
- c. After each incremental cut, inspect the cut surface in order to ensure that the existing reinforcement has not been cut.
- d. If at any depth the reinforcement becomes exposed, terminate the sawcut and notify the Engineer.

4. Chip away concrete within the repair area to a depth sufficient to expose sound concrete over the entire repair area, or to a minimum depth required by repair mortar, whichever is greater.

5. Base the selection of partial depth concrete removal equipment on the size of repair area, depth of concrete to be removed, and the location of the deteriorated concrete such as wall, slab-on-grade, underside or top of elevated slab.

6. Removal

- a. The maximum allowable pneumatic chipping hammer shall be a 30-lb class hammer.
- b. Hydroblast removal shall use a maximum pressure of 40,000 psig.
- c. Sand blasting is not permitted.
- d. Hydroblast concrete removal is recommended for large area of surface defects.
- e. Remove water blasting debris daily in order to prevent it from setting up.
- f. If a chipping hammer is used, ensure that the existing reinforcement is not damaged during the concrete removal operations.
- g. Remove protrusions, such as mortar spatter or fins, by grinding or by striking with a hammer or other tool.

7. Reinforcement

- a. Remove concrete from around reinforcement when the rebar is rusted, more than half the rebar perimeter is already exposed, the concrete bond around the rebar is broken, or if the concrete is unsound or honey-combed.
- b. Remove concrete in order to provide a clear space of minimum one inch on all sides of the reinforcement, such that the rebar can be cleaned, and the repair material will completely surround the rebar.
- c. Clean exposed reinforcement by water blasting or wire brushing.
- d. After fully exposing and cleaning the reinforcement, check for steel deterioration, and if the cross-sectional area of the steel has been reduced by more than 10 percent, whether by deterioration, surface preparation, or a combination of both, provide additional reinforcement.
- e. Consult with the Engineer before adding or replacing rebar.

C. Repairing Surface Defects

1. Clean the concrete surface after removing unsound concrete, repairing cracks, and cleaning the reinforcement.

DIVISION 3 - CONCRETE

2. Ensure that the concrete surface and reinforcement are free of form-release agents, curing compounds, surface hardeners, oils, grease, food, chemicals, and other contaminants.
3. Remove dust, including new dust generated by surface preparation or scarifying.
4. Prior to application of the bonding agent, apply anti-corrosion coating to exposed rebar in accordance with the manufacturer's recommendations, allow the coating to dry, reapply the coating, and allow to dry again.
5. Prior to applying the repair mortar, apply bonding agent in accordance with the manufacturer's recommendations.
6. Repair Mortar.
7. Apply repair mortar in accordance with the manufacturer's recommendations.
8. The thickness of each lift of repair mortar shall be in accordance with the manufacturer's recommendations, with the minimum thickness being not less than 1/4 inch.
9. Fully consolidate the repair mortar, working the material into the substrate to completely fill all pores and voids in the area to be filled.
10. Bring the repair surface into alignment with the adjacent existing surfaces in order to provide a uniform, even surface.
11. Match the repair surface to adjacent existing surfaces in texture by applying necessary coatings and surface treatments.
12. Float-finish the repaired surface using wood or sponge floats.
13. For repaired surfaces to receive a protective coating, brush-finish the surface in order to produce a roughened substrate for the coating.
14. Minimum and maximum ambient and surface temperatures shall be as recommended by repair material manufacturer.

D. Curing

1. Curing of repair mortar to receive waterproofing shall be as follows:
 - a. Keep the mortar continuously wet by the application of water for a minimum period of at least seven consecutive days, beginning immediately after the mortar has reached final set;
 - b. Weight the curing blankets or otherwise held them in place in order to prevent being dislodged by wind or other causes, and to be substantially in contact with the concrete surface;
 - c. Ensure that edges are continuously held in place; and,
 - d. Keep the curing blankets and concrete continuously wet by the use of sprinklers or other means, both during and after normal working hours.
2. If the repair mortar is not to receive waterproofing, provide curing in accordance with the manufacturer's recommendations except that the minimum cure period shall be 7 days.

3. During cold weather, maintain the repair material temperature above 50 degrees F for at least 3 days after placement.

3.06 SCALED CONCRETE REPAIR

A. Repair scaling and pop-outs using repair mortar.

B. Surface Preparation

1. Prior to repair, prepare the surface in accordance with the repair mortar manufacturer's recommendations with the following minimum requirement.
2. Remove unsound concrete from surfaces by high-pressure water blasting, using a minimum pressure of 10,000 psig and maximum pressure of 40,000 psig.
3. Clean exposed reinforcement by water blasting or wire brushing.

C. Repairing Surface Defects

1. Clean the concrete surface after removing unsound concrete, repairing cracks, and cleaning reinforcement.
2. Ensure that the concrete surface and reinforcement are free of form-release agents, curing compounds, surface hardeners, oils, grease, food, chemicals, and other contaminants.
3. Remove dust, including new dust generated by surface preparation or scarifying.
4. Prior to application of the bonding agent, apply anti-corrosion coating to exposed rebar in accordance with the manufacturer's recommendations, allow the coating to dry, reapply the coating, and allow to dry again.
5. Prior to applying the repair mortar, apply bonding agent in accordance with the manufacturer's recommendations.
6. Apply repair mortar in accordance with the manufacturer's recommendations, using a minimum repair material thickness of 1/4 inch.
7. Fully consolidate the repair material, working the material into the substrate to completely fill all pores and voids in the area to be filled.
8. Bring the repair surface into alignment with the adjacent existing surfaces in order to provide a uniform, even surface.
9. Match the repair surface to adjacent existing surfaces in texture by applying necessary coatings and surface treatments.
10. Float-finish the repaired surface using wood or sponge floats.

D. Provide strip joint in newly placed mortar at the location of repaired cracks.

E. Curing

1. Curing of repair mortar to receive waterproofing shall be as follows:

DIVISION 3 - CONCRETE

- a. Keep the mortar continuously wet by the application of water for a minimum period of at least seven consecutive days, beginning immediately after the mortar has reached final set;
 - b. Weight the curing blankets or otherwise held them in place in order to prevent being dislodged by wind or other causes, and to be substantially in contact with the concrete surface;
 - c. Ensure that edges are continuously held in place; and,
 - d. Keep the curing blankets and concrete continuously wet by the use of sprinklers or other means, both during and after normal working hours.
2. If the repair mortar is not to receive waterproofing, provide curing in accordance with the manufacturer's recommendations except that the minimum cure period shall be seven days.
 3. During cold weather, maintain the repair material temperature above 50 degrees F for at least three days after placement.

3.07 POP-OUT REPAIR, AND REPAIR OF OTHER SURFACE DAMAGE, DETERIORATION, OR DEFECTS

- A. Repair pop-outs and other surface damage, deterioration, and defects which are 1/4 inch deep or shallower, using the procedures described under Section 3.06 above.
- B. Repair other pop-outs and surface damage, deterioration, and defects using the procedures described under Section 3.05 above.

3.08 REPLACEMENT OF CONCRETE SECTIONS WHICH REQUIRE COMPLETE REPLACEMENT

- A. Refer to the Structural Drawings for locations where the level of concrete deterioration is such that complete removal and replacement of the deteriorated section is required.
- B. At these locations, remove the deteriorated concrete in accordance with the details on the Structural Drawings and the requirements of this Section.
- C. Limits
 1. The limits of concrete removal shall be as indicated on the Structural Drawings.
 2. If no limits of removal are indicated, determine the limits in accordance with the procedures described under Section 3.05.B.2.
- D. Provide sawcuts in accordance with the procedures described under Section 3.05.B.3.
- E. After removal of the concrete, prepare the area and provide repair concrete in accordance with the details on the Structural Drawings and the requirements of this Section.
- F. Unless otherwise indicated, match the finished cross-section of the repaired concrete to the cross-section of the adjacent undamaged concrete.

3.09 PATCHING OF HOLES IN CONCRETE

A. General

1. For the purposes of this Section, holes are defined as penetrations completely through the concrete member and with interior surfaces approximately perpendicular to the surface of the existing member.
2. Interior surface areas which are inclined and do not meet these criteria shall be chipped as needed to meet this requirement.
3. The perimeter of holes at the surface shall form a regular shape composed of curved or straight line segments.
4. Provide the minimum depth of placement for the material used; score the existing concrete by sawcutting, and chip as needed to meet this requirement.
5. Roughen the interior surface of holes less than 12 inches in diameter to a minimum of 0.125-inch amplitude and roughen larger holes to a minimum of 0.25-inch amplitude.
6. At holes, coat the existing surface to be repaired with a bonding agent.

B. Patching Small Holes: For holes which are less than 12 inches in their least dimension and extend completely through concrete members, fill with non-shrink grout.

C. Patching Large Holes

1. Fill holes which are larger than 12 inches in their least dimension with structural repair grout.
2. Provide large holes which are normally in contact with water or soil with hydrophilic waterstop placed in a groove.
3. Alternatively, bond the hydrophilic waterstop to the surface using an epoxy grout which completely fills all voids and irregularities beneath the waterstop material.
4. Install the waterstop in accordance with the requirements of Section 03290 .
5. Provide reinforcing steel in layers matching existing reinforcement location, size, spacing and cover requirements unless directed otherwise by the Engineer.
6. In locations where NSF/ANSI Standard 61 approval is required by the authority having jurisdiction, use one of the following procedures:
 - a. Provide Product Data showing the proposed structural repair grout is NSF/ANSI Standard 61 approved.
 - b. Complete the repair with structural repair grout. Coat all surfaces required to have NSF/ANSI Standard 61 approval completely with Sikadur 31, Tyfo S, or equal.
 - c. Place the structural repair grout to within 1 ½” of the finished surface of the repair. Complete the remainder of the repair with SikaTop123 Plus, or equal.

3.10 PATCHING OF LINED HOLES

A. General

1. This work applies to those openings which have embedded material over all or a portion of their inside edge.
2. The requirements for repairing holes in concrete, as indicated above, apply as modified herein.
3. The Engineer will determine whether the embedded material is allowed to remain.

B. Where embedded material is allowed to remain, trim it back a minimum of 2 inches from the concrete surface.

C. Roughen or abrade the embedded material in order to promote good bonding to the repair material.

D. Remove substances that interfere with good bonding.

E. Completely remove embedded items that are not securely and permanently anchored into the concrete.

F. Completely remove embedded items which are larger than 12 inches in their least dimension, unless they are composed of a metal to which reinforcing steel can be welded; where reinforcement is required, weld it to the embedded metal.

G. The following requirements shall apply to concrete members which are in contact with water or soil:

1. Using epoxy grout, fill lined openings which are less than 4 inches in their least dimension;
2. Using an epoxy bonding agent, coat lined openings which are greater than 4 inches but less than 12 inches in their least dimension, prior to being filled with non-shrink grout.
3. Using an epoxy bonding agent, coat lined openings which are greater than 12 inches in their least dimension and provide a hydrophilic waterstop bonded to the interior of the opening with epoxy adhesive, prior to being filled with approved repair material.

3.11 APPLICATION OF PROTECTIVE COATINGS

A. Waterproofing

1. Apply waterproofing in accordance with the manufacturer's printed instructions.
2. Do not begin waterproofing work until repairs and new construction in the affected area have been completed and adequately cured.

3.12 EXPANSION JOINT REPAIR

A. Repair deteriorated expansion joints as follows:

1. Completely remove existing sealant;
2. Remove defective backer materials in the joint;

DIVISION 3 - CONCRETE

3. Sand-blast the joint and prepare the surface in accordance with the sealant manufacturer's instructions;
4. Prepare the wall surface on each side of the joint in accordance with the expansion joint manufacturer's instructions;
5. Ensure that the prepared surface is clean, sound, and bare concrete;
6. Place backer material in the joint;
7. Apply a primer recommended by the sealant manufacturer;
8. Fill the joint with polyurethane sealant;
9. Allow a minimum of 3 days curing prior to installing the expansion joint; and,
10. Install the expansion joint in accordance with the manufacturer's instructions.

END OF SECTION 03900

**SECTION 05000
GENERAL METAL PROVISIONS**

PART 1 - GENERAL

1.01 SECTION INCLUDES

This section specifies general requirements for all sections of Division 5 – Metals.

1.02 RELATED SECTIONS

Section 01300 Contractor Submittals

1.03 REFERENCES

References listed in Division 5 are from the following organizations' latest editions of their publications and reference standards.

AISC – American Institute of Steel Construction: Steel Construction Manual, ASD

AISI – American Iron and Steel Institute

ASTM – ASTM International (formerly American Society of Testing and Materials)

AWCI – Association of the Wall and Ceiling Industry

AWS – American Welding Society: Structural Welding Code

IBC – International Building Code

MFMA – Metal Framing Manufacturers Association

TAA – The Aluminum Association: ADM – Aluminum Design Manual

1.04 SUBMITTALS

Provide submittals for items in all sections of Division 5 in accordance with Sections 00704.03 Shop Drawings and 01300 Contractor Submittals.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION 05000

**SECTION 05050
FASTENERS**

PART 1 - GENERAL

1.01 SECTION INCLUDES

The work under this Section includes providing all labor, materials, tools, and equipment necessary for connectors, fasteners, welded metal, and miscellaneous items required to complete the work, including but not limited to embedded and nonembedded metal work, fasteners for grating or aluminum fabricated items, anchor bolts, expansion anchors, bolts, nuts, washers, sheet metal screws, and steel epoxy-grouted anchors, as shown on the Drawings and described in the Specifications.

1.02 RELATED SECTIONS

Section 01330 Contractor Submittals
Section 05100 Structural Metal Framing
Section 05500 Miscellaneous Metals

1.03 REFERENCES

ASTM A108 – Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished

ASTM A193 – Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications

ASTM A194 – Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both

ASTM A307 – Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength

ASTM A563 – Standard Specification for Carbon and Alloy Steel Nuts

ASTM F3125 – Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated

1.04 SUBMITTALS

A. Furnish submittals in accordance with the requirements of Section 01300.

B. Provide catalog information and product data for all items provided under this Section.

C. Anchor Submittals:

1. Submit an ICC-ES or IAPMO-UES report listing the ultimate load capacity in tension and shear for each size and type of concrete anchor.

2. Submit manufacturer's recommended installation instructions and procedures for anchors.

3. Upon review by the Engineer, these instructions shall be followed specifically.
4. No substitution for the indicated anchors will be considered unless accompanied with an ICC-ES or IAPMO-UES report verifying strength and material equivalency.
5. Complete structural calculations and anchorage details shall be prepared and submitted by the Contractor for all anchors and anchor groups that are shown but not completely detailed (type, size, location, spacing and embedment) on the Contract Documents. Calculations and anchorage details shall be signed and stamped by a Professional Engineer registered in the state of Washington.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Unless otherwise indicated, use fasteners and connectors of the same material as the attached metal.
- B. Stainless steel fasteners are required
 1. Where connecting aluminum components.
 2. For connections to be used in submerged or wet locations, where water or other liquids may drip, splash, or flow on or against the components.
- C. Unless otherwise indicated, hot-dip galvanize after fabrication.

2.02 FASTENERS FOR ALUMINUM FABRICATED ITEMS

- A. All bolts, nuts, washers, and screws used for assembly or mounting of aluminum fabricated items shall be stainless steel grade 304 or 316. Do not use plated or galvanized assembly hardware with aluminum-fabricated items.
- B. All connections for assembly of head troughs and denil fishways such as bolts, washers, lock washers, shall be grade 304 stainless steel. Furnish all hardware necessary to assemble the troughs and fishways.

2.03 ANCHOR BOLTS AND EXPANSION ANCHORS

- A. Anchor bolts embedded in concrete and subjected to intermittent or continuous submergence during hatchery operations shall be stainless steel.
- B. Other anchor bolts and studs shall be ASTM A307 carbon steel, 60,000 psi tensile strength. Anchor bolts, nuts, expansion anchors, bolts, and washers shall be hot-dip galvanized unless otherwise noted.
- C. Expansion anchors set in holes drilled in the concrete after the concrete is placed will not be permitted in substitution for anchor bolts except with the prior written acceptance of the Engineer.

2.04 BOLTS, NUTS, WASHERS, AND SHEET METAL SCREWS

- A. All bolts and nuts that will be continuously or intermittently in contact with water during hatchery or other facility operations shall be stainless steel conforming to ASTM A193 and ASTM A194 for type 304 or 316 as approved.
- B. All other general use bolts, nuts, and washers shall be ASTM A307 and A563 respectively, hot-dip galvanized, unless noted otherwise.
- C. All assembly hardware for aluminum fabrication shall be stainless steel. Do not use galvanized, plated, or anodized materials with aluminum.
- D. Fasten structural steel members with high strength bolts conforming to ASTM F3125 unless otherwise indicated.
- E. Furnish washers and lock washers for all bolted connections unless otherwise noted. This includes washers for flange bolts. Washers and lock washers shall be of the same material as fasteners and connectors.

2.05 HEADED CONCRETE ANCHORS

ASTM A108 or AISI Type 304.

PART 3 - EXECUTION

3.01 INSTALLATION

Install all fasteners and connectors in accordance with industry standards.

3.02 ANCHOR BOLTS

Protect the threads of embedded anchor bolts with fitted nuts or by other accepted means until the equipment or metalwork is installed.

END OF SECTION 05050

**SECTION 05100
STRUCTURAL METAL FRAMING**

PART 1 - GENERAL

1.01 SECTION INCLUDES

This section specifies structural steel support members and required fasteners.

1.02 RELATED SECTIONS

SECTION 05050 - FASTENERS.

SECTION 09800 – PROTECTIVE COATING

SECTION 09870 – COATING SYSTEM FOR BURIED STEEL PIPING

GENERAL CONDITIONS, SUPPLEMENTAL CONDITIONS, and DIVISION 1

1.03 REFERENCES

AISC American Institute of Steel Construction

ASTM A36 Standard Specification for Carbon Structural Steel

ASTM A53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

ASTM A123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A153 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

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

ASTM A780 Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

AWS D1.1 Structural Welding Code - Steel

OSHA Occupational Health and Safety Administration

IBC International Building Code

PART 2 - PRODUCTS

2.01 MATERIALS

A. Structural Steel Members: ASTM A36.

B. Steel Pipe: ASTM A53, Grade B.

- C. Structural Tubing: ASTM A500, Grade B.
- D. Welding Materials: Per AWS D1.1 - Type required for materials being welded or E70XX electrodes.

2.02 FABRICATION

- A. Fabricate structural steel members in accordance with IBC and AISC Specifications.
- B. All ferrous elements shall be hot-dip galvanized after fabrication unless noted otherwise on the Drawings (reference DIVISION 9).

2.03 FINISH

- A. Clean, prepare, and galvanize according to ASTM A123 all structural steel members unless noted otherwise on the Drawings. Provide a minimum of 2.3 ounces per square foot galvanized coating (reference DIVISION 9).
- B. Clean, prepare, and galvanize according to ASTM A153 all iron and steel hardware unless completely embedded in concrete (reference DIVISION 9).

PART 3 - EXECUTION

3.01 ERECTION

- A. Erect structural steel in accordance with IBC requirements and AISC specifications.
- B. Do not field cut or alter structural members without approval of the Engineer.
- C. For welding, use electrodes compatible with galvanized steel. Minimum fillet weld size shall be 3/16 inch unless noted otherwise.
- D. After erection and welding repair scratches, gouges, cut edges, welds, and other bare areas with zinc-rich paint according to ASTM A780. Paint thickness at repaired areas to be minimum of 10 mils. Paint for repair to result in dried film containing minimum of 94 percent zinc dust by weight.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete.
- F. All sharp edges, burrs, and protrusions shall be removed by the Contractor to the satisfaction of the Engineer. All edges and corners in potential contact with fish shall be radiused and ground smooth to the satisfaction of the Engineer

END OF SECTION 05100

**SECTION 05500
MISCELLANEOUS METALS**

PART 1 - GENERAL

1.01 SECTION INCLUDES

Provide miscellaneous metalwork and appurtenances, complete and in place, as indicated in accordance with the Contract Documents.

