



**WILSON**  
ENGINEERING

# **Eastsound Sewer and Water District**

**Eastsound, Washington**

Contract Documents

for the Construction of

## **EASTSOUND WASTEWATER TREATMENT PLANT UPGRADE – PHASE II**

**PART 1 – BIDDING REQUIREMENT  
PART 2 – CONTRACTING REQUIREMENTS  
PART 3 – TECHNICAL SPECIFICATIONS  
PART 4 – REFERENCE DOCUMENTS  
PART 5 – DRAWINGS**

Wilson Project # 2023-123

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Department of Ecology  
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## ENGINEER'S STATEMENT

THE CONTRACT DOCUMENTS HAVE BEEN PREPARED UNDER THE DIRECTION OF THE PROFESSIONAL ENGINEER,  
REGISTERED IN THE STATE OF WASHINGTON, WHOSE SEAL AND SIGNATURE APPEARS BELOW.



JEFF CHRISTNER, PE  
PROJECT PRINCIPAL  
WILSON ENGINEERING, LLC

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**\*\*\*END OF SECTION\*\*\***

# **PART 1 - BIDDING REQUIREMENTS**

## SECTION 00 11 16 – INVITATION TO BID

### ADVERTISEMENT FOR BIDS

**Project Name:** Eastsound Sewer and Water District  
Wastewater Treatment Plant Upgrade – Phase II  
**Bid Date:** March 5, 2025 – 2:00 PM  
**Pre-Bid Meeting:** February 12, 2025 – 9:30 AM  
**Engineer:** Wilson Engineering, LLC

NOTICE TO BIDDERS: Sealed bids will be received from contractors by the Eastsound Sewer and Water District, 143 Cessna Rd, Eastsound, WA 98245 until 2:00 PM, Wednesday, March 5, 2025 for the ESWD WWTP UPGRADE - PHASE II. The District will accept either hand delivered or electronic .PDF copies of bid proposals. PDF bid proposals will be received by the District via email to JasonB@eswd.org. Please note: email attachments must not exceed 10 MB. The opening and reading of the bids will then be live-streamed via Google Meet for the ESWD WWTP UPGRADE – PHASE II project. The Project involves the proposed wastewater treatment plant upgrades per contract documents. Said bids will then and there be opened and read aloud. Bidders and other properly interested parties are invited to be present at the bid opening. Bids received after the time fixed for opening cannot be considered. Live stream information can be found on the project website at <https://wilsonengineering.com/bidding-documents.aspx/>.

Hard copies matching the electronically delivered bid proposals must be either hand delivered or received via mail. Mailing address: Eastsound Sewer and Water District, ESWD WWTP UPGRADE – PHASE II Project Bid, P.O. Box 640, Eastsound, WA 98245. Physical Address: Eastsound Sewer and Water District, 143 Cessna Rd, Eastsound, WA 98245, District Phone: (360) 376-2720. Hard copies must be received no later than March 10, 2025 at 5:00 pm.

Please contact Jeff Christner or Matt Strittmatter, Wilson Engineering, (360) 733-6100, for project information. Only bids from bidders who have obtained the Contract Documents and have requested to be listed on the Planholders' List, will be accepted. Copies of plans and specifications are on file for review at the Eastsound Sewer and Water District, 143 Cessna Rd, Eastsound, WA 98245. Hard copies are available for purchase (\$200 non-refundable fee), or may be downloaded from the project website at <https://wilsonengineering.com/bidding-documents/>

A deposit in the form of a postal money order, cashier's check, or bond in the amount of 5% of the greatest amount bid must be submitted with each bid proposal. Should the successful bidder fail to enter into a contract or furnish a satisfactory contract bond within the time stated in the specifications, the deposit shall be forfeited to the District.

There will be non-mandatory, pre-bid meeting for the Project held at 9:30 AM, Wednesday, February 12, 2025, at the WWTP, 143 Cessna Rd, Eastsound, WA 98245. A site visit of the Eastsound WWTP will follow the meeting.

The District shall reject any bid not accompanied by bid security. The District reserves the right to reject any or all bids if such action is in the best interest of the District. The Eastsound Sewer and Water District is an equal opportunity and affirmative action employer. Small, Minority and Women-owned businesses are encouraged to submit bids.

It is anticipated that this project will be funded in part by the Washington State Department of Ecology. Neither the State of Washington nor any of its departments or employees are, or shall be, a party to this contract or any subcontract resulting from this solicitation for bids. All bidders must be licensed contractors registered in the State of Washington.

The Successful bidder will be required to conform to the wage requirements prescribed by the federal Davis-Bacon and Related Acts which requires that all laborers and mechanics employed by contractors and subcontractors performing on contracts funded in whole or in part by SRF appropriations in excess of \$2000 pay their laborers and mechanics not less than the prevailing wage rates and fringe benefits, and determined by the Secretary of Labor, for corresponding classes of laborers and mechanics employed on similar projects in the area.