1.02 RELATED SECTIONS

SECTION 03315 - GROUT
SECTION 09800 – PROTECTIVE COATING

1.03 REFERENCES

MIL-A-907E	Antiseize Thread Compound, High Temperature
MIL-DTL-18015	(Ships) Aluminum Planks. (6063-T6)
MIL-PRF-907F	Antiseize Thread Compound, High Temperature
OSHA 1927.10	Fixed Ladders
AA-M32C22A41	Aluminum Assn.
AASHTO HS-20	Truck Loading
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ASTM A36	Carbon Structural Steel
ASTM A48	Gray Iron Castings
ASTM A53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A123	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A193	Alloy Steel and Stainless Steel Bolting Materials for High Temperature Service
ASTM A194	Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service
ASTM A307	Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
ASTM A325	Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A500	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A992	Steel for Structural Shapes for Use in Building Framing
ASTM C478	Precast Reinforced Concrete Manhole Sections

ASTM C497	Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile
ASTM D4101	Standard Classification System and Basis for Specification for Polypropylene Injection and Extrusion Materials
ASTM F1554	Standard Specification for Anchor Bolts, Steel, 36, 55 and 105-ksi Yield Strength
ANSI/AWS D1.1	Structural Welding Code – Steel
ANSI/AWS D1.2	Structural Welding Code – Aluminum
ANSI/AWS QC1	Qualification and Certification of Welding Inspectors
SSPC-SP1	Solvent Cleaning
SSPC-SP7	Brush-off Blast Cleaning

1.04 CONTRACTOR SUBMITTALS

A. Shop Drawings:

1. Shop Drawings shall conform to AISC recommendations and specifications, and shall show holes, and the like, as may be required for other parts of the work.
2. Shop Drawings shall include complete details of members and connections, anchor bolt layouts, schedules for fabrication procedures, and diagrams for the sequence of erection.
3. Coating repair products and application data

B. Grating:

1. Submit layout drawings for grating, showing the direction of span, type and depth of grating, size and shape of grating panels, seat angle details, and details of grating hold down fasteners.
2. Submit load and deflection tables for each style and depth of grating used.

C. Anchor Submittals:

1. Submit an ICC-ES or IAPMO-UES report listing the ultimate load capacity in tension and shear for each size and type of concrete anchor.
2. Submit manufacturer's recommended installation instructions and procedures for anchors.
3. Upon review by the Engineer, these instructions shall be followed specifically.
4. No substitution for the indicated anchors will be considered unless accompanied with an ICC-ES or IAPMO-UES report verifying strength and material equivalency.
5. Complete structural calculations and anchorage details shall be prepared and submitted by the Contractor for all anchors and anchor groups that are shown but not completely detailed (type, size, location, spacing and embedment) on the Contract Documents. Calculations and anchorage details shall be signed and stamped by a Professional Engineer registered in the state of Washington.

1.05 QUALITY ASSURANCE

- A. Weld procedures and welder qualifications shall be available in the Contractor's field office for review. Copies of procedures and welder qualifications shall be provided to the special inspector prior to the start of the welding activity.
- B. Welding Special Inspection shall be performed by the Contractor in accordance with the enforceable Building Code, and these Contract Documents.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENT

A. Steel:

Wide Flange Shapes	ASTM A992
Shapes, Plates, Bars	ASTM A36
Pipe, Pipe Columns, Bollards	ASTM A53, Type E or S, Grade B standard weight unless indicated otherwise
HSS	ASTM A500 Grade B

B. Corrosion Protection:

- 1. Unless otherwise indicated, fabricated steel metalwork which will be used in a corrosive environment and/or will be submerged in water or wastewater shall be coated in accordance with the requirements of Section 09800, and shall not be galvanized prior to coating.
- 2. Other miscellaneous steel metalwork shall be hot-dip galvanized after fabrication.

C. Stainless Steel:

- 1. Unless otherwise indicated, stainless steel metalwork and bolts shall be fabricated from Type 316 stainless steel.
- 2. Where anaerobic conditions are noted, Type 304 stainless steel shall be used.

D. Aluminum:

- 1. Unless otherwise indicated, aluminum metalwork shall be fabricated from Alloy 6061-T6.
- 2. Aluminum in contact with concrete, masonry, wood, porous materials, or dissimilar metals shall have contact surfaces coated in accordance with the requirements of Section 09800 Protective Coating.

E. Cast Iron: Unless otherwise indicated, iron castings shall conform to the requirements of ASTM A48, Class 50B, or better.

2.02 STEEL PIPE HANDRAILS

- A. Steel pipe handrails, including brackets and related hardware which may be partially or wholly submerged or which are located inside a hydraulic structure, shall be fabricated entirely of Type 316 stainless steel.

- B. Other steel pipe handrails shall be standard 1-1/2-inch black steel pipe made up by welding, and shall be hot-dip galvanized after fabrication. Alternately, steel pipe handrails may be constructed of 1 1/2-inch galvanized steel pipe and Kee-Klump system.

2.03 METAL STAIRS

- A. Metal stairs shall be composed of steel or aluminum stringers and supports, shall be fabricated in accordance with the standard practice of the National Association of Ornamental Metal Manufacturers, and shall be as indicated.
- B. Steel stair members shall be hot-dip galvanized after fabrication.

2.04 GRATING STAIR TREADS

- A. Grating stair treads shall be designed to support a live load of 100 psf or a concentrated load at mid-span of 300 pounds, whichever creates the higher stress.
- B. The maximum deflection due to the uniform live load shall be as required for metal grating, below.
- C. Grating stair treads shall be provided with an integral non-slip nosing.

2.05 LADDERS

- A. Materials:
 - 1. Ladders which may be partially or wholly submerged or which are located inside a hydraulic structure shall be fabricated entirely of Type 316 stainless steel or aluminum coated in accordance with Section 09800.
 - 2. Other ladders shall be fabricated from hot-dip galvanized after fabrication or Type 316 stainless steel or T6061 aluminum coated in accordance with Section 09800 or materials as indicated on the contract documents.

2.06 METAL GRATING

- A. General:
 - 1. Metal grating shall be of the indicated design, size, and type.
 - a. Grating shall be supported around an opening by support members.
 - b. Where grating is supported on concrete, unless otherwise indicated provide embedded support angles that match the grating material and are mitered and welded at their corners.
 - 2. Banding:
 - a. The grating shall be completely banded at edges and cutouts.
 - b. The banding material and cross-section shall be equivalent to the bearing bars.
 - c. The banding shall be welded to each cut bearing bar.
 - 3. The grating pieces shall be fastened to each support in 2 locations.
 - 4. Where grating forms the landing at the top of a stairway, the edge of the grating that forms the top riser shall have an integral non-slip nosing with a width equal to that of the stairway.

DIVISION 5 – METALS

5. Where the grating depth is not indicated, provide grating within allowable stress levels and which shall not exceed a deflection of 1/4 inch or the span divided by 180, whichever is less.
6. Design Loading:
 - a. For standard duty plank and safety grating, the loading to be used for determining stresses and deflections shall be the uniform live load of the adjacent floor or 100 psf, whichever is greater, or a concentrated load of 1000 pounds.
 - b. For heavy duty grating, the loading used for determining stresses and deflections shall be in accordance with AASHTO HS-20.

B. Material:

1. Except where indicated otherwise, bar grating shall be fabricated entirely of:
 - a. Galvanized steel
2. Safety grating shall be fabricated from aluminum alloy 5052-H32 or as shown on Contract Documents.
3. Plank grating shall be fabricated from aluminum alloy 6063-T6 or as shown on Contract Documents.
4. Grating that may be partially or wholly submerged shall be fabricated entirely of Type 316 stainless steel

C. Standard-Duty Grating:

1. No single piece of grating shall weigh more than:
 - a. 150 lbs \pm 10 lbs all standard grating outside of fenced areas.
 - b. 80 pounds all standard grating inside fenced area, unless indicated otherwise.
2. Standard duty grating shall be composed of serrated bar grating.
3. Grating panels shall be arranged such that no panel is less than 12-inches in width perpendicular to the span.
4. Cross bars shall be welded or mechanically locked tightly into position such that there is no movement between the bearing and cross bars.

D. Safety Grating:

1. Safety grating shall be fabricated from sheet metal punched into an open serrated diamond pattern and be formed into plank sections.
2. The open diamond shapes shall be approximately 1-7/8 inches by 11/16-inch in size.
3. Safety grating shall be Grip Strut by Metal Products Division, United States Gypsum Company, Deck Span by IKG Industries, or equal.

E. Heavy-Duty (traffic rated) Grating:

1. Heavy-duty grating shall be fabricated from welded steel, galvanized after fabrication.
2. Crossbars shall be welded in position.

05500-5

3. Heavy-Duty grating panel widths shall be 36 inches wide except where required to be smaller at transitions. Minimum panel width shall be 12 inches.

2.07 CHECKERED PLATE

- A. Checkered plate shall be provided with a pattern of raised lugs on one face, and shall be smooth on the opposite face.
- B. Lugs:
 1. Lugs shall be a minimum of one inch in length and raised a minimum of 1/4 inch above the surface.
 2. The lugs shall be located in a pattern in which the lugs are oriented at 90 degrees from the adjacent lugs in two orthogonal directions.
 3. The rows of lugs shall be oriented at 45 degrees from the edges of the plates.
- C. Where no material is indicated, the plates shall be fabricated from aluminum.
- D. Unless indicated otherwise, the minimum plate thickness shall be as required to limit deflection resulting from a live load of 100 psf to 1/4 inch, or the span divided by 240, whichever is less.
- E. Non-slip coating shall be provided on the top surface of all checker plate. Non-slip coating shall be in accordance with Section 09800. The color for non-slip coating shall be brown.

2.08 HATCHES

- A. Where access hatches are mounted on a floor slab (including top slabs that are not covered with a roofing membrane) or on a concrete curb, the hatch shall be flush-type as indicated.
- B. Hatches mounted on a roof surface that has a membrane or other roofing material covering it shall be of the integral raised curb-type.
- C. Hatches shall be fabricated from aluminum 5086 H34, 6063-T5 or 6061-T6, unless otherwise indicated.
- D. Hatch hardware shall be fabricated from Type 316 stainless steel, and shall be of the gutter-type.
- E. Hatches shall be designed for H20 traffic loading.
- F. The design live load shall be 300 psf, unless indicated otherwise.
- G. Configuration:
 1. Hatch opening sizes, number and swing direction of door leaves, and locations shall be as indicated.
 2. Indicated sizes are for the clear opening.
 3. Where the number of leaves is not indicated, openings larger than 42 inches in either direction shall be provided with double-leaf doors.
 4. Unless indicated otherwise, hinges shall be located on the longer dimension side.

DIVISION 5 – METALS

5. Unless indicated otherwise, ladder hatches shall be a minimum of 30 inches wide by 36 inches long, with the ladder centered on the shorter dimension and the door hinge opposite the ladder.
- H. Door leaves shall be fabricated from a minimum of 1/4-inch thick checkered-pattern plate.
- I. Channel frames shall be fabricated from a minimum 1/4-inch material with an anchor flange around the perimeter.
- J. Hatches shall be provided with an automatic hold-open arm with release handle.
- K. Hatches shall be designed for easy opening from both inside and outside.
- L. Hatches shall be designed to be water-tight and shall be equipped with a joint gutter, a moat-type edge drain, and drain piping of the length and size necessary to remove the drain water from all dry spaces accessed by the hatch.
- M. A minimum 1-1/2 inch diameter drain connection shall be provided, located by the manufacturer.
- N. Hatches shall be provided with a recessed hasp for a padlock covered by a hinged lid that is flush with the surface.
- O. Hatches shall be Bilco Type J or JD, Babcock-Davis Type B-FGA, or equal.
- P. Nets:
 1. Unless indicated otherwise, hatch nets shall be provided on floor hatches.
 2. Hatch nets shall conform to OSHA requirements.
 3. Hatch nets shall be Hatch Net 121, as manufactured by Safe Approach, Inc, Auburn, ME, or equal.

2.09 IRON CASTINGS

- A. General:
 1. Iron castings shall be of uniform quality, free from blowholes, porosity, hard spots, shrinkage, distortion, or other defects.
 2. The castings shall be smooth and well cleaned by shotblasting.
 3. Covers and grates shall fit together evenly, such that the cover fits flush with the surrounding finished surface and such that the cover does not rock or rattle when a loading is applied.
 4. Round covers and frames shall be provided with machined bearing surfaces.
- B. Covers and grates with matching frames shall be designed to support the following loadings:
 1. Where located within a structure, the design loading shall match that required for the adjacent floor area, or, if no floor loading is indicated, a minimum of 300 pounds per square foot.
 2. Exterior covers and grates shall be designed for AASHTO HS-20 loading unless indicated otherwise.

2.10 MANHOLE RUNGS

A. Rungs shall meet ASTM C478 and the following requirements:

1. Rungs shall be spaced not less than 10 inches apart nor more than 14 inches apart, as measured between centerlines of the rungs.
2. Rungs shall be parallel, level, and uniformly spaced.
3. The rungs shall be shaped such that a person's foot cannot slide off the end of the rung.
4. Rungs shall be surfaced to prevent injury from punctures or lacerations, and to prevent snagging of clothing.
5. The minimum perpendicular clearance between rungs and any obstruction behind the ladder shall be 6 inches.
6. The minimum width of rungs shall be 14 inches.

B. Submit certified test results in accordance with ASTM C497, Section 10, for the following loads:

1. The horizontal pull-out load shall be 400 pounds.
2. The vertical load shall be 800 pounds.

C. Material:

1. Rungs shall be fabricated from co-polymer polypropylene that encapsulates a minimum 1/2-inch grade 60 steel reinforcing rod.
2. The co-polymer polypropylene shall meet ASTM D4101, Type PP200B33430.

2.11 BOLTS AND ANCHORS

A. Standard Service (Non-Corrosive Application):

1. Bolts, anchor rods, anchor bolts, washers, and nuts shall be fabricated from steel as indicated.
2. Threads on galvanized bolts, rods and nuts shall be formed with suitable taps and dies such that they retain their normal clearance after hot-dip galvanizing.
3. Except as otherwise indicated, steel for bolt material, anchor rods, anchor bolts, and cap screws shall be in accordance with the following requirements:
 - a. Structural Connections: ASTM A307, Grade A or B, hot-dip galvanized.
 - b. Headed Anchor Rods and Anchor Bolts: ASTM F1554, Grade 36, hot-dip or mechanically galvanized with Grade A matching nuts.
 - c. High-Strength Bolts, where indicated: ASTM A325.
 - d. Pipe and Equipment Flange Bolts: ASTM A193, Grade B-7.

B. Corrosive Service:

1. Bolts, anchor rods, anchor bolts, nuts, and washers in the locations listed below shall be fabricated from stainless steel as indicated.

- a. Buried locations.
 - b. Submerged locations.
 - c. Locations subject to seasonal or occasional flooding.
 - d. Inside hydraulic structures below the top of the structure.
 - e. Inside buried vaults, manholes, and structures that do not drain through a gravity sewer or to a sump with a pump.
 - f. Chemical handling areas.
 - g. Inside trenches, containment walls, and curbed areas.
 - h. Locations indicated or designated by the Engineer to be provided with stainless steel bolts.
- C. Unless otherwise indicated, stainless steel bolts, anchor rods, anchor bolts, nuts, and washers shall be fabricated from Type 316 stainless steel, Class 2, conforming to ASTM A193 for bolts and to ASTM A194 for nuts.
- D. Buried pipe flange bolts and nuts on pipe of Class 275 and greater shall be in accordance with ASTM A193/A194, Grade B7.
- E. Coating:
- 1. Threads on stainless steel bolts and rods shall be protected with an antiseize lubricant suitable for submerged stainless steel bolts, meeting specification MIL-A-907E.
 - 2. Buried bolts in poorly drained soil shall be coated the same as the buried pipe.
 - 3. Antiseize lubricant shall be classified as acceptable for potable water use by the NSF.
 - 4. Antiseize lubricant shall be "PURE WHITE" by Anti-Seize Technology, Franklin Park, IL, 60131, AS-470 by Dixon Ticonderoga Company, Lakehurst, NJ, 08733, or equal.
- F. Bolt Requirements:
- 1. The bolt and nut material shall be free-cutting steel.
 - 2. The nuts shall be capable of developing the full strength of the bolts.
 - 3. Threads shall be Coarse Thread Series conforming to the requirements of the American Standard for Screw Threads.
 - 4. Bolts and cap screws shall have hexagon heads and nuts shall be Heavy Hexagon Series.
 - 5. Bolts and nuts shall be installed with washers fabricated from material matching the base material of bolts, except that hardened washers for high-strength bolts shall conform to the requirements of the AISC Specification.
 - 6. Lock washers fabricated from material matching the bolts shall be installed where indicated.
 - 7. The length of each bolt shall be such that the bolt extends at least 1/8 inch beyond the outside face of the nut before tightening, except for anchor bolts which shall be flush with the face of the nut before tightening.

G. Adhesive Anchors:

1. General:

- a. Unless otherwise indicated, drilled concrete or masonry anchors shall be adhesive anchors.
- b. No substitutions will be considered unless accompanied with a current ICC-ES or IAPMO-UES report verifying strength and material equivalency.

2. Epoxy Anchors:

- a. Epoxy adhesive anchors are required for drilled anchors for outdoor installations, in submerged, wet, splash, overhead, and corrosive conditions, and for anchoring handrails and reinforcing bars.
- b. Epoxy shall be in accordance with the requirements of Section 03315.
- c. Threaded rod shall be galvanized for general purpose applications and fabricated from Type 316 stainless steel for use in corrosive applications.
- d. Epoxy anchors shall not be permitted in areas where the concrete temperature is in excess of 100 degrees F or higher than the limiting temperature recommended by the manufacturer, whichever is lower.
- e. Epoxy anchors shall not be used where anchors are subject to vibration or fire.
- f. Minimum substrate temperatures shall be maintained during the full curing period as required by the manufacturer.

3. Unless otherwise noted, threaded rod shall be galvanized steel.

H. Expanding-Type Anchors:

1. Expanding-type anchors, if indicated or permitted, shall be hot dipped galvanized steel unless otherwise noted, shall be of the expansion type, and shall be Simpson Strong-Tie Strong-Bolt 2 anchors, Hilti Kwik-Bolt TZ anchors, Powers Power-Stud+ SD1 or SD2 anchors, or equal.
2. Lead caulking anchors will not be permitted.
3. Minimum size shall be as indicated on the Contract Documents.
4. Non-embedded buried or submerged anchors shall be fabricated from stainless steel.

I. Non-Shrink Grouted Anchors:

1. Grouted anchors, if indicated or permitted, shall be grouted with a non-shrink cementitious grout in accordance with the manufacturer's recommendations.
2. Non-shrink grout material shall be Class B or C in accordance with Section 03315.

PART 3 - EXECUTION

3.01 FABRICATION AND INSTALLATION REQUIREMENTS

- A. Fabrication and Erection: Except as otherwise indicated, the fabrication and erection of structural steel shall conform to the requirements of the American Institute of Steel Construction "Manual of Steel Construction."

- B. Steel Railings: Field welding of steel pipe handrail joints will be permitted only if approved by the Engineer, and then only in accordance with the Engineer's instructions.
- C. Unless otherwise indicated, provide a 1/2-inch drain line to the nearest floor drain for hatches or outside of the structure to a free surface above grade or into a 1/2 cu yard of geotextile drainrock sump. In no case shall drains be capped or drained into the protected space.

3.02 WELDING

A. Method:

1. Welding shall be performed by the metal-arc method or gas-shielded arc method as described in the American Welding Society "Welding Handbook" as supplemented by other pertinent standards of the AWS.
2. The qualification of the welders shall be in accordance with the AWS Standards.

B. Quality:

1. In assembly and during welding, the component parts shall be adequately clamped, supported, and restrained in order to minimize distortion and for control of dimensions.
2. Weld reinforcement shall be as indicated by the AWS Code.
3. Upon completion of welding, remove weld splatter, flux, slag, and burrs left by attachments.
4. Welds shall be repaired in order to produce a workmanlike appearance, with uniform weld contours and dimensions.
5. Sharp corners of material that is to be painted or coated shall be ground to a minimum of 1/32 inch on the flat.

3.03 GALVANIZING

- A. Structural steel plates shapes, bars, and fabricated assemblies required to be galvanized shall, after the steel has been thoroughly cleaned of rust and scale, be galvanized in accordance with the requirements of ASTM A123.
- B. Any galvanized part that becomes warped during the galvanizing operation shall be straightened.
- C. Bolts, anchor rods, anchor bolts, nuts, and similar threaded fasteners, after being properly cleaned, shall be galvanized in accordance with the requirements of ASTM A153.
- D. Field Repairs:
 1. Field repairs to damaged galvanizing shall be performed by preparing the surface and applying a coating.
 2. Surface preparation shall consist of removing oil, grease, soil, and soluble material by cleaning with water and detergent (SSPC SP1) followed by brush-off blast cleaning (SSPC SP7) over an area extending at least 4 inches into the undamaged area.
 3. The coating shall be applied to at least 3 mils dry film thickness, and shall be Zinc-Clad XI by Sherwin-Williams, Galvax by Alvin Products, Galvite by ZRC Worldwide, or equal.

3.04 DRILLED ANCHORS

- A. Drilled anchors and reinforcing bars shall be installed in strict accordance with the manufacturer's instructions.
- B. Holes shall be roughened with a brush on a power drill, and then cleaned and dried.
- C. Drilled anchors shall not be installed until the concrete has reached the required 28-day compressive strength.
- D. Adhesive anchors shall not be loaded until the adhesive has reached its indicated strength in accordance with the manufacturer's instructions.
- E. Existing reinforcing steel in the vicinity of proposed holes shall be located prior to drilling. The location of holes shall be adjusted to avoid drilling through or cutting any existing reinforcing bars.
- F. All abandoned drilled holes shall be filled with Epoxy Anchor Grout and ground flush to the surface leaving a clean and neat appearance.

END OF SECTION 05500

**SECTION 09800
PROTECTIVE COATING**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Provide protective coatings, complete and in place, in accordance with the Contract Documents.

1.02 RELATED SECTIONS

Section 01300 Contractor Submittals
Section 09870 Coating System for Buried Steel Piping
Section 15005 Piping Identification

1.03 DEFINITIONS

- A. The term "paint," "coatings," or "finishes" as used herein, shall include surface treatments, emulsions, enamels, paints, epoxy resins, and other protective coatings, excepting galvanizing or anodizing, whether used as a pretreatment, primer, intermediate coat, or finish coat.
- B. The term "DFT" means minimum dry film thickness, without any negative tolerance.

1.04 REFERENCES

- ANSI/AWWA C105 Polyethylene Encasement for Ductile-Iron Pipe Systems
- ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
- NACE Standard TM-01-70 Visual Standard for Surfaces of New Steel Airblast Cleaned with Sand Abrasive
- NACE Standard TM-01-75 Visual Standard for Surfaces of New Steel Centrifugally Blast Cleaned with Steel Grit
- SSPC PA1 Paint Application Specification No. 1
- SSPC PA2 Paint Application Specification No. 2
- SSPC SP1 Solvent Cleaning
- SSPC SP2 Hand Tool Cleaning
- SSPC SP3 Power Tool Cleaning
- SSPC SP5 White Metal Blast Cleaning
- SSPC SP6 Commercial Blast Cleaning
- SSPC SP7 Brush-Off Blast Cleaning
- SSPC SP10 Near-White Blast Cleaning
- SSPC SP13 Surface Preparation of Concrete

1.05 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with Section 01300.
- B. Submittals shall include the following information and be submitted at least 30 days prior to commencing any protective coating work:
 - 1. Materials List: Eight copies of a coating materials list showing the manufacturer and the product number, keyed to the coating systems herein. The list shall be submitted prior to or at the time of submitting samples.
 - 2. Manufacturer's Information: For each coating system to be used, the following data:
 - a. Manufacturer's data sheet for each product proposed, including statements on the suitability of the material for the intended use.
 - b. Technical and performance information that demonstrates compliance with the system performance and material requirements.
 - c. Paint manufacturer's instructions and recommendations on surface preparation and application.
 - d. Colors available for each product (where applicable).
 - e. Compatibility of shop and field applied coatings (where applicable).
 - f. Non-slip additives including specific manufacturer's application instructions, application rates, repair procedures.
 - g. Material Safety Data Sheet for each product proposed.

1.06 QUALITY ASSURANCE

- A. The following surfaces shall not be coated:
 - 1. Concrete, unless required by items on the concrete coating schedule below or the Drawings.
 - 2. Stainless steel.
 - 3. Electrical conduit.
 - 4. Machined surfaces.
 - 5. Grease fittings.
 - 6. Glass.
 - 7. Equipment nameplates.
 - 8. Platform gratings, stair treads, door thresholds, and other walk surfaces, unless specifically indicated to be coated.
 - 9. PVC piping indoors not subject to UV exposure.

- B. The coating system schedules summarize the surfaces to be coated, the required surface preparation, and the coating systems to be applied. Coating notes on the Drawings are used to show or extend the limits of coating schedules, to show exceptions to the schedules, or to clarify or show details for application of the coating systems.

1.07 SPECIAL CORRECTION OF DEFECTS REQUIREMENTS

Inspection: An inspection may be conducted during the eleventh month following completion of coating work. The Contractor and a representative of the coating material manufacturer shall attend this inspection. Defective work shall be repaired in accordance with these specifications and to the satisfaction of the Owner. The Owner may, by written notice to the Contractor, reschedule the inspection to another date within the one year correction period or may cancel the inspection altogether. The Contractor is not relieved of its responsibilities to correct defects, whether or not the inspection is conducted.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Suitability: The Contractor shall use suitable coating materials as recommended by the manufacturer. Materials shall comply with Volatile Organic Compound (VOC) limits applicable at the site.
- B. Material Sources: Where manufacturers and product numbers are listed, it is to show the type and quality of coatings that are required. If a named product does not comply with VOC limits in effect at the time of Bid opening, that product will not be accepted, and the Contractor shall propose a substitution product of equal quality that does comply. Proposed substitute materials will be considered as indicated below. Coating materials shall be materials that have a record of satisfactory performance in industrial plants, manufacturing facilities, and water and wastewater treatment plants.
- C. Compatibility: In any coating system only compatible materials from a single manufacturer shall be used in the work. Particular attention shall be directed to compatibility of primers and finish coats. If necessary, a barrier coat shall be applied between existing prime coat and subsequent field coats to ensure compatibility.
- D. Containers: Coating materials shall be sealed in containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, and name of manufacturer, all of which shall be plainly legible at the time of use.
- E. Colors: Colors and shades of colors of coatings shall be as indicated or selected by the Engineer. Each coat shall be of a slightly different shade to facilitate inspection of surface coverage of each coat. Finish colors shall be as selected from the manufacturer's standard color samples by the Engineer.
- F. Substitute or "Or-Equal" Products:
 - 1. To establish equality, the Contractor shall furnish satisfactory documentation from the manufacturer of the proposed substitute or "or-equal" product that the material meets the indicated requirements and is equivalent or better in the following properties:
 - a. Quality.
 - b. Durability.
 - c. Resistance to abrasion and physical damage.

- d. Life expectancy.
 - e. Ability to recoat in future.
 - f. Solids content by volume.
 - g. Dry film thickness per coat.
 - h. Compatibility with other coatings.
 - i. Suitability for the intended service.
 - j. Resistance to chemical attack.
 - k. Temperature limitations during application and in service.
 - l. Type and quality of recommended undercoats and topcoats.
 - m. Ease of application.
 - n. Ease of repairing damaged areas.
 - o. Stability of colors.
2. Protective coating materials shall be standard products produced by recognized manufacturers who are regularly engaged in production of such materials for essentially identical service conditions. When requested, the Contractor shall provide the Engineer with the names of not less than 10 successful applications of the proposed manufacturer's products that comply with these requirements.
 3. If a proposed substitution requires changes in the work, the Contractor shall bear such costs involved as part of the work.

2.02 INDUSTRIAL COATING SYSTEMS

A. System 4 - Epoxy/Polyurethane

1. Materials

Primer type	Rust-Inhibitive, 2 Component epoxy
VOC Content, max	285 g/L
Finish Type	2 component aliphatic polyurethane
VOC Content, max	300 g/L
Demonstrated suitable for	ferrous surfaces, superior color and gloss retention, exceptional resistance to weathering, chemical fumes, and splash

2. Application and manufacturers

Surface Preparation	Prime Coat (DFT = 3 - 5 mils)	Finish Coat (DFT = 3 - 4 mils)	Total System DFT
SSPC SP6	Ameron Amerlock 400/2	Ameron Amershield	6 - 9 mils
	Carboline Carboguard 893	Carboline Carbothane 134 HG (2 coats)	
	Tnemec Hi-Build Epoxoline II Series N69	Tnemec Endura-Shield Series 1075	

B. System 5 – Inorganic Zinc/Epoxy/Polyurethane

1. Material

Prime Coat	Inorganic Zinc Silicate, Water or Solvent Based, 2 Component
Zinc content in dry film	83 percent, minimum
VOC Content, max	325 grams per liter
Demonstrated suitable for	ferrous metal, providing superior corrosion, chemical, and abrasion resistance, recommended for use as primer under epoxy
Intermediate Coat	2 component epoxy, high build, recommended by manufacturer for application over inorganic zinc primer
VOC Content, max	276 grams per liter
Demonstrated suitable for	outstanding chemical, corrosion, and abrasion resistance
Finish Coat	2 component aliphatic or acrylic polyurethane
VOC Content, max	315 grams per liter
Demonstrated suitable for	superior color and gloss retention, resistance to chemical fumes and severe weathering, abrasion resistance

2. Application and manufacturers

Surface preparation for primer	SSPC SP 6
Anchor profile for primer	per manufacturer

Prime Coat (DFT = 2 - 4 mils)	Intermediate Coat (DFT = 3 - 5 mils)	Finish Coat (DFT = 2 - 4 mils)	Total System DFT
Ameron Dimetcote 9HS or Dimetcote 21-5	Amercoat 385	Amercoat 450H	7 - 13 mils
Carboline Carbozinc 11HS or 11WB	Carboguard 890	Carbothane 134HG	
Devoe Cathacote 302H	Devran 224HS	Devthane 379UVA	

C. System 7 - Acrylic Latex

1. Material

Primer	Product, surface preparation, and DFT as recommended by manufacturer for the surface
Finish Type	Single component, water based acrylic latex, with fungicide
VOC Content, max	180 grams per gallon
Demonstrated suitable for	PVC piping, weather and mild chemical resistance, excellent color and gloss retention

2. Application and manufacturers

Surface Preparation	Primer (DFT per manufacturer)	Finish (at least 2 coat required)	Total System DFT
SSPC SP1, min	Per PPG/Ameron recommendation	Ameron Amercoat 220	primer plus 6 mils
	Sherwin Williams DTM Bonding Primer	Sherwin Williams Metalatex	
	Carboline Sanitile 120	Carboline Carbocrylic 3359	
	Per Tnemec recommendation	Tnemec Tneme-Cryl 6	

D. System 8 - Epoxy, Equipment

1. Materials

Primer Type	2 Component epoxy, recoatable up to one year
Demonstrated suitable for	Rust inhibitive, outstanding chemical, abrasion, and weathering resistance, resistance to splash, washdown, and condensation. Immersion capability is not required
VOC content, max	330
Finish Type	2 component epoxy, available in many colors
Demonstrated suitable for	Outstanding chemical, abrasion, and weathering resistance, resistance to splash, washdown, and condensation. Immersion capability is not required
VOC content, max	330

2. Application and manufacturers

Surface Preparation	Prime Coat (DFT = 4 to 6 mils)	Finish Coat (DFT = 3 to 4 mils)	Total System DFT
SSPC SP6	Ameron 400	Ameron 400	7 to 10 mils
	Tnemec N69	Tnemec N69	
	Devco Devran 224HS	Devran 224HS	
	Carboline Carboguard 888	Carboguard 888	

2.03 SUBMERGED AND SEVERE SERVICE COATING SYSTEMS

A. System 100 - Amine Cure Epoxy

1. Material

Type	High build, amine cure epoxy
VOC content, g/L max	220
Demonstrated suitable for	steel, long term immersion in water and wastewater, resistant to corrosion, chemical fumes, good color retention
Certification	NSF 61 if in contact with potable water

2. Application and manufacturers

Surface Preparation	Products (3 coats or more)	Total System DFT
SSPC SP10	Ameron Amercoat 395 FD	15 to 17 mils For non-submerged valves and other equipment, DFT = 10 to 12 mils
	Carboline Carboguard 891	
	Devco Bar-Rust 233H	

3. Non-skid surfaces of steel or galvanized steel: Where non-skid surface is required, add grit or silica sand to the protective coating for slip protection. Texture shall be 30-50mesh grit or silica sand incorporated into the coating system. The Contractor shall submit and follow the manufacturer's recommended materials, number and thickness of coats, and methods.

B. System 102 - Polyamide Epoxy

1. Materials

Type	High build polyamide cure epoxy
VOC content, max, g/L	366
Demonstrated suitable for	long term immersion in water and wastewater, resistant to corrosion and chemical fumes, good color retention
Certification	NSF 61 if in contact with potable water

2. Application and manufacturers

Surface Preparation	Products (3 coats or more)	Total System DFT
SSPC SP10	Ameron Amercoat 370	11 - 13 mils
	Tnemec Pota-Pox Series 20	
	Carboline CarboGuard 561	

C. System 106 - Fusion Bond Epoxy

1. Material

Type	100 Percent solids fusion bond epoxy
Demonstrated suitable for	fluidized bed or electrostatic spray application, recommended for pumps, valves, pipe appurtenances, tanks, pipe hangers, flow meters, and hydrants
Certification requirement	NSF 61

2. Application in accordance with AWWA C213 and the following:

Surface Preparation	Product	Surface and DFT
SSPC SP10	3M Scotchkote 134 or 206N	Valves: 12-mils
		All others: 16-mils

2.04 SPECIAL COATING SYSTEMS

- A. System 200 - PVC Tape: Prior to wrapping the pipe with PVC tape, the pipe and fittings first shall be primed using a primer recommended by the PVC tape manufacturer. After being primed, the pipe shall be wrapped with a 20-mil adhesive PVC tape, half-lapped, to a total thickness of 40 mils.
- B. System 201 - Rich Portland Cement Mortar: Rich Portland cement mortar coating shall have a minimum thickness of 1/8-inch, followed by enclosure in an 8-mil thick polyethylene sheet with all joints and edges lapped and sealed with tape.
- C. System 205 - Polyethylene Encasement: Application of polyethylene encasement shall be in accordance with ANSI/AWWA C105 using Method C.
- D. System 206 - Cement Mortar Coating: A 1-1/2-inch minimum thickness mortar coating reinforced with 3/4-inch galvanized welded wire fabric shall be provided. The cement mortar shall contain no less than one part Type V cement to 3 parts sand. The cement mortar shall be cured by a curing compound meeting the requirements of ASTM C309, Type II, white pigmented, or by enclosure in an 8-mil thick polyethylene sheet with all edges and joints lapped by at least 6-inches.

E. System 208 - Aluminum Metal Isolation

1. Material

Type	High Build Polyamide Epoxy With Chemical And Abrasion Resistance
Demonstrated suitable for	Concrete and aluminum substrates, to isolate aluminum from contact with concrete and the resulting chemical degradation
VOC content, max	250

2. Application and manufacturers

Surface Preparation	Coating (DFT = 16 - 20 mils)
SSPC SP1	Ameron Amercoat 351
	Sherwin Williams Macropoxy 646
	Tnemec Epoxoline 80

F. System 210 - Acrylic, Wood and Gypsum Board

1. Materials

Primer type	As Recommended By Manufacturer
Finish type	single component, water based, acrylic, fungicide added
VOC content, max, g/L	250
Demonstrated suitable for	wood, mild to moderate exposure inside and outside building, and gypsum board, inside

2. Application

Surface Preparation	Prime Coat (1.5 to 2.5 mils)	Finish Coat (4 to 6 mils) (2 coats)	Total System DFT
Clean, dry, smooth	Ameron Amercoat 148	Amercoat 220	5.5 to 8.5 mils
	Tnemec Elasto-Grip 151-1051 (2 coats)	Tneme Cryl 6	

PART 3 - EXECUTION

3.01 MANUFACTURER'S SERVICES

- A. The Contractor shall require the protective coating manufacturer to furnish a qualified technical representative to visit the site for technical support as may be necessary to resolve field problems.
- B. For submerged and severe service coating systems, the Contractor shall require the paint manufacturer to furnish the following services:
 - 1. The manufacturer's representative shall provide at least 6 hours of on-site instruction in the proper surface preparation, use, mixing, application, and curing of the coating systems.
 - 2. The manufacturer's representative shall observe the start of surface preparation, mixing, and application of the coating materials for each coating system.

3.02 WORKMANSHIP

- A. Skilled craftsmen and experienced supervision shall be used on coating work.
- B. Coating shall be done in a workmanlike manner so as to produce an even film of uniform thickness. Edges, corners, crevices, and joints shall receive special attention to insure thorough surface preparation. The finished surfaces shall be free from runs, drops, ridges, waves, laps, brush marks, and variations in color, texture, and finish. The hiding shall be so complete that the addition of another coat would not increase the hiding. Special attention shall be given so that edges, corners, crevices, welds, and similar areas receive a film thickness equivalent to adjacent areas, and installations shall be protected by the use of drop cloths or other precautionary measures.
- C. Damage to other surfaces resulting from the work shall be cleaned, repaired, and refinished to original condition.

3.03 STORAGE, MIXING, AND THINNING OF MATERIALS

- A. Manufacturer's Recommendations: Unless otherwise indicated, the coating manufacturer's printed recommendations and instructions for thinning, mixing, handling, applying, and protecting its coating materials, for preparation of surfaces for coating, and for other procedures relative to coating shall be strictly observed.
- B. Coating materials shall be used within the manufacturer's recommended shelf life.
- C. Storage and Mixing: Coating materials shall be stored under the conditions recommended by the Product Data Sheets, and shall be thoroughly stirred, strained, and kept at a uniform consistency during application. Coatings from different manufacturers shall not be mixed together.

3.04 PREPARATION FOR COATING

- A. General: Surfaces to receive protective coatings shall be prepared as indicated prior to application of coatings. The Contractor shall examine surfaces to be coated and shall correct surface defects before application of any coating material. Marred or abraded spots on shop-primed and on factory-finished surfaces shall receive touch-up restoration prior to any field coating application. Surfaces to be coated shall be dry and free of visible dust.
- B. Protection of Surfaces Not to be Coated: Surfaces that are not to receive protective coatings shall be protected during surface preparation, cleaning, and coating operations.
- C. Hardware, lighting fixtures, switch plates, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not to be painted shall be removed, masked, or otherwise protected. Drop cloths shall be provided to prevent coating materials from falling on or marring adjacent surfaces. The working parts of mechanical and electrical equipment shall be protected from damage during surface preparation and coating operations. Openings in motors shall be masked to prevent entry of coating or other materials.
- D. Care shall be exercised not to damage adjacent work during blasting operations. Spraying shall be conducted under carefully controlled conditions. The Contractor shall be fully responsible for and shall promptly repair any and all damage to adjacent work or adjoining property occurring from blasting or coating operations.
- E. Protection of Painted Surfaces: Cleaning and coating shall be coordinated so that dust and other contaminants from the preparation process will not fall on wet, newly-coated surfaces.

3.05 SURFACE PREPARATION STANDARDS

The following referenced surface preparation specifications of the Steel Structures Painting Council shall form a part of this specification:

- A. Solvent Cleaning (SSPC SP1): Removal of oil, grease, soil, salts, and other soluble contaminants by cleaning with solvent, vapor, alkali, emulsion, or steam.
- B. Hand Tool Cleaning (SSPC SP2): Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, by hand chipping, scraping, sanding, and wire brushing.
- C. Power Tool Cleaning (SSPC SP3): Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, by power tool chipping, descaling, sanding, wire brushing, and grinding.
- D. White Metal Blast Cleaning (SSPC SP5): Removal of all visible rust, oil, grease, soil, dust, mill scale, paint, oxides, corrosion products and foreign matter by blast cleaning.
- E. Commercial Blast Cleaning (SSPC SP6): Removal of all visible oil, grease, soil, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except that staining shall be limited to no more than 33 percent of each square inch of surface area.
- F. Brush-Off Blast Cleaning (SSPC SP7): Removal of all visible oil, grease, soil, dust, loose mill scale, loose rust, and loose paint.
- G. Near-White Blast Cleaning (SSPC SP10): Removal of all visible oil, grease, soil, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except that staining shall be limited to no more than 5 percent of each square inch of surface area.
- H. Surface Preparation of Concrete (SSPC SP13): Removal of protrusions, laitance and efflorescence, existing coatings, form-release agents, and surface contamination by detergent or steam cleaning, abrasive blasting, water jetting, or impact or power tool methods as appropriate for the condition of the surface and the requirements of the coating system.

3.06 FERROUS METAL SURFACE PREPARATION (UNGALVANIZED)

- A. The minimum abrasive blasting surface preparation shall be as indicated in the coating system schedules included at the end of this Section. Where there is a conflict between these requirements and the coating manufacturer's printed recommendations for the intended service, the higher degree of cleaning shall apply.
- B. Workmanship for metal surface preparation shall be in conformance with the current SSPC Standards and this Section. Blast-cleaned surfaces shall match the standard samples available from the NACE Standard TM-01-70 and TM-01-75 .
- C. Oil, grease, welding fluxes, and other surface contaminants shall be removed by solvent cleaning per SSPC SP1 prior to blast cleaning.
- D. Sharp edges shall be rounded or chamfered, and burrs and surface defects and weld splatter shall be ground smooth prior to blast cleaning.
- E. The type and size of abrasive shall be selected to produce a surface profile that meets the coating manufacturer's recommendation for the particular product and service conditions. Abrasives for submerged and severe service coating systems shall be clean, hard, sharp cutting crushed slag. Automated blasting systems shall not be used for surfaces that will be in submerged service. Metal shot or grit shall not be used for surfaces that will be in

submerged service, even if subsequent abrasive blasting will use hard, sharp cutting crushed slag.

- F. Abrasive shall not be reused unless an automated blasting system is used for surfaces that will be in non-submerged service. For automated blasting systems, clean oil-free abrasives shall be maintained. The abrasive mix shall include at least 50 percent grit.
- G. The Contractor shall comply with the applicable federal, state, and local air pollution control regulations for blast cleaning.
- H. Compressed air for air blast cleaning shall be supplied at adequate pressure from well-maintained compressors equipped with oil and moisture separators that remove at least 95 percent of the contaminants.
- I. Surfaces shall be cleaned of dust and residual particles of the cleaning operation by dry air blast cleaning, vacuuming, or another approved method prior to painting.
- J. Enclosed areas and other areas where dust settling is a problem shall be vacuum-cleaned and wiped with a tack cloth.
- K. Damaged or defective coating shall be removed by the blast cleaning to meet the clean surface requirements before recoating.
- L. If the required abrasive blast cleaning will damage adjacent work, the area to be cleaned is less than 100 square feet, and the coated surface will not be submerged in service, then SSPC SP2 or SSPC SP3 may be used.
- M. Shop-applied coatings of unknown composition shall be completely removed before the indicated coatings are applied. Valves, castings, ductile or cast iron pipe, and fabricated pipe or equipment shall be examined for the presence of shop-applied temporary coatings. Temporary coatings shall be completely removed by solvent cleaning per SSPC SP1 before the abrasive blast cleaning has been started.
- N. Shop primed equipment shall be solvent-cleaned in the field before finish coats are applied.

3.07 FERROUS METAL SURFACE PREPARATION (GALVANIZED)

- A. Galvanized ferrous metal shall be alkaline cleaned per SSPC SP1 to remove oil, grease, and other contaminants detrimental to adhesion of the protective coating system, followed by brush off blast cleaning per SSPC SP7.
- B. Pretreatment coatings of surfaces shall be in accordance with the printed recommendations of the coating manufacturer.

3.08 SURFACE PREPARATION OF FERROUS SURFACES WITH EXISTING COATINGS,

- A. General: Grease, oil, heavy chalk, dirt, or other contaminants shall be removed by solvent or detergent cleaning prior to abrasive blast cleaning. The generic type of the existing coatings shall be determined by laboratory testing.
- B. Abrasive Blast Cleaning: The Contractor shall provide the degree of cleaning indicated in the coating system schedule for the entire surface to be coated. If the degree of cleaning is not indicated in the schedule, deteriorated coatings shall be removed by abrasive blast cleaning to SSPC SP6. Areas of tightly adhering coatings shall be cleaned to SSPC SP7, with the remaining thickness of existing coating not to exceed 3-mils.

- C. Incompatible Coatings: If coatings to be applied are not compatible with existing coatings the Contractor shall apply intermediate coatings per the manufacturer's recommendation for the indicated coating system or shall completely remove the existing coating prior to abrasive blast cleaning. A small trial application shall be conducted for compatibility prior to painting large areas.
- D. Unknown Coatings: Coatings of unknown composition shall be completely removed prior to application of new coatings.
- E. Water Abrasive or Wet Abrasive Blast Cleaning: Where indicated or where site conditions do not permit dry abrasive blasting for industrial coating systems due to dust or air pollution considerations, water abrasive blasting or wet abrasive blasting may be used. In both methods, paint-compatible corrosion inhibitors shall be used, and coating application shall begin as soon as the surfaces are dry. Water abrasive blasting shall be done using high pressure water with sand injection. In both methods, the equipment used shall be commercially produced equipment with a successful service record. Wet blasting methods shall not be used for submerged or severe service coating systems unless indicated.

3.09 CONCRETE AND CONCRETE BLOCK MASONRY SURFACE PREPARATION

- A. Surface preparation shall not begin until at least 30 days after the concrete or masonry has been placed.
- B. Oil, grease, and form release and curing compounds shall be removed by detergent cleaning per SSPC SP1 before abrasive blast cleaning.
- C. Concrete, concrete block masonry surfaces, and deteriorated concrete surfaces to be coated shall be abrasive blast cleaned to remove existing coatings, laitance, deteriorated concrete, and to roughen the surface equivalent to the surface of the No. 80 grit flint sandpaper.
- D. If acid etching is required by the coating application instructions, the treatment shall be made after abrasive blasting. After etching, rinse surfaces with water and test the pH. The pH shall be between neutral and 8.
- E. Surfaces shall be clean and as recommended by the coating manufacturer before coating is started.
- F. Unless required for proper adhesion, surfaces shall be dry prior to coating. The presence of moisture shall be determined with a moisture detection device such as Delmhorst Model DB, or equal.

3.10 CONCRETE SURFACE PREPARATION FOR WATERPROOFING

- A. Concrete deck shall be dry, clean, and free of contaminants that may interfere with proper adhesion or curing. The concrete shall be water cured for a minimum of 28 days, or be at 80 percent of design strength.
- B. Verify that the concrete deck is finished by a power or hand steel trowel followed by a soft hair broom, or equivalent.
- C. Before starting application, conduct a Mat Test as follows: place a 2-foot by 2-foot non-breathing rubber mat onto the concrete deck not in sunlight; tape the edges of the mat to the concrete. If no condensation is seen under the mat at 16 hours, the concrete is dry enough that application may begin.

- D. Visible hairline cracks and cold joints in the concrete shall be treated with a liquid flashing a minimum of 2-inches on each side of the crack or joint. Liquid flashing shall have a minimum dry thickness of 30-mils.

3.11 PLASTIC, FIBER GLASS AND NONFERROUS METALS SURFACE PREPARATION

- A. 100% of plastic and fiber glass surfaces to be coated shall first be solvent cleaned with a chemical compatible with the coating system primer, and then sanded with 120 grit sandpaper (unless another grit size is recommended by the paint manufacturer) and/or brush off blast cleaned.
- B. Non-ferrous metal surfaces shall be solvent-cleaned in accordance with SSPC SP1, rinsed with clean water, and allowed to dry. Surfaces shall then be sanded using medium grit sanding media, by hand or with low RPM D/A power sanders, as described in SSPC SP2 and/or SSPC SP3 to impart a tooth or anchor profile without gouging the substrate. A 2-3 mil profile shall be attained or other profile per the coating manufacturer's recommendations. Remove residual debris using compressed air or whisk broom.
- C. Surfaces shall be clean and dry prior to coating application.
- D. Surface preparation requirements shall be verified with the coating manufacturer prior to preparation, and shall conform to the coating manufacturer's requirements. The coating manufacturer's recommendations shall govern if there are any discrepancies with the Specifications.

3.12 SHOP COATING REQUIREMENTS

- A. Unless otherwise indicated, items of equipment or parts of equipment which are not submerged in service shall be shop-primed and then finish-coated in the field after installation with the indicated or selected color. The methods, materials, application equipment, and other details of shop painting shall comply with this section. If the shop primer requires top coating within a specific period of time, the equipment shall be finish-coated in the shop and then be touched up after installation.
- B. Items of equipment or parts and surfaces of equipment which are submerged or inside an enclosed hydraulic structure when in service, with the exception of pumps and valves, shall have surface preparation and coating performed in the field.
- C. The interior surfaces of steel water reservoirs, except for Part A surfaces, shall have surface preparation and coating work performed in the field.
- D. For certain pieces of equipment, it may be undesirable or impractical to apply finish coatings in the field. Such equipment may include engine generator sets, equipment such as electrical control panels, switchgear or main control boards, submerged parts of pumps, ferrous metal passages in valves, or other items where it is not possible to obtain the indicated quality in the field. Such equipment shall be primed and finish-coated in the shop and touched up in the field with the identical material after installation. The Contractor shall require the manufacturer of each such piece of equipment to certify as part of its Shop Drawings that the surface preparation is in accordance with these specifications. The coating material data sheet shall be submitted with the Shop Drawings for the equipment.
- E. For certain small pieces of equipment, the manufacturer may have a standard coating system that is suitable for the intended service conditions. In such cases, the final determination of suitability will be made during review of the Shop Drawing submittals. Equipment of this type generally includes only indoor equipment such as instruments, small compressors, and chemical metering pumps.

- F. Shop-painted surfaces shall be protected during shipment and handling by suitable provisions including padding, blocking, and the use of canvas or nylon slings. Primed surfaces shall not be exposed to the weather for more than 2 months before being top coated, or less time if recommended by the coating manufacturer.
- G. Damage to shop-applied coatings shall be repaired in accordance with this section and the coating manufacturer's printed instructions.
- H. The Contractor shall make certain that the shop primers and field topcoats are compatible and meet the requirements of this section. Copies of applicable coating manufacturer's data sheets shall be submitted with equipment Shop Drawings.

3.13 APPLICATION OF COATINGS

- A. The application of protective coatings to steel substrates shall be in accordance with SSPC PA1.
- B. Cleaned surfaces and each coat shall be inspected prior to applying each succeeding coat. The Contractor shall schedule such inspection with the Engineer in advance.
- C. Blast cleaned ferrous metal surfaces shall be painted before any rusting or other deterioration of the surface occurs. Blast cleaning shall be limited to only those surfaces that can be coated in the same day.
- D. Coatings shall be applied in accordance with the manufacturer's instructions and recommendations and this Section, whichever has the most stringent requirements.
- E. Special attention shall be given to edges, angles, weld seams, flanges, nuts and bolts, and other places where insufficient film thicknesses are likely to occur. Use stripe painting with a brush in these areas.
- F. Special attention shall be given to materials that will be joined so closely that proper surface preparation and application are not possible. Such contact surfaces shall be coated prior to assembly or installation.
- G. Finish coats, including touch-up and damage repair coats shall be applied in a manner that will present a uniform texture and color matched appearance.
- H. Coatings shall not be applied under the following conditions:
 - 1. Temperatures exceeding the manufacturer's recommended maximum and minimum allowable.
 - 2. Dust or smoke laden atmosphere.
 - 3. Damp or humid weather.
 - 4. Substrate or air temperature is less than 5 degrees F above the dewpoint.
 - 5. Air temperature is expected to drop below 40 degrees F or less than 5 degrees F above the dewpoint within 8 hours after application of coating.
 - 6. Wind conditions are not calm.
- I. Dewpoint shall be determined by use of a sling psychrometer in conjunction with U.S. Dept. of Commerce, Weather Bureau psychrometric tables.
- J. Unburied steel piping shall be abrasive blast cleaned and primed before installation.

- K. Finish coats shall be applied after concrete, masonry, and equipment installation is complete, and the working areas are clean and dust free.

3.14 CURING OF COATINGS

- A. The Contractor shall maintain curing conditions in accordance with the conditions recommended by the coating material manufacturer or by this section, whichever is the most stringent, prior to placing the completed coating system into service.
- B. In the case of enclosed areas, forced air ventilation, using heated air if necessary, may be required until the coatings have fully cured.
- C. Forced Air Ventilation of Steel Pipeline and Enclosed Hydraulic Structures: Forced air ventilation is required for the application and curing of coatings on the interior surfaces of steel reservoirs and enclosed hydraulic structures. During application and curing periods, continuously exhaust air from a manhole in the lowest shell ring, or in the case of an enclosed hydraulic structure, from the lowest level of the structure using portable ducting. After interior coating operations have been completed, provide a final curing period for a minimum of 10 days, during which the forced ventilation system shall operate continuously. For additional requirements, refer to the specific coating system requirements in Part 2 above.

3.15 IDENTIFICATION OF PIPING

- A. Identification of piping shall be in accordance with Section 15005.
- B. Unburied pipes in structures and in chemical pipe trenches shall be color-code painted. Colors shall be as selected by the Engineer or as indicated.

3.16 SHOP AND FIELD INSPECTION AND TESTING

- A. General: The Contractor shall give the Engineer a minimum of 3 days advance notice of the start of any field surface preparation or coating application, and a minimum of 7 days advance notice of the start of any surface preparation activity in the shop.
- B. Such work shall be performed only in the presence of the Engineer unless the Engineer has granted prior approval to perform such work in its absence.
- C. Inspection by the Engineer, or the waiver of inspection of any particular portion of the work, shall not relieve the Contractor of its responsibility to perform the work in accordance with these Specifications.
- D. Scaffolding shall be erected and moved to locations where requested by the Engineer to facilitate inspection. Additional illumination shall be furnished on areas to be inspected.
- E. Inspection Devices: The Contractor shall furnish inspection devices in good working condition for the detection of holidays and measurement of dry film thicknesses of coatings. Dry-film thickness gauges shall be made available for the Engineer's use while coating is being done, until final acceptance of such coatings. The Contractor shall furnish the services of a trained operator of the holiday detection devices until the final acceptance of such coatings. Holiday detection devices shall be operated only in the presence of the Engineer.
- F. Holiday Testing: The Contractor shall test for continuity all coated ferrous surfaces inside a steel reservoir, other surfaces that will be submerged in water or other liquids, surfaces that are enclosed in a vapor space in such structures, and surfaces coated with any of the submerged and severe service coating systems. Areas that contain discontinuities shall be

DIVISION 9 – FINISHES

marked and repaired or recoated in accordance with the coating manufacturer's printed instructions and then be retested.

- G. Coatings with thickness exceeding 20-mils total DFT: Pulse-type holiday detector such as Tinker & Razor Model AP-W, D.E. Stearns Co. Model 14/20, or equal shall be used. The unit shall be adjusted to operate at the voltage required to cause a spark jump across an air gap equal to twice the required coating thickness.
- H. Coatings with thickness of 20-mils or less total DFT: Tinker & Razor Model M1 non-destructive type holiday detector, K-D Bird Dog, or equal shall be used. The unit shall operate at less than 75 volts. For thicknesses between 10- and 20-mils, a non-sudsing type wetting agent, such as Kodak Photo-Flo or equal, shall be added to the water prior to wetting the detector sponge.
- I. Film Thickness Testing: On ferrous metals, the dry film coating thickness shall be measured in accordance with the SSPC PA2 using a magnetic type dry film thickness gauge such as Mikrotest Model FM, Elcometer Model 111/1EZ, or equal. Each coat shall be tested for the correct thickness. No measurements shall be made until at least 8 hours after application of the coating. On non-ferrous metals and other substrates, the coating thicknesses shall be measured at the time of application using a wet film gauge.
- J. Surface Preparation: Evaluation of blast cleaned surface preparation will be based upon comparison of the blasted surfaces with the standard samples available from NACE, using NACE standards TM-01-70 and TM-01-75.

3.17 COATING SYSTEM SCHEDULE, FERROUS METAL - NOT GALVANIZED

	Item	Surface Prep.	System No.
FM-1	All surfaces indoors and outdoors, exposed or covered, except those included below.	Near white metal blast cleaning SSPC SP10	(5) inorganic zinc/epoxy/polyurethane
FM-3	Surfaces of equipment and ferrous surfaces submerged or intermittently submerged in water including all surfaces lower than 2 feet above high water level in hydraulic structures, and all surfaces inside enclosed hydraulic structures and vents (excluding shop-coated valves, couplings, pumps).	White metal blast cleaning SSPC SP5	(100) amine cure epoxy
FM-7	Ferrous surfaces in water passages of all valves 2-inch size and larger, exterior surfaces of submerged valves.	White metal blast cleaning SSPC SP5	(102) polyamide epoxy
FM-8	Ferrous surfaces in water passages and submerged surfaces of all pumps which have discharge size of 4 inches or larger.	White metal blast cleaning SSPC SP5	(100) amine cure epoxy
FM-9	Ferrous surfaces of sleeve couplings.	Solvent cleaning SSPC SP1, followed by white metal blast cleaning SSPC-SP10	(106) fusion bond epoxy
FM-10	All ferrous surfaces of sluice gates, flap gates, and shear gates, including wall thimbles.	White metal blast cleaning SSPC SP5	(102) polyamide epoxy
FM-11	Buried surfaces that are not indicated to be coated elsewhere.	Near white metal blast cleaning SSPC SP10	(100) amine cure epoxy
FM-16	Surfaces of indoor equipment, not submerged	Commercial blast cleaning SSPC SP6	(8) epoxy, equipment

DIVISION 9 – FINISHES

	Item	Surface Prep.	System No.
FM-18	Buried pipe couplings, valves, fittings, and flanged joints (where piping is plastic).	Removal of dirt, grease, oil	(201) rich Portland cement mortar
FM-19	Buried pipe couplings, valves, and flanged joints (where piping is ductile or cast iron, not tape-coated), including factory-coated surfaces.	As specified by reference specification	(205) polyethylene encasement
FM-20	Buried pipe couplings, valves, and flanged joints (where piping is mortar-coated steel or reinforced concrete), including factory-coated surfaces.	Removal of dirt, grease, oil	(206) cement mortar coating

3.18 COATING SYSTEM SCHEDULE, NON-FERROUS METAL, PLASTIC, FIBER GLASS

Where isolated non-ferrous parts are associated with equipment or piping, the Contractor shall use the coating system for the adjacent connected surfaces. Do not coat handrails, gratings, frames or hatches. Only primers recommended by the coating manufacturer shall be used.

	Item	Surface Prep.	System No.
NFS-1	All exposed surfaces, indoors and outdoors, except those included below.	Solvent cleaned SSPC SP1	(4) epoxy/polyurethane
NFS-3	Aluminum surfaces in contact with concrete, or with any other metal except galvanized ferrous metal.	Solvent cleaned SSPC SP1	(208) aluminum metal isolation
NFS-4	Polyvinyl chloride plastic piping, outdoors, or in structures, not submerged.	Solvent cleaned SSPC SP1, sanded to 2-3 mil profile per SSPC SP-2/SP-3	(7) acrylic latex

END OF SECTION 09800

**SECTION 09870
COATING SYSTEM FOR BURIED STEEL PIPING**

PART 1 - GENERAL

1.01 SECTION INCLUDES

This section specifies application of exterior coating of buried steel pipe, joints, and fittings greater than 4 inches nominal diameter.

1.02 RELATED SECTIONS

Not Used.

1.03 REFERENCES

AWWA C209 - Tape Coatings for Steel Water Pipe and Fittings
AWWA C214 - Tape Coatings for Steel Water Pipe
SSPC SP6 - Commercial Blast Cleaning

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Pipe: Factory-applied; 3 part system consisting of primer; minimum 20 mil butyl, rubber adhesive, polyethylene backed corrosion barrier tape; 30 mil butyl rubber adhesive; and high density polyethylene backed outer wrap of contrasting color to corrosion barrier tape, conforming to AWWA C214. Pipe to receive shop applied coating shall receive an SSPC-SP6 blast finish prior to priming. Polyken YGIII System, or Owner approved equal.
- B. Joints, Fittings, Ells, Tees: Field-applied, single wrap of protective coating, conforming to AWWA C209, Polyken #930-35, or Owner approved equal.
- C. Primer: As recommended in the coating manufacturer's literature; Polyken #1019 for factory applications, Polyken #1027 for field applications, or Owner approved equal.
- D. Filler Tape: Pure butyl rubber designed by the manufacturer to build up around irregular shapes at fittings to provide a smooth transition for wrapping. Polyken #939 filler tape or Owner approved equal.
- E. Cutback on pipe ends shall be tapered and be 6 inches from ends for welded joints.

PART 3 - EXECUTION

3.01 FIELD COATING APPLICATION

- A. Handling of wrapped pipe and field application of protective tape shall be in accordance with tape manufacturer's written instructions.

- B. All surfaces to receive coating shall be clean, dry, and prime coated. Allow prime to dry.
- C. Apply filler tape as necessary at fittings to ease transition at irregularities for wrapping. Apply filler tape so that no voids are under the wrap tape.
- D. Apply tape system; wrap with 50 percent overlap to achieve 70 mil overall thickness.

3.02 PROTECTION

Protect lining and coating from damage. Repair damage immediately to minimize possibility of corrosion. Place pipe in trench and backfill carefully, ensuring large rocks are not dropped on coating.

END OF SECTION 09870

**SECTION 15000
GENERAL MECHANICAL REQUIREMENTS**

PART 1 - GENERAL

1.01 SECTION INCLUDES

This Section describes the various mechanical systems such as piping, valves, pumps, and miscellaneous appurtenances described in DIVISION 15. The Contractor shall furnish all labor, materials, services, product accessories, equipment, tools, and other incidentals necessary, whether specifically shown and/or mentioned, for the completed and fully-operational mechanical system(s) shown on the Drawings.

1.02 RELATED SECTIONS

Provisions of the GENERAL CONDITIONS, SUPPLEMENTARY CONDITIONS AND DIVISION 1 of the contract are by this reference a part of this Division and shall govern work under this Division where applicable.

Section 00704.02 – Project Records.
Section 00704.03 – Shop Drawings
Section 15015 – Control of Hazardous Energy
Division 14 – Conveying Systems
Division 15 – Mechanical

1.03 REFERENCES

The Contractor shall comply with applicable local, state, and national codes, ordinances, and regulations affecting materials and methods of installation of mechanical systems. Recommended practices as set down by current edition of ASME, ASTM, NFPA, UBC, UMC, UPC, and NEC shall be followed. The Contractor shall be responsible to obtain any permits (Federal, State and Local) to complete the project.

1.04 SUBMITALS

- A. As-Built Drawings: In addition to the as-built drawing requirements of DIVISION 0 - GENERAL CONDITIONS, the Contractor shall maintain one (1) set of blue-line drawings on the job site. This set shall be marked to indicate current job progress and show deviations from the construction drawings. In addition, these drawings shall show depths and routing of all concealed, below-grade installations. This set of drawings shall be available to the Engineer during construction. After final inspection, but before acceptance of the work, the Contractor shall deliver to the Engineer a set of neatly marked plans showing these as-built changes and conditions. Refer to 00704.02 Project Records.
- B. Shop Drawings and Submittals: Provide shop drawings and submittals for all equipment and materials provided under Division 15. All submittals shall be made complete and receive favorable review from the Engineer before manufacture of equipment or purchase of materials. These drawings shall show layouts, dimensions, construction details, and connection diagrams and include catalog cuts, bulletins, brochures, or copies thereof as supplements to the shop drawings. Failure to obtain prior approval of the drawings may result in rejection of equipment supplied. Refer to 00704.03 Shop Drawings.

C. Operation and Maintenance:

1. Manuals: The Contractor shall submit bound sets of equipment manuals and operating instructions to the Engineer. The manuals will consist of complete descriptive data pertinent to all fixtures, equipment, valves, and automatic controls as well as diagrams, including a complete list of repair and replacement parts essential to maintenance and general servicing of all equipment. A pump-performance curve showing head, quantity, NPSHR, BPH and efficiency shall be included in equipment manuals. The operating instructions, in conjunction with the maintenance manuals, shall include written step-by-step detail of start-up and shut-down procedures.
2. Operation Instructions: Before final acceptance, the Contractor shall instruct the Engineer on the proper operation and maintenance of all mechanical systems, equipment, and controls under this Contract. A qualified technician for each component of this installation shall be made available by the Contractor for this instruction.

1.05 QUALITY ASSURANCE

- A. Materials: All materials shall be new, full weight, standard materials of specified or approved quality in first-class condition. Materials of similar type shall be of the same manufacturer. Promptly after award of contract, the Contractor must submit full information on all materials proposed for use on the project. No materials shall be installed or purchased until approved for use by the Engineer.
- B. Handling: Pipe, fittings, and other equipment shall be handled and stored in a manner that will ensure that the material is undamaged. Any unit of equipment damaged beyond repair shall be replaced at the Contractor's expense. Damage to pipe coating or dropping of fittings may be cause for rejection. Any materials damaged but repairable may be repaired in the field or, at the direction of the Engineer, returned to the manufacturer for repair, all at the Contractor's expense.

1.06 IDENTIFICATION

Each valve, actuator, motor, or mechanical equipment shall have a nameplate designating the function of the unit. Nameplates shall be of 1/16 inch thick, machine-engraved, laminated phenolic plastic with white letters not less than 3/16 inch high on black or red background. Nameplates shall be secured to the equipment with stainless steel screws and to valves with stainless steel wire.

1.07 TESTING

A. Inspection and Testing:

1. The project will be subject to continual inspection during construction. The Contractor shall schedule, obtain, and pay for all fees and/or services required to test the mechanical systems. All equipment and installation shall have an operational performance test receiving the approval of the Engineer before acceptance. The Contractor shall be responsible for final adjustment of all equipment under actual loaded conditions and shall guarantee all equipment and work for a period of one year after acceptance.
2. The Contractor shall furnish all labor, tools, and equipment for testing, including pressure pumps, piping, gates, temporary caps, and supports. Contractor shall make all arrangements and pay all costs incidental to furnishing and conveying water for testing purposes. Any damage resulting from or caused by these tests shall be repaired at the Contractor's expense.

- B. Request for Tests: The Contractor shall notify the Engineer a minimum of 48 hours in advance of when planning to test. In the event the Engineer chooses not to witness the test, the Contractor shall certify in writing that all tests have been made as required by these Specifications.
- C. Deficiencies: All deficiencies evidenced during the tests shall immediately be corrected and tests repeated until the system is approved. No piping, equipment, or other portions of the mechanical installations shall be covered or concealed until satisfactory tests are made and approved.
- D. Operating Tests: The Contractor shall, upon request from the Engineer, place the entire mechanical installation, and/or any portion thereof, in operation for such a period of time as is necessary to demonstrate satisfactory operations.
- E. Completion: Upon completion of the mechanical installation, the Contractor shall demonstrate that the systems have been installed in a satisfactory manner in accordance with the Drawings, Specifications, and applicable codes. The final testing will be conducted in the presence of the Engineer.
- F. Pipe Tests:
 - 1. Upon completion of the piping installation, fittings, valves, and gates, the Contractor shall test each system as specified later herein. All thrust blocks shall be in place with at least seven days allowed for the concrete to cure before testing. The Contractor shall install adequate blocking or other means of resisting test pressure. It shall be the Contractor's responsibility to adequately block or otherwise support all caps whether temporary or permanent and whether attached in the field or by the fabricator.
 - 2. Supply pipes and fittings shall be tested to the pressure as indicated in the Pipe Schedule on the drawings. The test pressure shall be maintained for a period of four hours, and the amount of makeup water required to maintain this pressure shall be carefully measured. The allowable leakage rate shall not exceed 5 gallons of water per inch of inside diameter of pipe per 1,000 feet in 24 hours. All tests shall be witnessed by the Engineer. Where the leakage exceeds the allowable, the Contractor shall locate and repair the defects and then retest the pipeline. Any individual defects shall be corrected to the satisfaction of the Engineer regardless of the allowable leakage.
- G. Valve Tests: Gates, valves, and operators shall be tested by operation through a complete cycle of opening, closing, and opening. Gates shall be adjusted so they operate freely with leakage around the perimeter held to a quantity which is satisfactory to the Engineer.

1.08 LOCKOUT/TAGOUT

Procure and install laminated visual lockout procedures, energy source tags, and lockout devices as determined by the Lock Out Tag Out (LOTO) Procedure Report developed per requirements of Section 15015.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

END OF SECTION 15000

**SECTION 15005
PIPING IDENTIFICATION**

PART 1 - GENERAL

1.01 SECTION INCLUDES

Provide identification for exposed piping and valves inside the buildings, complete and in place, in accordance with the Contract Documents.

1.02 RELATED SECTIONS

Section 01300 - Contractor Submittals
Section 09800 - Protective Coating
Division 2 – Site Work
Division 15 - Mechanical

1.03 REFERENCES

ANSI A13.1 – Pipe Labeling Requirements

1.04 CONTRACTOR SUBMITTALS

- A. Shop Drawings: A list of suggested wording for each valve tag, prior to fabrication.
- B. Samples
 - 1. One sample of each type of identification device.
 - 2. Sample of each proposed color required by the pipe color schedule.

PART 2 - PRODUCTS

2.01 IDENTIFICATION OF PIPING

- A. Except as indicated below for very short pipe lengths, identify exposed piping larger than 2-inches nominal size for the pipe contents and direction of flow.
 - 1. Marker Type
 - a. Adhesive: Vinyl or polyester sheet with UV- resistant ink, shaped similar to pipe curvature and coated with pressure sensitive adhesive
 - 2. Marker Area: Sized per pipe size according to ANSI A13.1; color from the table below.
 - 3. Lettering: Sized per pipe size according to ANSI A13.1; color from the table below.
 - 4. Arrows: At least two arrows at each marker area, showing direction of flow.
- B. Pipe 2-inches and smaller shall be identified by plastic plates made from laminated 3-layer plastic with engraved black letters on white background.
- C. Manufacturer or Equal.
 - 1. Seton Identification Products, Opti Code Pipe Markers
 - 2. Grainger, Inc.
 - 3. Marking Services, Inc.

2.02 BURIED PIPELINE IDENTIFICATION

A. Underground Warning Tape

1. Material:

- a. Polyethylene tape or polyolefin film. The material and ink shall be chemically inert and shall not degrade when exposed to acids, alkalis and other destructive substances commonly found in soil.
- b. 6" wide tape with a minimum 4 mil thickness.
- c. Message: "CAUTION, LINE BURIED BELOW" with the name of the fluid service in black lettering on a colored background.
 - 1) Water: Blue
 - 2) Sewer: Green
 - 3) Gas and other services: Yellow
 - 4) Other services: colors as approved by the OWNER.

2. Manufacturer, or Equal

- a. Reef Industries, Inc.
- b. Seton Identification Products
- c. T. Christy Enterprises, Inc.

B. Tracer Wire

1. Material:

- a. Solid copper conductor with 30 mil HMWPE.
- b. 10 gauge or thicker wire.

2. Manufacturer, or Equal

- a. Kris-Tech Wire
- b. Corrpro Companies, Inc.

2.03 IDENTIFICATION OF VALVES AND SHORT PIPE LENGTHS

A. Identifying devices for valves and the sections of pipe that are too short to be identified with markers and arrows shall be identified with metal or plastic tags.

B. Metal tags shall be stainless steel with embossed lettering. Plastic tags shall be solid black plastic laminate with white embossed letters. Tags shall be designed to be firmly attached to the valves or short pipes or to the structure immediately adjacent to such valves or short pipes.

C. Wording on the valve tags shall describe the exact function of each valve.

2.04 PIPE COATING:

Unless otherwise indicated, pipe coating shall be in conformance with Section 09800.

PART 3 - EXECUTION

3.01 GENERAL

Markers and identification tags shall be installed in accordance with the manufacturer's printed instructions, and shall be neat and uniform in appearance. Tags and markers shall be readily visible from all normal working locations.

3.02 VALVE TAGS

Valve tags shall be permanently attached to the valve or structure by means of two stainless steel bolts or screws.

3.03 MARKER LOCATIONS

- A. Each pipe shall be marked at:
 1. Intervals of 20-feet in straight runs.
 2. At least once in every room.
 3. Within 2-feet of turns, elbows, and valves.
 4. On the upstream side of tees, branches, and other distribution points.
 5. On both sides of walls and floors through which the piping passes.

3.04 IDENTIFICATION COLORS

Conform to the following color codes.

Color Schedule				
Pipe Contents		Pipe Color	Marker Color	Letter Color
Abbreviation	Identification			
D	Drain	green	yellow	black
WS	Surface water supply	blue	blue	white
RW	Reuse Water	green	green	white
UW	Utility water (non-potable water)	white	green	white

END OF SECTION 15005

**SECTION 15007
PIPE COUPLINGS**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Provide pipe couplings indicated, complete and operable.
- B. The couplings, adapters and joints shall be provided with restraining devices to restrict pipe axial movement. Where the restraining devices and/or details are not indicated on the Drawings, it is the Contractor's responsibility to provide the devices/details necessary to restraint the piping system.
- C. The Items specified in this section include the following:
 - 1. Groove Couplings
 - 2. Sleeve Couplings
 - 3. Flanged Coupling Adapters
 - 4. Dismantling Joints
 - 5. Transition Couplings.
 - 6. Miscellaneous Adapters

1.02 RELATED SECTIONS

Section 09800 – Protective Coating
Section 02610 - Gravity Pipeline Testing
Section 02615 - Pressure Pipeline testing
Division 2 Site Work
Division 15 Mechanical

1.03 REFERENCES

AISI C1012
ASTM A512 - Cold-Drawn Butt-Weld Carbon Steel Mechanical Tubing
ASTM A513 - Electric-Resistance Welded Carbon and Alloy Steel Mechanical Tubing
ASTM A576 - Steel Bars, Carbon, Hot Wrought, Special Quality
AWWA Manual M11 – Steel Pipe: A Guide for Design and Installation
AWWA C207 – Steel Pipe Flanges for Waterworks Services, Sizes 4 In. Through 144 In.
AWWA C219 - Standard for Bolted Sleeve-Type Couplings for Plain-End Pipe

1.04 Contractor SUBMITTALS

- A. Shop Drawings: Shop Drawings shall contain the following information:
 - 1. Product submittals, and shall be specifically identified with the applicable style or series designation, pressure rating and restraint system if applicable.
 - 2. Couplings schedule or layout indicating where the couplings will be installed.

3. Expansion Joints: Submit detailed calculations and manufacturer's Shop Drawings of proposed expansion joints, piping layouts, and guides, including information on materials, temperature, and pressure ratings
4. Flexible Connectors: Submit pressure and thermal expansion calculations

B. Certifications

Necessary certificates, test reports, and affidavits of compliance shall be obtained by the Contractor.

1.05 MATERIAL DELIVERY, STORAGE, AND PROTECTION

- A. Piping couplings, adapters and joints accessories shall be delivered in a clean and undamaged condition and stored off the ground for protection against oxidation caused by ground contact.
- B. Defective or damaged materials shall be replaced with new materials.

PART 2 - PRODUCTS

2.01 GENERAL

A. Extent of work

1. Piping couplings, adapters, joints and accessories shall be provided in accordance with the requirements of the applicable Sections of Divisions 2 and 15 and as indicated.
2. The Contractor shall not be allowed to substitute any other type of coupling in lieu of the couplings as specified herein unless approved by the Engineer.
3. The Contractor shall assign the responsibility to the coupling manufacturer to review the piping connection to the equipment and submit any modifications to the Engineer for review.

B. Pressure Rating

1. Couplings, adapters and joints shall be designed for the pressure as defined in respective pipe sections, or as indicated on the Piping Schedule, whichever is greater.

C. Seals

1. Seal elastomer materials shall be selected to be compatible with the fluid service, pressure and temperature. They shall be composed of elastomeric-compound material that will not deteriorate from age under normal storage or use conditions.
2. Where couplings are used in water containing dissolved ozone residual or chloramines, seal material shall be Viton-A.

D. Coating

1. Couplings shall be lined and coated at the factory, unless otherwise indicated.
2. Coating shall be in accordance with the Section 09800, unless otherwise indicated.

2.02 SLEEVE COUPLINGS

A. General

1. Provide sleeve couplings specifically designed suitable for the fluid service and pressure rating.

B. Construction

1. Sleeve couplings shall be in accordance with AWWA C219.
2. Couplings shall be constructed without pipe stop.
3. The middle ring shall be at least the same wall thickness as the pipe to which the coupling is connected and not less than 1/4-inch thick.
4. If the strength of the middle ring material is less than the strength of the pipe material, the thickness of the middle ring shall be increased to have the same strength as the pipe.
5. For standard sleeve couplings, the coupling shall be either 5 or 7 inches long for pipe diameters up to and including 30-inch and 10 inches long for pipe diameters greater than 30-inch. For long sleeve couplings, the coupling shall be 16 inches long for all pipe diameters.
6. The followers shall be single-piece contoured mill sections welded and cold-expanded as required for the middle rings and of sufficient strength to accommodate the number of bolts necessary to obtain adequate gasket pressures without excessive rolling.

C. Sleeve-Type Couplings Manufacturer, or Equal

1. World Wide Metric, Inc. (Dresser), Style 38.
2. Ford Meter Box Company, Inc., Style FC1 or FC3.
3. Smith-Blair, Inc., Style 411.

2.03 FLANGED COUPLING ADAPTERS

- A. Provide flanged coupling adapters specifically designed suitable for the fluid service and pressure rating.**

B. Construction

1. Coupling bodies shall be fabricated from steel, ASTM A512 or ASTM A513.
2. Provide flanges in conformance with AWWA C207.
3. The body shall be at least the same wall thickness as the pipe to which the coupling is connected, but not less than 1/4 inch thick.
4. If the strength of the body material is less than the strength of the pipe material, the thickness of the middle ring shall be increased to have the same strength as the pipe.
5. The follower flange shall be fabricated from steel, ASTM A576 or AISI C1012.

C. Flanged Couplings Adapter Manufacturer, or Equal

1. Smith-Blair, Model 913.
2. Dresser, Model 128-W.
3. JCM, Model 303.

2.04 DISMANTLING JOINTS

- A. Provide dismantling joints products specifically designed suitable for the fluid service and pressure rating.
- B. Construction
 - 1. Coupling bodies shall be fabricated from steel, ASTM A512 or ASTM A513.
 - 2. Provide flanges in conformance with AWWA C207.
 - 3. The body shall be at least the same wall thickness as the pipe to which the coupling is connected, but not less than 1/4 inch thick.
 - 4. If the strength of the body material is less than the strength of the pipe material, the thickness of the middle ring shall be increased to have the same strength as the pipe.
 - 5. The follower flange shall be fabricated from steel, ASTM A576 or AISI C1012.
- C. Dismantling Joints Manufacturer, or Equal
 - 1. Smith-Blair, Model 975.
 - 2. Dresser, Model 131.
 - 3. JCM, Model 309.

2.05 TRANSITION COUPLINGS

- A. Provide transition-coupling products specifically designed suitable for the fluid service and manufactured for the piping applications.
- B. The transition couplings shall have function and design similar to the flexible couplings, joint and flanged coupling adapters for connecting piping having different outside diameters.

2.06 MISCELLANEOUS ADAPTERS

- A. A special pipe adapter may be required to provide proper connection between different type of pipes and/or fittings. The adapter may be indicated on the Drawing with the pipe type or equipment. However, it is the Contractor'S responsibility to ensure proper connection between various type of pipes and pipe appurtenances. Provide adapters as required whether specifically indicated or not.
- B. Provide piping adapter products specifically designed suitable for the fluid service and manufactured for the piping applications.

PART 3 - EXECUTION

3.01 GENERAL

- A. Installation, inspection and field testing of the pipes shall in accordance with the requirements of Section 02610and Section 02615.
- B. The Contractor shall have the coupling manufacturer's service representative verify the correct choice and application of couplings and gaskets, and the workmanship, to assure a correct installation.

- C. The Contractor shall assign the responsibility to the couplings manufacturer to review the piping connection to the couplings and submit any modifications to the Engineer for review.

3.02 INSTALLATION

- A. Where couplings are shown to connect piping to mechanical equipment such as pumps, compressors, and blowers, the piping shall be aligned with the equipment point of connection and shall be perpendicular to the axis of the flange or fitting for which the piping is to be connected.
- B. The couplings or the piping shall not impose excessive stress to the equipment connection to cause misalignment of the equipment.
- C. Restrained Joints on couplings, adapters and joints
 - 1. Couplings, adapters and joints on pressure lines shall be harnessed unless thrust restraint is provided by other means.
 - 2. Harnesses shall be designed by the pipe manufacturer in accordance with AWWA Manual M11, or as indicated.
 - 3. Harness sets shall be designed for the maximum test pressure of the pipe in which they are installed.
 - 4. Where harness sets are installed near the suction and discharge of the pump, harness bolts shall have zero elongation in order to prevent misalignment of the pump imparted by the thrust within the piping system.

END OF SECTION 15007

**SECTION 15030
DUCTILE IRON PIPE**

PART 1 - GENERAL

1.01 SECTION INCLUDES

The work under this Section includes providing all labor, materials, tools, and equipment necessary for ductile iron pipe and appurtenant work, complete and in place, as described in the Contract Documents.

1.02 RELATED SECTIONS

Section 09800 – Protective Coating
Section 15070 – Gravity Pipeline Testing

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems
AWWA C110- Ductile-Iron and Gray-Iron Fittings, 3 in through 48 in for Water
AWWA C111- Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C115 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
AWWA C116 - Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings for Water Supply Service
AWWA C150 - Thickness Design of Ductile-Iron Pipe
AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast for Water
AWWA C153 - Ductile-Iron Compact Fittings for Water Service
AWWA C222 - Polyurethane Coatings for the Interior and Exterior of Steel Water Pipe and Fittings
AWWA C600 - Installation of Ductile Iron Water Mains and Their Appurtenances
AWWA C606 - Grooved and Shouldered Joints
ASTM C150 - Portland Cement
NSF Standard 61 – Drinking Water System Components

1.04 SUBMITTALS

A. Furnish submittals in accordance with Section 01300 Contractor Submittals and the following supplemental requirements:

1. Shop Drawings:
 - a. Certified dimensional drawings of valves, fittings, and appurtenances.
 - b. For all exposed ductile iron pipe, provide a completed and scaled dimensional drawing of the pipe layout including valves and fittings. Indicate the specific number of each fitting and the location and the direction of each fitting in the completed line.

2. Certifications: Certified affidavit of compliance for pipe and other products or materials furnished under this Section and as specified in the referenced standards and the following supplemental requirements:
 - a. Physical and chemical properties.
 - b. Hydrostatic test reports.
3. The Contractor shall be responsible for performing and paying for sampling and testing as necessary for the certifications.

1.05 QUALITY ASSURANCE

- A. Tests: Except as modified herein, materials used in the manufacture of the pipe shall be tested in accordance with the requirements of the referenced standards as applicable.
- B. The Contractor shall perform said material tests as part of the work. The Engineer shall have the right to witness testing conducted by the Contractor; provided that the Contractor's schedule is not delayed for the convenience of the Engineer.
- C. In addition to those tests specifically required, the Engineer may request additional samples of any material including lining and coating samples for testing by the Owner. The additional samples shall be furnished as a part of the work.
- D. Inspection: Pipe shall be subject to inspection at the place of manufacture in accordance with the provisions of the referenced standards, as supplemented by the requirements herein. The Contractor shall notify the Engineer in writing of the manufacturing starting date not less than 14 days prior to the start of any phase of the pipe manufacture.
- E. During the manufacture of the pipe, the Engineer shall be given access to areas where manufacturing is in process and shall be permitted to make inspections necessary to confirm compliance with the Specifications.

PART 2 - PRODUCTS

2.01 PIPE GENERAL

- A. Mortar-lined and ductile iron pipe shall conform to AWWA C151, AWWA C104, and AWWA C222, subject to the supplemental requirements in this section. The pipe shall be of the diameter and class indicated, shall be provided complete with rubber gaskets, specials, and fittings as required under the Contract Documents.
- B. Unless noted otherwise, all ductile iron pipe shall be Class 50 or equivalent pressure rating.
- C. Markings: The Contractor shall legibly mark specials 24-inches diameter and larger in accordance with the laying schedule and marking diagram. Each fitting shall be marked at each end with top field centerline.
- D. Handling and Storage: The pipe shall be handled as a minimum at the 1/3 points 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 that might injure the pipe coating/exterior will not be permitted. Stockpiled pipe shall be supported on padded skids, sand or earth berms free of rock exceeding 3-inches diameter, sandbags, or suitable means so that the coating will not be damaged. The pipe shall not be rolled and shall be secured to prevent accidental rolling

- E. Laying Lengths: Nominal pipe laying lengths shall be 20-ft.
- F. Finish: The pipe shall have smooth dense interior surfaces and shall be free from fractures, excessive interior surface crazing, and roughness.
- G. Closures and Correction Pieces: Closures and correction pieces shall be provided as required so that closures may be made due to different headings in the pipe laying operation and so that correction may be made to adjust the pipe laying to conform to pipe stationing on the Drawings. The locations of correction pieces and closure assemblies are indicated. Any change in location or number of said items shall only be as accepted by the Engineer.

2.02 SPECIALS AND FITTINGS

Fittings for ductile iron pipe shall conform to the requirements of AWWA C153 or AWWA C110 and shall have a minimum pressure rating of 250 psi. Ductile iron fittings larger than 48-inches shall conform to AWWA C153.

2.03 DESIGN OF PIPE

- A. The pipe shall be designed, manufactured, tested, inspected, and marked according to AWWA C150 and AWWA C 151 except where modified by this section.
- B. Pipe Dimensions: The pipe shall be of the diameter and class indicated.
- C. Fitting Dimensions: The fittings shall be of the diameter and class indicated.
- D. Joint Design: Ductile iron pipe and fittings shall be furnished with mechanical joints, push-on joints, flanged joints, or restrained joints as required.
 - 1. Mechanical and push-on joints shall conform to AWWA C111.
 - 2. Flanged joints shall conform to AWWA C115. Where threaded flanges are provided, the pipe wall thickness under the cut threads shall not be less than the calculated net thickness required for the pressure class of the pipe.
 - 3. Restrained joints shall be Flex-Ring restrained joint by American Ductile Iron Pipe, TR FLEX restrained joint by U.S. Pipe, or equal.
 - 4. Joint restraining devices that impart point loads and/or wedging action on the pipe wall as a means of joint restraint shall not be allowed unless there are no other options for joint restraint available. Under such circumstances, the Contractor may propose such devices provided the following conditions are met and the request is made as a substitution:
 - a. A formal request for substitution is submitted stating the locations where the devices are intended to be used and a statement from the device manufacturer and the pipe manufacturer that the proposed device is appropriate for the intended installation and is rated at least for the class of the pipe being supplied.
 - b. A statement from the pipe manufacturer is provided accepting the use of the retaining devices and indicating that the use of such devices will in no way affect the warranty of the pipe and/or the performance of the pipe.
 - c. The manufacturer of the device and the pipe manufacturer jointly provide instruction on the proper installation of the device to the personnel installing the units and provide certification to the Owner that the installers are adequately trained in the installation of the units and that warranties are in full affect for the project.

- d. The devices shall be MegaLug Model 1100 as manufactured by EBAA Iron or equal.
- E. For bell-and-spigot ends with rubber gaskets, the clearance between the bells and spigots shall be such that when combined with the gasket groove configuration and the gasket itself, will provide watertight joints under all operating conditions when properly installed. The Contractor shall require the pipe manufacturer to submit details complete with significant dimensions and tolerances and also to submit performance data indicating that the proposed joint has performed satisfactorily under similar conditions. In the absence of a history of field performance, the results of a test program shall be submitted.
- F. Shop-applied interior linings and exterior coatings shall be held back from the ends of the pipe as indicated.

2.04 CEMENT-MORTAR LINING

- A. Cement-Mortar Lining for Shop Application: Except as otherwise provided herein, interior surfaces of ductile iron pipe, fittings, and specials shall be cleaned and lined in the shop with cement-mortar lining applied centrifugally in conformity with AWWA C104. During the lining operation and thereafter, the pipe shall be maintained in a round condition by suitable bracing or strutting. The lining machines shall be of a type that has been used successfully for similar work. Every precaution shall be taken to prevent damage to the lining. If lining is damaged or found defective at the site, the damaged or unsatisfactory portions shall be replaced with lining conforming to these Specifications.
 - 1. Cement: Cement for mortar lining shall conform to the requirements of AWWA C104; provided, that cement for mortar lining shall be Type II or V. Cement shall not originate from kilns that burn metal-rich hazardous waste fuel, nor shall a fly ash or pozzolan be used as a cement replacement.
- B. The minimum lining thickness shall be as follows:

Nominal Pipe Diameter, in	Minimum Lining Thickness, in
3 - 12	1/16
14 - 24	3/32
30 - 64	1/8

2.05 EXTERIOR PROTECTION OF PIPE

- A. Exterior Coating of Exposed Piping: The exterior surfaces of pipe which will be exposed to the atmosphere inside structures or above ground shall be thoroughly cleaned and then given a shop coat of rust-inhibitive primer conforming to the requirements of Section 09800 Protective Coating.
- B. Exterior Coating of Buried Piping: The exterior coating shall be an asphaltic coating approximately 1-mil thick.

PART 3 - EXECUTION

3.01 INSTALLATION OF PIPE

- A. The Contractor shall inspect each pipe and fitting prior to installation to insure that there are no damaged portions of the pipe. Pipe damaged prior to Substantial Completion shall be repaired or replaced by the Contractor.

- B. 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 pipes and fittings in the trench shall be closed during any interruption to the work.
- C. Pipe Laying: The pipe shall be installed in accordance with AWWA C600.
- D. Pipe shall be laid directly on the bedding material. No blocking will be permitted, and the bedding shall be such that it forms a continuous, solid bearing for the full length of the pipe. Excavations shall be made as needed to facilitate removal of handling devices after the pipe is laid. Bell holes shall be formed at the ends of the pipe to prevent point loading at the bells or couplings. Excavation shall be made as needed outside the normal trench section at field joints to permit adequate access to the joints for field connection operations and for application of coating on field joints.
- E. Each section of pipe 24-inches diameter and larger shall be laid in the order and position shown on the laying schedule. Each section shall be laid to the line and grade, within approximately one-inch plus or minus.
- F. Where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the Engineer may change the alignment and/or the grades. Such change shall be made by the deflection of joints, by the use of bevel adapters, 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. No joint shall be misfit any amount that will be detrimental to the strength and water tightness of the finished joint.
- G. Except for short runs that may be permitted by the Engineer, pipes shall be laid uphill on grades exceeding 10 percent. Pipe that 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. Bends shall be properly installed as indicated.
- H. Cold Weather Protection: No pipe shall be installed upon a foundation into which frost has penetrated or at any time that there is a danger of the formation of ice or penetration of frost at the bottom of the excavation before backfilling occurs.
- I. Pipe and Specials Protection: The openings of pipe and specials shall be protected with suitable bulkheads to prevent unauthorized access by persons, animals, water, or any undesirable substance. At all times, means shall be provided to prevent the pipe from floating.
- J. Pipe Cleanup: As pipe laying progresses, the Contractor shall keep the pipe interior free of debris. The Contractor shall completely clean the interior of the pipe of sand, dirt, mortar splatter, and any other debris following completion of pipe laying and shall perform any necessary interior repairs prior to testing and disinfecting the completed pipeline.

3.02 RUBBER GASKETED JOINTS

- A. Immediately before jointing pipe, the bell end of the pipe shall be thoroughly cleaned, and a clean rubber gasket shall be placed in the bell groove. The spigot end of the pipe and the inside surface of the gasket shall be carefully cleaned and lubricated.
- B. The lubricant shall be suitable for lubricating the parts of the joint for assembly and be a compound listed as in compliance with NSF Standard 61. The lubricant shall be nontoxic, shall not support the growth of bacteria, and shall have no deleterious effects on the gasket material. The lubricant shall not impart taste or odor to water in the pipe.

- C. The spigot end of the pipe section shall then be inserted into the bell of the previously laid joint and telescoped into its proper position. Tilting of the pipe to insert the spigot into the bell will not be permitted.

3.03 INSTALLATION OF PIPE APPURTENANCES

- A. Protection of Appurtenances: Where the joining pipe is dielectric-coated, buried appurtenances shall be coated in kind. Where pipe is encased in polyethylene sleeves, buried appurtenances shall be encased in polyethylene.
- B. Installation of Valves: Valves shall be handled in a manner to prevent any injury or damage to any part of the valve. Joints shall be thoroughly cleaned and prepared prior to installation. The Contractor shall adjust stem packing and operate each valve prior to installation to insure proper operation.
- C. Valves shall be installed so that the valve stems are plumb and in the location indicated.

END OF SECTION 15030

**SECTION 15062
SMALL NON-PRESSURE PVC PIPING**

PART 1 - GENERAL

1.01 SECTION INCLUDES

The work under this Section includes providing all labor, materials, tools, and equipment necessary for Provide Poly Vinyl Chloride (PVC) solid wall non pressure pipe from 4- to 15- inches diameter nominal size and appurtenant work, complete and in place.

1.02 RELATED SECTIONS

02220 – Earthwork
02610 – Gravity Pipeline Testing

1.03 REFERENCES

ASTM D1784 - Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds

ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

ASTM D2444 - Test Method for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)

ASTM D3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings, SDR 26

ASTM D3212 - Joints for Drain and Sewer Plastic Pipe Using Flexible Elastomeric Seals

ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe

ASTM F913 - Thermoplastic Elastomeric Seals (Gaskets) for Joining Plastic Pipe

1.04 SUBMITTALS

- A. Shop Drawings: The Contractor shall submit Shop Drawings and laying diagrams of pipe, joints, bends, special fittings, and piping appurtenances.
- B. Certificates: The Contractor shall submit manufacturer's certificate that pipe conforms to these specifications.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Pipe shall be continuously and permanently marked with the manufacturer's name, pipe size, and minimum pipe stiffness in psi.
- B. The Contractor shall also require the manufacturer to mark the date of extrusion on the pipe. This dating shall be done in conjunction with records to be held by the manufacturer for 2 years, covering quality control tests, raw material batch number, and other information deemed necessary by the manufacturer.

2.02 PIPE

- A. Pipe shall conform to the requirements of ASTM D3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings, SDR 26. Material for PVC pipe shall conform to the requirements of ASTM D1784 - Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds, for cell classification 12454-B or 12454-C as defined therein. The manufacturer shall test a sample from each batch according to ASTM D 2444 - Test Method for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight).
- B. Joints shall conform to ASTM D3212 - Joints for Drain and Sewer Plastic Pipe Using Flexible Elastomeric Seals. Elastomeric seals for compression type joints shall conform to the requirements of ASTM F 477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe or ASTM F913 - Thermoplastic Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

2.03 FITTINGS

- A. Fittings shall conform to the requirements of ASTM D3034. The ring groove and gasket ring shall be compatible with PVC pipe ends. The flanged fittings shall be compatible with cast-iron or ductile iron pipe fittings.
- B. The stiffness of the fittings shall be not less than the stiffness of adjoining pipe.

2.04 BEDDING MATERIAL

Unless otherwise indicated, material used for pipe bedding shall conform to Section 02200.

2.05 FLEXIBLE COUPLINGS

- A. Couplings: shall be installed as recommended by the coupling manufacturer. All couplings shall receive manufacturer's prime coat and corrosion-resistant finish coat
 - 1. Flexible type couplings, where indicated on the Drawings, shall be:
 - a. Dresser Style 40, or Romac equivalent, for nominal diameters smaller than 18"
 - b. Dresser Style 38, or Romac equivalent with:
 - 1) Middle ring length for pipe 18 inches to 36 inches nominal diameter shall be 16 inches.
 - 2) Middle ring length for pipe 42 inches in diameter or greater shall be 18 inches

2. Flange to pipe coupling adapters may be Rockwell Type 913. The coupling-rated working pressure shall be not less than the service rating of the pipeline. The middle ring shall have a minimum thickness of 3/8 inch, and the follower ring shall have a minimum thickness of 1/4 inch. Coupling gaskets shall be supplied by the coupling manufacturer.
3. Victaulic couplings will be standard coupling Style 77, malleable iron housing, with factory standard, orange enamel housing coating. Gaskets shall be Grade T Buna N with temperature range from minus 20° F to plus 180° F. Bolts and nuts shall be heat-treated carbon steel conforming to ASTM A183. Grooves on pipes fitted with Victaulic couplings shall have factory recommended groove cuts suitable for Style 77 couplings.

B. Flexible Pipe-to-Manhole Connector: Use KOR-N-SEAL connectors with stainless steel fastening hardware, manufacturer: NPC Inc. or Engineer-approved equal.

2.06 TRACER WIRE AND WARNING TAPE

The entire length of all polyethylene pipe runs shall contain a 12-gauge, direct-bury, UF, single conductor tracer wire, and a warning tape at 4 inches below the finished surface. The tracer wire shall be accessed by 1-inch PVC pipe stubbed out of the ground complete with cap and identifying label. The PVC stubs shall be located as shown on the Drawings.

PART 3 - EXECUTION

3.01 TRENCHING AND BACKFILL

Trench excavation and backfill shall conform to the requirements of Section 02200 and the Drawings.

3.02 LAYING PIPE

A. Pipe shall be installed in accordance with the requirements of ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications and as indicated. Pipe sections shall be closely jointed to form a smooth flow line. Immediately before placing each section of pipe in final position for jointings, the bedding for the pipe shall be checked for firmness and uniformity of slope.

B. Handling

1. Handling of the PVC pipe shall be done with implements, tools, and facilities as recommended by the pipe manufacturer to ensure that the pipe is not damaged in any manner during storage, transit, loading, unloading, and installation.
2. Pipe shall be inspected both prior to and after installation in the ditch and all defective lengths shall be rejected and immediately removed from the working area.
3. Fittings shall be lowered into trench by means of rope, cable, chain, or other means without damage. Cable, rope, or other devices used for lowering fitting into trench, shall be attached around exterior of fitting for handling. Under no circumstances shall the cable, rope, or other device be attached through the fitting interior for handling or shall pipe or fittings be dropped or dumped into the trench.

DIVISION 2 – SITE WORK

- C. Cutting and machining of the pipe shall be accomplished in accordance with the pipe manufacturer's standard procedures. Pipe shall not be cut with a cold chisel, standard iron pipe cutter, or any other method that may fracture the pipe or will produce ragged, uneven edges.
- D. Foreign matter or dirt shall be removed from the interior of the pipe before lowering into position in the trench. Pipe shall be kept clean during and after laying. Openings in the pipeline shall be closed with watertight expandable type sewer plugs or PVC test plugs at the end of each day's operation or whenever the pipe openings are left unattended. The use of burlap, wood, or other similar temporary plugs will not be permitted.
- E. Adequate protection and maintenance of all underground and surface utility structures, drains, sewers, and other obstructions encountered in the progress of the work shall be the Contractor's responsibility.
- F. Where the grade or alignment of the pipe is obstructed by existing utility structures such as conduits, ducts, pipes, branch connections to main sewers, or main drains, the obstruction shall be permanently supported, relocated, removed, or reconstructed by the Contractor in cooperation with Owners of such utility structures. Unless otherwise indicated, protection of existing utility structures shall be the Contractor's responsibility.

3.03 FIELD JOINTING

- A. Each pipe compression type joint shall be joined with a lock-in rubber ring and a ring groove that is designed to resist displacement during pipe insertion.
- B. The ring and the ring seat inside the bell shall be wiped clean before the gasket is inserted. A thin film of lubricant shall be applied to the exposed surface of the ring and to the outside of the clean pipe end. Lubricant other than that furnished with the pipe shall not be used. The end of the pipe shall be then forced into the ring to complete the joint.
- C. The pipe shall not be deflected either vertically or horizontally in excess of the printed recommendations of the manufacturer of the coupling.
- D. Fittings shall be carefully connected to pipe, and joint shall be checked to insure a sound and proper joint.
- E. When pipe laying is not in progress, the open ends of the pipe shall be closed to prevent trench water from entering pipe. Adequate backfill shall be deposited on pipe to prevent floating of pipe. Any pipe that has floated shall be removed from the trench, cleaned, and relaid in an acceptable manner. No pipe shall be laid when, in the opinion of the Owner, the trench conditions or weather are unsuitable.

3.04 TESTING

Field testing of gravity sewer pipe shall conform to the requirements of Section 02610.

END OF SECTION 15062

**SECTION 15070
GRAVITY PIPELINE TESTING**

PART 1 - GENERAL

1.01 SECTION INCLUDES

The Contractor shall test sanitary and gravity flow system pipelines in accordance with the Contract Documents.

1.02 CONTRACTOR SUBMITTALS

A. The Contractor shall submit to the Owner one copy of the following information

1. A testing plan and schedule including methods for water conveyance, control, leak testing, and water disposal.

PART 2 - PRODUCTS

2.01 EQUIPMENT AND MATERIALS

Temporary valves, bulkheads, and other water control equipment shall be as determined by the Contractor. No materials shall be used which would be injurious to the work.

PART 3 – EXECUTION

3.01 GENERAL

- A. Gravity sewer, storm drainage and pollution abatement pipes and laterals shall be tested for exfiltration or infiltration as indicated. Manholes and pipe shall be backfilled prior to testing. Leakage tests shall be completed and approved prior to placing of permanent resurfacing of pavement. When leakage or infiltration exceeds the allowed amount, the Contractor shall locate the leaks and make the necessary repairs or replacements to reduce the leakage or infiltration to the allowable limits. Individually detectable leaks shall be repaired, regardless of whether the test results are acceptable or not.
- B. Unless otherwise indicated, the Contractor shall be responsible for furnishing water for testing and for transporting it to the points of use.
- C. No materials shall be used which would be injurious to pipeline structure and future function. Air test gauges shall be laboratory-calibrated test gauges, and if required by the Engineer, shall be recalibrated by a certified laboratory prior to the leakage test. Air test gauges shall have a size and pressure range appropriate for the pipe being tested.
- D. Testing operations shall be performed in the presence of the Engineer.

3.02 TESTING SCHEDULE

A. Leakage Tests:

1. Perform the type of leakage tests determined from the table below, based on pipe size, slope between manholes (Criterion 1), and difference in water levels (Criterion 2).

Nominal Pipe Size	Criterion 1		Criterion 2	
	Manhole Delta H, feet		Test Water vs Ground Water Delta H, feet	
	Less than or equal to 10 ft	greater than 10 ft	greater than or equal to 4 ft	less than 4 ft
less than or equal to 24 inches	See Criterion 2	Infiltration or Air See Note 1	Exfiltration	Infiltration or Air
greater than 24 inches	See Criterion 2	See Criterion 2	Exfiltration	Infiltration

Note 1: If ground water is present, perform an infiltration test or air test at the option of the Contractor; if no ground water is present, perform an air test.

B. Definitions:

1. Delta H: The difference between two elevations, expressed in feet.
2. Manhole Delta H: The invert elevation difference in two adjacent manholes.
3. Test Water vs. Ground Water Delta H: The required elevation of water surface for testing minus the average elevation of ground water adjacent to the pipe to be tested. Units are feet.

3.03 WATER EXFILTRATION TEST

- A. Each section of sewer, drain or pollution abatement pipe shall be tested between successive manholes by closing the lower end and the inlet sewers pipe of the upper manhole with stoppers or inflatable plugs. The pipe and manhole shall be tested to the pressure requirements provided in the Pipe Schedule in the Drawings.
- B. Water shall remain in the pipe for at least one hour or until the water level stabilizes, whichever is longer, before the test begins. The minimum test duration shall be 4 hours.
- C. Unless indicated otherwise, the Contractor shall measure exfiltration. Measure the amount of water added to the upstream manhole to maintain the water level at the elevation set above. Compare the amount added to the allowable leakage calculated below, and if the amount added is equal to or less than the allowable amount, the tested section of the pipe has passed.
- D. The allowable leakage shall be as defined in the Pipe Schedule in the Drawings.

3.04 WATER INFILTRATION TEST

- A. The end of the sewer, drain or pollution abatement pipe at the upper structure shall be closed to prevent the entrance of water, and pumping of ground water shall be discontinued for at least 3 days, after which the section shall be tested for infiltration.
- B. The infiltration into each individual reach of sewer, drain or pollution abatement pipe between adjoining manholes shall not exceed that allowed by the formula above, where H is the difference in the elevation between the ground water surface and the invert of the sewer at the downstream manhole.
- C. Unless otherwise indicated, infiltration shall be measured by the Contractor and witnessed by the Engineer.

3.05 MANHOLE TEST

- A. Drain manholes shall be hydrostatically tested for leakage prior to backfilling. Prior to testing, manholes shall be visually inspected for obvious defects. Leaks or cracks shall be repaired to the satisfaction of the Engineer.
- B. Hydrostatic Testing: All pipes entering the manhole shall be sealed at a point outside the manhole walls to include testing of the pipe to manhole joints. The manhole shall be filled with water to a level 2-inches below the top of the frame. Safety lines shall be secured to all plugs utilized. After a period of at least one hour to allow the water level to stabilize, the manhole shall be refilled, and the water level shall be marked. The water level shall again be checked after 4 hours. If the water level falls more than 1-inch, the leakage shall be considered excessive, and the Contractor shall make repairs and retest the manhole. The exterior of the manhole shall be inspected during this period for visible evidence of leakage. Visible moisture, sweating, or beads of water on the exterior of the manhole shall not be considered leakage, but any water running across the surface will be considered leakage and shall be repaired to the satisfaction of the Engineer regardless of the volume of water lost.

END OF SECTION 15070

**SECTION 15200
VALVES, GENERAL**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Provide valves, actuators, and appurtenances, complete and operable, as indicated in accordance with the Contract Documents.
- B. Apply the provisions of this section to all valves and valve actuators except where otherwise indicated.
- C. Valves and actuators in particular locations may require a combination of units, sensors, limit switches, and controls, as indicated.

1.02 RELATED SECTIONS

Section 05500 Miscellaneous Metalwork
Section 09800 Protective Coating
Section 15000 General Mechanical Requirements
Section 15201 Valve and Gate Actuators

1.03 REFERENCES

ASTM A48 - Gray Iron Castings
ASTM A126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A216 - Steel Castings, Carbon Suitable for Fusion Welding for High-Temperature Service
ASTM A351 - Steel Castings, Austenitic, for High-Temperature Service
ASTM A395 - Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures
ASTM A515 - Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service
ASTM A536 - Ductile Iron Castings
ASTM B62 - Composition Bronze or Ounce Metal Castings
ASTM B584 - Copper Alloy Sand Castings for General Applications
Cell Classification 12454
Cell Classification 23447
NSF Standard 14 - Plastics Piping System Components and Related Materials
NSF Standard 61 – Drinking Water System Components

1.04 SUBMITTALS

- A. Furnish the following information on Shop Drawings:
 - 1. Valve name, size, Cv factor, pressure rating, identification number, and specification section number;

2. Complete information on the valve actuator, including size, manufacturer, model number, limit switches, and mounting;
 3. Cavitation limits for control valves;
 4. Assembly drawings showing part nomenclature, materials, dimensions, weights, and relationships of valve handles, hand wheels, position indicators, limit switches, integral control systems, needle valves, and control systems;
 5. Motor data for electric motor-actuated valves;
 6. Complete wiring diagrams and control system schematics; and,
 7. A valve-labeling schedule, listing the valves to be furnished with stainless steel tags, indicating in each case the valve location and the proposed wording for the label.
- B. Furnish a technical manual containing the required information for each valve.
- C. Furnish a spare parts list, containing the required information for each valve assembly, as indicated.

1.05 QUALITY ASSURANCE

A. Support:

1. Where a valve is to be supported by means other than the piping to which it is attached, obtain from the valve manufacturer a design for its support and foundation that satisfies the criteria in Section 11000.
2. Submit the support design, including drawings and calculations sealed by an engineer, with the Shop Drawings.
3. Provide the support after the design has been approved.

B. Unit Responsibility:

1. Make a single manufacturer responsible for the coordination of design, assembly, testing, and furnishing of each valve; however, the Contractor shall be responsible to the Owner for compliance with the requirements of each valve section.
2. Unless indicated otherwise, the responsible manufacturer shall be the manufacturer of the valve.

C. Single Manufacturer:

Where 2 or more valves of the same type and size are required, the valves shall be furnished by the same manufacturer.

PART 2 - PRODUCTS

2.01 PRODUCTS

A. General:

1. Provide valves and gates of new and current manufacture.
2. Provide shut-off valves 6-inch and larger with actuators with position indicators.
3. Provide gate valves 18-inch and larger, or where chain wheel is required, with spur gear and hand wheel.

4. Provide buried valves with valve boxes and covers containing position indicators and valve extensions.
5. Provide manual valves mounted higher than 7 feet above the working level with chain actuators.

B. Valve Actuators:

Unless otherwise indicated, provide valve actuators in accordance with Section 15201.

C. Protective Coating:

1. Coat the exterior surfaces of valves and the wet interior surfaces of ferrous valves of sizes 4-inch and larger in accordance with the requirements of Section 09800.
2. The valve manufacturer shall certify in writing that the required coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with the indicated requirements.
3. Do not epoxy-coat the flange faces of valves.

D. Valve Labeling:

1. Except when such requirement is waived by the Engineer in writing, provide a label on shut-off valves and control valves except for hose bibbs.
2. Furnish a label composed of 1/16-inch plastic or stainless steel, a minimum of 2 inches by 4 inches in size, and permanently attached to the valve or on the wall adjacent to the valve as directed by the Engineer.

E. Valve Testing:

1. As a minimum, unless otherwise indicated or recommended by the reference standards, test valves 3 inches in diameter and smaller in accordance with the manufacturer's standard procedure.
2. Factory-test valves 4 inches in diameter and larger as follows:
 - a. Hydrostatic Testing:
 - 1) Subject valve bodies to an internal hydrostatic pressure equivalent to twice the water-rated pressure of the valve.
 - 2) Metallic valves rating pressures shall be at 100 degrees F.
 - 3) Plastic valves rating pressures shall be at 73 degrees F, or at a higher temperature according to material type.
 - 4) During the hydrostatic test, there shall be no leakage through the valve body, end joints, or shaft seals, nor shall parts of the valve be permanently deformed.
 - 5) Allow a test duration of at least 10 minutes, in order to allow visual examination for leakage.
 - b. Seat Testing:
 - 1) Test the valves for leaks in the closed position, with the pressure differential across the seat equal to the water rated pressure of the valve.
 - 2) Provide a test duration of at least 10 minutes, in order to allow visual examination for leakage.
 - 3) The leakage rate shall be the more stringent of the following:
 - a) As recommended by the reference standard for that type of valve; or,.

b) Leakage past the closed valve not to exceed one fluid ounce per hour per inch diameter for metal seated valves, and drop-tight for resilient seated valves.

c. Performance Testing:

Shop-operate the valves from the fully-closed to the fully-open position, and reverse under no-flow conditions in order to demonstrate that the valve assembly operates properly.

F. Certification:

Prior to shipment of valves over 12-inches in size, submit certified copies of the hydrostatic factory tests, showing compliance with the applicable standards of AWWA, ANSI, or ASTM.

G. Valve Markings:

Permanently mark valve bodies in accordance with MSS SP25 - Standard Marking Systems for Valves, Fittings, Flanges, and Unions.

2.02 MATERIALS

A. General:

1. Provide materials suitable for the intended application.
2. Provide materials in contact with potable water listed as compliant with NSF Standard 61.
3. Ensure that materials not indicated are of high-grade standard commercial quality, free from defects and imperfections that might affect the serviceability of the product for the purpose for which it is intended.
4. Unless otherwise indicated, provide valve and actuator bodies conforming to the following requirements:
 - a. Cast Iron: Close-grained gray cast iron, conforming to ASTM A48, Class 30, or to ASTM A126 .
 - b. Ductile Iron: ASTM A536 or to ASTM A395.
 - c. Steel: ASTM A216, or to ASTM A515 .
 - d. Bronze: ASTM B62, and valve stems not subject to dezincification shall conform to ASTM B584 .
 - e. Stainless Steel: Stainless steel valve and operator bodies and trim shall conform to ASTM A351, Grade CF8M, or shall be Type 316 stainless steel.
 - f. PVC: Polyvinyl chloride materials for valve body, flanges, and cover shall conform to Cell Classification 12454.
 - g. CPVC: Chlorinated Poly Vinyl Chloride materials for valve body, flanges, and cover shall conform to Cell Classification 23447.
 - h. NSF Standard 14: Materials shall be listed for use in contact with potable water.

2.03 VALVE CONSTRUCTION

A. Bodies:

1. Provide valve bodies that are cast, molded (in the case of plastic valves), forged, or welded, of the materials indicated, and with smooth interior passages.

2. Provide wall thicknesses uniform and in agreement with the applicable standards for each type of valve, without casting defects, pinholes, and other defects that could weaken the body.
3. Perform welds on welded bodies by certified welders and ground welds smooth.
4. Provide valve ends as indicated, and rated for the maximum temperature and pressure to which the valve will be subjected.

B. Valve End Connections:

1. Unless otherwise indicated, valves 2-1/2 inches in diameter and smaller may be provided with threaded end connections.
2. Provide valves 3 inches in diameter and larger with flanged end connections.

C. Bonnets:

1. Connect valve bonnets to the body by clamping, screwing, or flanging.
2. Provide bonnets of the same material, temperature, and pressure rating as the body.
3. Make provisions for the stem seal with the necessary glands, packing nuts, and yokes.

D. Stems:

1. Provide valve stems of the materials indicated, or, if not indicated, of the best commercial material for the specific service, with adjustable stem packing, O-rings, chevron V-type packing, or other suitable seal.
2. Provide bronze valve stems conforming to ASTM B584 may be used, except that the zinc content shall not exceed 16 percent.

E. Stem Guides:

1. Provide stem guides spaced 10 feet on centers, unless the manufacturer can demonstrate by calculation that a different spacing is acceptable.
2. Construct submerged stem guides from Type 304 stainless steel.

F. Internal Parts:

1. Provide internal parts and valve trim as indicated for each individual valve.
2. Where not indicated, construct valve trim from Type 316 stainless steel or other best-suited material.

G. Nuts and Bolts:

Provide nuts and bolts on valve flanges and supports in accordance with the requirements of Section 05500.

2.04 VALVE ACCESSORIES

Provide valves complete with the accessories required to provide a functional system.

2.05 SPARE PARTS

- A. Furnish the required spare parts, suitably packaged and labeled with the valve name, location, and identification number.
- B. Furnish the name, address, and telephone number of the nearest distributor for the spare parts of each valve.

- C. Spare parts are intended for use by the OWNER, after expiration of the correction of defects period.

2.06 MANUFACTURERS

Valve manufacturers shall have a successful record of not less than five years in the manufacture of the indicated valves.

PART 3 - EXECUTION

3.01 VALVE INSTALLATION

A. General:

1. Install valves, actuating units, stem extensions, valve boxes, and accessories in accordance with the manufacturer's written instructions and as indicated.
2. Adequately brace gates in order to prevent warpage and bending under the intended use.
3. Firmly support valves in order to avoid undue stresses on the pipe.

B. Access:

Install valves in a manner to provide easy access for actuation, removal, and maintenance, and to avoid interference between valve actuators and structural members, handrails, and other equipment.

C. Valve Accessories:

1. Where combinations of valves, sensors, switches, and controls are indicated, properly assemble and install such items such that systems are compatible and operating properly.
2. Clearly note the relationship between interrelated items on Shop Drawing submittals.

END OF SECTION 15200

**SECTION 15201
VALVE AND GATE ACTUATORS**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Provide valve and gate actuators and appurtenances, complete and operable.
- B. The provisions of this section apply to valves and gates except where otherwise indicated in the Contract Documents.

1.02 RELATED SECTIONS

Section 05500 Miscellaneous Metalwork
Section 09800 Protective Coating
Section 15200 Valves, General

1.03 REFERENCES

AWWA C500 - Metal-Seated Gate Valves for Water Supply Service
AWWA C504 - Rubber-Seated Butterfly Valves
AWWA C542 - Electric Motor Actuators for Valves and Slide Gates

1.04 CONTRACTOR SUBMITTALS

- A. Submit Shop Drawing information for actuators with the valve and gate submittals as a complete package.
- B. Submit calculations showing dynamic seating and unseating torques versus the output torque of the actuator.

1.05 QUALITY ASSURANCE

- A. Unit Responsibility:
Make the valve or gate manufacturer responsible for the coordination of design, assembly, testing, and installation of actuators on the valves and gates; however, the Contractor shall be responsible to the Owner for compliance of the valves, gates, and actuators with the Contract Documents.
- B. Where 2 or more valve or gate actuators of the same type or size are required, the actuators shall be produced by the same manufacturer.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Unless otherwise indicated, provide shut-off and throttling valves and externally actuated valves and gates with manual or power actuators.
- B. Provide actuators complete and operable with mounting hardware, motors, gears, controls, wiring, solenoids, hand wheels, levers, chains, and extensions, as applicable.

- C. Provide actuators with torque ratings equal to or greater than required for valve seating and dynamic torques, whichever is greater, and capable of holding the valve in any intermediate position between fully-open and fully-closed without creeping or fluttering.
- D. Actuator torque ratings for butterfly valves shall be determined in accordance with AWWA C504.
- E. Identify wires of motor-driven actuators by unique numbers.
- F. Manufacturers:
 - 1. Where indicated, certain valves and gates may be provided with actuators manufactured by the valve or gate manufacturer.
 - 2. Where actuators are furnished by different manufacturers, coordinate the selection to result in the fewest number of manufacturers possible.
- G. Materials:
 - 1. Provide actuators of current models, of the best commercial quality materials, and liberally sized for the required torque.
 - 2. Provide materials suitable for the environment in which the valve or gate is to be installed.
- H. Actuator Mounting and Position Indicators:
 - 1. Securely mount actuators by means of brackets or hardware specially designed and sized for this purpose and of ample strength.
 - 2. Cast the word "OPEN" on each valve or actuator, with an arrow indicating the direction to open in the counter-clockwise direction.
 - 3. Equip gear and power actuators with position indicators.
 - 4. Unless otherwise indicated, where possible, locate manual actuators between 48 and 60 inches above the floor or the permanent working platform.
- I. Standards:

Unless otherwise indicated and where applicable, provide actuators in accordance with AWWA C542.
- J. Functionality:

Coordinate electric actuators with the power requirements of Division 16 Electrical, Provide fasteners in accordance with the requirements of Section 05500.
- K. Provide coatings in accordance with the requirements of Section 09800.

2.02 MANUAL ACTUATORS

- A. General:
 - 1. Unless otherwise indicated, provide valves and gates with manual actuators.
 - 2. Provide valves in sizes up to and including 4 inches with direct-acting lever or hand wheel actuators of the manufacturer's best standard design.
 - 3. Provide valves and gates larger than 4-inch with gear-assisted manual actuators, with an operating pull of maximum 60 pounds on the rim of the hand wheel.
 - 4. Provide buried and submerged gear-assisted valves, gates, and where indicated, with worm gear actuators, hermetically-sealed water-tight and grease-packed.

5. Valves 6-inch to 24-inch diameter may be provided with traveling-nut actuators, worm gear actuators, spur or bevel gear actuators, as appropriate for each valve.

B. Buried Valves:

1. Unless otherwise indicated, provide buried valves with extension stems to grade, with square nuts or floor stands, position indicators, and cast-iron or steel pipe extensions with valve boxes, covers, and operating keys.
2. Where indicated, provide buried valves in cast-iron, concrete, or similar valve boxes with covers of ample size in order to allow operation of the valve actuators.
3. Permanently label the valve box covers as required by the local Utility Company or the Owner.
4. Provide wrench-nuts in compliance with AWWA C500.

C. Chain Actuator:

1. Provide manually-activated valves with the stem located more than 7 feet above the floor or operating level with chain drives consisting of sprocket-rim chain wheels, chain guides, and operating chains supplied by the valve manufacturer.
2. Construct the wheel and guide from ductile iron, cast iron, or steel.
3. Chains:
 - a. Fabricate the chain from hot-dip galvanized steel or stainless steel, and extend to 5 feet, 6 inches above the operating floor level.
 - b. Provide an extra strong valve stem on chain-actuated valves in order to allow for the extra weight and chain pull.
 - c. Provide hooks for chain storage where chains interfere with pedestrian traffic.

D. Floor Boxes:

1. Provide hot-dipped galvanized cast iron or steel floor boxes and covers to fit the slab thickness, for operating nuts in or below concrete slabs.
2. For operating nuts in the concrete slab, provide a bronze-bushed cover.

E. Tee Wrenches:

1. Furnish buried valves with floor boxes with two operating keys.
2. Size the tee wrenches such that the tee handle will be 2 to 4 feet above ground, and to fit the operating nuts.

F. Manual Worm Gear Actuator:

1. Provide an actuator consisting of a single- or double-reduction gear unit contained in a weatherproof cast iron or steel body with cover, and a minimum 12-inch diameter handwheel.
2. Provide the actuator to be capable of a 90-degree rotation, and equip the actuator with travel stops capable of limiting the valve opening and closing.
3. Provide the actuator with spur or helical gears and worm gearing.
4. Provide a self-locking gear ratio in order to prevent "back-driving."
5. Construct the spur or helical gears of hardened alloy steel, and the worm gear of alloy bronze.

6. Construct the worm gear shaft and the hand wheel shaft from 17-4 PH or similar stainless steel.
 7. Accurately cut gearing with hobbing machines.
 8. Use ball or roller bearings throughout.
 9. Provide the output shaft end with a spline in order to allow adjustable alignment.
 10. Actuator output gear changes shall be mechanically possible by simply changing the exposed or helical gearset ratio without further disassembly of the actuator.
 11. Design gearing for a 100 percent overload.
 12. The entire gear assembly shall be sealed weatherproof.
- G. Design and rate buried gear actuators for buried service, provide with a stainless steel input shaft, and double-seal on shaft and top cap.
- H. Traveling-Nut Actuator:
1. Provide the actuator with a traveling-nut and screw (Scotch yoke), contained in a weatherproof cast iron or steel housing with a spur gear and a minimum 12-inch diameter hand wheel.
 2. The screw shall run in 2 end bearings, and provide a self-locking actuator in order to maintain the valve position under any flow condition.
 3. Construct the screw and gear from hardened alloy steel or stainless steel, and the construct the nut and bushings from alloy bronze.
 4. The bearings and gear shall be grease-lubricated by means of nipples.

PART 3 - EXECUTION

3.01 SERVICES OF MANUFACTURER

Field Adjustments:

The adjustment of actuator controls and limit switches in the field for the required function shall be performed by field representatives of the manufacturers of valves or gates with electric actuators.

3.02 INSTALLATION

- A. Install valve and gate actuators and accessories in accordance with the requirements of Section 15200.
- B. Locate the actuators to be readily accessible for operation and maintenance without obstructing walkways.
- C. Do not mount actuators where shock or vibrations will impair their operation, and do not attach the support systems to handrails, process piping, or mechanical equipment.
- D. Instruction of Owner's Personnel: The authorized service representative shall visit the site for not less than one day in order to instruct the Owner's personnel in the operation and maintenance of the equipment, including step-by-step troubleshooting procedures with necessary test equipment.

END OF SECTION 15201

15201-4

**SECTION 15202
BUTTERFLY VALVES**

PART 1 - GENERAL

1.01 SECTION INCLUDES

Provide butterfly valves and appurtenances, complete and operable.

1.02 RELATED SECTIONS

Section 09800 Protective Coating
Section 15000 General Mechanical Requirements
Section 15200 Valves, General
Section 15201 Valve Actuators

1.03 REFERENCES

AWWA C504 – Rubber-Seated Butterfly Valves

1.04 SUBMITTALS

A. Shop Drawings:

1. Complete Shop Drawings of butterfly valves and actuators.
2. Drawings showing valve port diameter complete with dimensions, part numbers, and materials of construction.
3. Dynamic seating and unseating torque for motor actuated valves.
4. Certified statement of proof-of-design tests from the valve manufacturer. Valve manufacturer shall state that the valves proposed for this project will be manufactured with identical basic type of seat design and materials of construction to the prototype evaluated under the proof of design testing.
5. Manufacturer's certification that the valve complies with applicable provisions of AWWA C504.

1.05 QUALITY ASSURANCE

Valves shall be subjected to performance, leakage, and hydrostatic tests in accordance with procedures and acceptance criteria established by AWWA C504.

PART 2 - PRODUCTS

2.01 RUBBER SEATED BUTTERFLY VALVES 25 TO 150 PSI (AWWA)

- A. General: Butterfly valves for steady-state water working pressures and steady-state differential pressure up to 150 psi and for freshwater service having a pH range from 6 to 10 and temperature range from 33 to 125 degrees F shall conform to AWWA C504 and be as indicated. Valves subjected to steady state working pressures and steady state differential pressures from 25 to 150 psi in sizes 3-inches through 24-inches shall be rated for Class 150B with actuator sized for Class 150B. If the operating conditions such as flow, velocity, and differential pressures are not indicated, the valve body and shaft shall be sized for the pressure class rating of the valve.

DIVISION 15 – MECHANICAL

- B. Valves shall be of the body type, pressure class, end joint, and actuator indicated.
- C. Construction: Unless otherwise indicated, materials of construction shall be in accordance with AWWA C504, suitable for the service. Seats shall be positively clamped or bonded into the disc or body of the valve, but cartridge-type seats that rely on a high coefficient of friction for retention shall not be acceptable. Seat material shall be guaranteed to last for at least 75 percent of the number of cycles in the AWWA C504 proof-of-design test without premature damage.

Description	Material Standards
Valve bodies	Gray iron, ASTM A 48, Class 40 or Gray iron, ASTM A 126, Class B, or Ductile iron, ASTM A 536, grade 65-45-12 or 70-50-05
End flanges	Same material as valve bodies
Valve shafts	Stainless steel ASTM A 240 or A 276, Type 316
Valve discs	Same material as valve bodies.
Rubber seats	New natural or synthetic rubber
Seat mating surfaces	Stainless steel, ASTM A240 or A276, Type 316
Clamps and retaining rings	Type 316 retaining rings and cap screws.
Valve bearings	Self-lubricating materials per AWWA C504
Shaft seals	Resilient non-metallic materials suitable for service
Painting and coating	Refer to Section 09800

- D. Manual Actuators: Unless otherwise indicated, manually-actuated butterfly valves shall be equipped with a valve mounted handwheel actuator and position indicator.
- E. Worm Gear Actuators: Submerged or buried valves, shall be equipped with worm-gear actuators, lubricated and sealed to prevent entry of dirt or water into the housing. Buried valves shall be furnished with 2-inch square actuating nut.
- F. Manufacturers, or Equal:
 1. DeZURIK Water Controls, Corporation
 2. Kennedy Valve
 3. M & H Valve Company
 4. Mueller Company
 5. Henry Pratt Company
 6. Rodney Hunt Company (24-inches and larger)

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Exposed butterfly valves shall be installed with a means of removing the complete valve assembly without dismantling the valve or operator. Installation shall be in accordance with Section 15200.
- B. Valves shall be installed with the shafts mounted horizontal and the disc positioned to open in the downstream direction from the seat at the invert of the pipe, unless noted otherwise.

END OF SECTION 15202

**SECTION 15203
CHECK VALVES**

PART 1 - GENERAL

1.01 SECTION INCLUDES

Provide check valves and appurtenances, complete and operable.

1.02 RELATED SECTIONS

Section 15200 Valves, General

1.03 REFERENCES

ASTM A313 – Standard Specification for Stainless Spring Wire

1.04 SUBMITTALS

Furnish submittals in accordance with Section 15200.

PART 2 - PRODUCTS

2.01 SPRING WAFER CHECK VALVES (3-INCHES AND LARGER)

- A. General: Spring wafer check valves for water and general service shall be of double disc, wafer style with torsion spring induced closure. Valve shall be designed for a water-working pressure of 150 psi. Valve for horizontal flow shall be installed with the shafts in vertical position.
- B. Body: Valves have a cast iron or ductile Iron body to fit inside 125# ANSI bolt circles.
- C. Disc, Shafts, and Spring: The valve shall have a two piece Stainless Steel disc type 304 disc, type 304 Stainless Steel dual shafts, ASTM A313, type 304/316 Stainless Steel torsion spring and have an integrally molded elastomer seat vulcanized to the body.
- D. Seat: EPDM material.
- E. Manufacturers, or Equal:
 - 1. Henry Pratt.
 - 2. APCO (Valve and Primer Corp.).
 - 3. Kennedy Valve.

2.02 LOW HEADLOSS RUBBER CHECK VALVES

- A. General: Low head loss rubber check valves shall be duckbill style and fully passive. Valves shall be of standard neoprene construction. The valve shall have a low cracking pressure of no more than 1 inch of water head and shall have an internal clamp for connecting to pipe.
- B. Manufacturers, or Equal
 - 1. Proco Style 790 ProFlex Low Headloss

PART 3 - EXECUTION

3.01 GENERAL

Valves shall be installed in accordance with provisions of Section 15200.

END OF SECTION 15203

**SECTION 15204
BALL VALVES**

PART 1 - GENERAL

1.01 SECTION INCLUDES

Provide ball valves and appurtenances, complete and operable.

1.02 RELATED SECTIONS

Section 15200 Valves, General
Section 15201 Valve and Gate Actuators

1.03 REFERENCES

ASME B16.5 – Pipe Flanges and Flanged Fittings Dimensions

1.04 SUBMITTALS

Furnish submittals in accordance with Section 15200.

PART 2 - PRODUCTS

2.01 METAL BALL VALVES (4-INCHES AND SMALLER)

- A. General: Unless otherwise indicated, general purpose metal ball valves in sizes up to 4-inches shall have actuators in accordance with Section 15201.
- B. Body: Ball valves up to and including 1-1/2 inches in size shall have bronze or carbon steel 2 or 3 piece bodies with screwed ends for a pressure rating of not less than 600 psi WOG. Valves 2-inches to 4-inches in size shall have bronze or carbon steel 2 or 3 piece bodies with flanged ends for a pressure rating of ANSI 125 psi or 150 psi unless otherwise indicated.
- C. Balls: The balls shall be solid chrome-plated brass or bronze, or stainless steel, with standard port (single reduction) or full port openings.
- D. Stems: The valve stems shall be of the blow-out proof design, of bronze, stainless steel, or other acceptable construction, with reinforced Teflon seal.
- E. Seats: The valve seats shall be of Teflon or Buna-N, for bi-directional service and easy replacement.
- F. Manufacturers, or Equal:
 - 1. Conbraco Industries, Inc. (Apollo).
 - 2. ITT Engineered Valves.
 - 3. Neles-Jamesbury, Inc.

PART 3 - EXECUTION

3.01 GENERAL

Valves shall be installed in accordance with Section 15200. Care shall be taken that valves in plastic lines are well supported at each end of the valve.

END OF SECTION 15204

**SECTION 15206
GATE VALVES**

PART 1 - GENERAL

1.01 SECTION INCLUDES

Provide knife gate valves for the fish release pipe and appurtenances, complete and operable.

1.02 RELATED SECTIONS

Section 09800 Protective Coating
Section 15200 Valves, General
Section 15201 Valve and Gate Actuators

1.03 REFERENCES

AWWA C509 - Resilient-Seated Gate Valves For Water Supply Service

1.04 SUBMITTALS

Furnish submittals in accordance with Section 15200.

PART 2 - PRODUCTS

2.01 RESILIENT-SEATED GATE VALVES

- A. Construction: Resilient-seated gate valves shall be suitable for a minimum design working water pressure of 150 psig, with flanged ends. The valve body, bonnet, and disc shall be of cast iron or ductile iron and the disc or body shall be rubber-coated. Body and bonnet wall thickness shall be equal to or greater than the minimum wall thickness as listed in Table 1 of AWWA C509. The stem, stem nuts, glands, and bushings shall be bronze or stainless steel.
- B. Pressure Ratings: Valves shall be rated for 150 psig design working water pressure.
- C. Protective Coating: Valves shall be factory coated in accordance with Section 09800. The Contractor shall submit a test report from a coating inspector that the coating is holiday-free.
- D. Extension Stem: Valves shall be provided with non-rising extension stem or torque tube per the requirements of Section 15201.
- E. Actuators: Provide manual square nut actuators for all valves and a compatible tee handle.
- F. Manufacturers, or Equal:
 - 1. FNW.
 - 2. Mueller Company.
 - 3. M & H.

PART 3 - EXECUTION

3.01 GENERAL

Gate valves shall be installed in accordance with the provisions of Section 15200. Care shall be taken that valves in plastic lines are well supported at each end of the valve.

END OF SECTION 15206

**SECTION 15230
MISCELLANEOUS VALVES**

PART 1 - GENERAL

1.01 SECTION INCLUDES

Provide miscellaneous valves and appurtenances, complete and operable.

1.02 RELATED SECTIONS

Section 15200 Valves, General

1.03 REFERENCES

Section 15200 Valves, General

1.04 CONTRACTOR SUBMITTALS

Furnish submittals in accordance with Section 15200.

PART 2 - PRODUCTS

2.01 AIR AND VACUUM VALVES FOR VERTICAL TURBINE PUMPS

- A. An air and vacuum valve for the vertical turbine pump shall be installed on the pump discharge pipe indicated. The valve shall vent large quantities of air out through the orifice when pump starts, close tight when liquid enters, and permit large quantities of air to re-enter through orifice when pump stops, to prevent vacuum forming in the pump column. They shall be of the size indicated, with flanged or screwed ends to match piping. Bodies shall be of high-strength cast iron.
- B. The float, seat, and moving parts shall be constructed of Type 316 stainless steel. Seat washers and gaskets shall be of a material insuring water tightness with a minimum of maintenance.
- C. The discharge orifice shall be fitted with a double-acting throttling device to regulate and restrict air venting, which shall establish a pressure loading on the rising column of water and eliminate damaging shock to the pump, controls, and valves during pump start.
- D. On pump stop, a double-acting throttling device shall automatically open, allowing full line unrestricted air re-entry to prevent any vacuum from forming in the pump column. The valve shall be designed for minimum 250 psi water-working pressure.
- E. Manufacturer or Equal:
 - 1. APCO (Valve and Primer Corporation)
 - 2. Val-Matic (Valve and Manufacturing Corporation)

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Valves shall be installed in accordance with the manufacturer's printed recommendations, and with Section 15200.
- B. Air and vacuum release valves shall have piped outlets to the nearest acceptable drain, firmly-supported, and installed in such a way as to avoid splashing and wetting of floors and obstruction of traffic.

END OF SECTION 15230

**SECTION 15240
FLOW METERS**

PART 1 - GENERAL

1.01 SECTION INCLUDES

Install Owner provided field-mounted ultrasonic flow meters and appurtenant work, complete and operable, in accordance with the Contract Documents. The meters will consist of 2 acoustic sensors, a local flow indicator, an electronic transmitter, associated mounting hardware, cables, junction box, and accessories. The meter will be bi-directional in measurement, utilizing an ultrasonic velocity measurement to characterize flow volume in the pipe.

1.02 RELATED SECTIONS

Section 15000 General Mechanical Requirements

1.03 REFERENCES

NEMA – National Electrical Manufacturers Association

1.04 SUBMITTALS

- A. Flow meter technical information demonstrating conformance of the proposed product to these specifications;
- B. Installation instructions;
- C. Technical Manual.

1.05 QUALITY ASSURANCE

A. MANUFACTURER'S REPRESENTATIVE

- 1. The Contractor shall obtain the services of a factory-trained specialist to electrically install, check, and calibrate all field-mounted ultrasonic flow meters.
- 2. The Contractor shall obtain the services of Field Instruments and Controls (FIC) to perform start-up services and commissioning of the three Flexim meters.

PART 2 - PRODUCTS

2.01 ULTRASONIC LIQUID FLOW MEASURING SYSTEMS - FIELD MOUNTED (TRANSIT TIME)

- A. Description: Meters shall be directional and utilize ultrasonic velocity measurement principles. The electronic unit shall utilize information from the velocity sensing probes to accurately measure flow in the pipe. The meters shall be suitable for measuring process fluid as indicated in the data sheet. The meter shall not be affected by changes in temperature, density, or viscosity. The transducer shall beam acoustic pulses diagonally upstream and downstream across and through the centerline of the pipe. The difference in transit time of the 2 pulses shall be measured and be converted to electrical signals linear to

flow rate. The electronic unit shall utilize information from the velocity sensing probes to accurately measure fluid velocity in the pipe.

B. Power: 115 VAC, 50-60 Hz

C. Measurement Capabilities:

1. Range: 0.5 to 10 ft/sec
2. Accuracy: +/- 0.5% of flow reading
3. Repeatability: 0.5%

D. Operating Specs – Transducers and Cable:

1. Permanently submersible;
2. Liquid Temperatures: Standard sensors -10° to 120° F;
3. Liquid Pressure: 250 psig @ 27°C;
4. Sensors: Rated for permanent submergence;
5. Cable Length (Max): 500 feet;
6. Humidity: 0-100%, non-condensing.

E. Materials / Components: Field-mounted ultrasonic flow meters shall consist of transducers mounted as per manufacturer's instructions. The equipment manufacturer shall select the signal and frequency for proper ultrasonic transmission. Wiring within the electronic unit shall be factory pre-wired. A local flow indicator, scaled in the indicated flow range, shall be provided in an accessible location for easy reading.

1. Transducers: transducers shall be permanently mounted in accordance with manufacturer's instructions. As a minimum, mounting hardware material shall be 316 stainless steel. The probes shall be fabricated of non-corrosive material and shall be equipped with an armored triaxial cable rated for permanent submergence for electric transmission.
2. Junction Box: Provide an above grade NEMA 3R minimum junction box near the transmitter for the coiled up excess transducer cables.
3. Transmitter (readout meter):
 - a. Transmitter shall provide backlit LED display, and provide instantaneous flow and totalized flow for daily, monthly and yearly terms. Data shall be stored for up to a year, and transferrable to standard desktop computer. Software shall be provided by the manufacturer for reading and manipulation of data. The transmitter unit shall produce a 4 to 20 mA DC signal proportional to the flow rate.
 - b. The transmitter electronics shall be mounted in a NEMA 4X enclosure, with a RS232 / RS485 port standard.

- F. Computer Mode: All functions for setup and measurement available through a RS232 interface on the transmitter.

PART 3 - EXECUTION

3.01 MOUNTING TRANSDUCER

The electroacoustic transducers shall be mounted with strap or saddle type mounting brackets supplied by the manufacturer. Transducers shall be carefully installed in accordance with the manufacturer's instructions and shall be installed suitably for a permanently submerged condition.

3.02 CABLING

Except for the transducers and their cables, all electrical connections and junction boxes inside the meter vault shall be mounted within 2 feet of the top of the vault to reduce the susceptibility to groundwater damage in the future. Cabling shall be sufficiently slack to allow personnel to work in the vault without interference. Meter vault shall have a locking hatch.

3.03 FLOW METER CONTROL

The flow meter control shall be mounted inside a PVC NEMA-4X enclosure with clear window to allow observation of the display. The enclosure shall be lockable by padlock.

3.04 COMMISSIONING

The flow meter shall be calibrated and programmed by the manufacturer's representative and certified as meeting all the operating characteristics of the manufacturer.

END OF SECTION 15240