All work performed on this project will be subject to the higher of the prevailing state or federal wage rates.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 00 21 13 – INSTRUCTIONS TO BIDDERS**

### **INSTRUCTIONS TO BIDDERS**

It is anticipated that this project will be funded in part by the Washington State Department of Ecology. Neither the State of Washington nor any of its departments or employees are, or shall be, a party to this contract or any subcontract.

#### **1. Bidder Qualifications**

- A. Prospective Bidders shall be registered by the Washington State Department of Labor and Industries in accordance with state law.
- B. Corporations shall be registered with the State of Washington, Office of the Secretary of State.
- C. Bidders shall be regularly employed in the type of work contemplated herein.

#### **2. Bidder's Representations**

Submittal of a bid shall be deemed conclusive evidence that the bidder has:

- A. Carefully examined the proposed work site, become familiar with conditions impacting the work, and incorporated such observations into the bid.
- B. Read and understands the bidding and contract documents.
- C. produced a bid that is without exception based on the materials, equipment and systems required by the bidding documents.
- D. produced a bid that is made based on a complete set of Bidding Documents. The Owner is not responsible for any bidding errors resulting from the use of incomplete documents.

#### **3. Document Interpretation**

- A. The bidder shall carefully study and review the Bid Documents and promptly report any errors or omissions to the Engineer.
- B. Bidders or sub-bidders shall make any requests for clarification to the Engineer. If so directed, the Engineer may require the Bidder to submit requests in writing.
- C. Interpretations, corrections and changes to the Bidding Documents shall be made by Addendum. Interpretations, corrections and changes to the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely on them.
- D. Substitutions shall not be considered prior to the receipt of bids. The Owner is not responsible for any bidding errors resulting from the use of substitutions.

#### **4. Addenda**

- A. Addenda will be mailed, emailed, delivered or faxed to all who are known by the Engineer to have received a complete set of Bidding Documents. Copies will also be provided to the locations where plans are available for review.
- B. The Bidder shall acknowledge receipt of addenda in their bid.

**5. Bidding Procedures**

- A. To be considered responsive, bids shall be submitted on the enclosed form and shall be filled in by typewriter or manually in ink.
- B. The Bid form shall include the Bidder's legal name exactly as it appears on his/her registration. Form shall be signed by the individual authorized to represent the Bidder.
- C. A list of subcontractors individually accounting for more than 10-percent of the Contract Sum and the work said subcontractor will perform shall be submitted with the bid or within one hour of the published bid time.

**6. Pre-Bid Meeting**

- A. There will be a pre-bid meeting at date and time shown on the Invitation to Bid.
- B. Prior to attending the pre-bid meeting, bidders shall have carefully studied and compared all drawings, specifications and other instructions to identify any inconsistency or omission. Also any discrepancies between the contract documents and the physical condition of the locality shall be identified. The intent is to identify any questions or concerns regarding the proposed improvements that the bidders may have.

**7. Bid Security**

- A. Each Bid shall be accompanied by a Bid Security in the form of a cashier's check, certified check or surety bond equal to 5-percent of the total Bid amount. Security shall pledge that the Bidder shall enter into a contract with the Owner in accordance with the terms of the Bid Documents including furnishing payment and performance bonds.
- B. In the event a Bidder refuses to enter into such contract or fail to furnish such bonds as required, the bid security shall be forfeited to the Owner as liquidated damages.
- C. The Owner may retain bid securities submitted with the bid until such time as; (1) the contract has been executed and bonds received, (2) 30-days have elapsed, (3) all Bids have been rejected.

**8. Submission of Bids**

- A. Bids shall be submitted in a sealed envelope. Envelopes shall clearly show (1) the project's name and owner as it appears on the Bid Solicitation, (2) the Contractor's name and registration number, and (3) the time and date of the bid opening.
- B. Bids received after the published bid time and date will be returned unopened.
- C. Bids submitted by mail shall conform with the above requirements and be sent to Eastsound Sewer and Water District – ESWD WWTP 143 Cessna Rd, EASTSOUND, WA 98245, All bids shall be received in sealed envelopes with “ESWD WWTP UPGRADE - PHASE II” marked plainly thereon. Bidder shall assume full responsibility for timely delivery of bid documents and the Owner is not responsible for bids received late.
- D. Oral, facsimile or telegraphic bids, modifications, or adjustments are not valid and will not receive consideration.

**9. Modification or Withdrawal of Bid**

- A. After the bid opening, bids shall not be withdrawn, modified or canceled by the Bidder during the stipulated time period.
- B. Bids submitted by mail prior to the bid opening may be modified or withdrawn by notice to the Owner. Such notice shall be in writing and signed by the same authorized individual signing the bid form. If such modifications or withdrawals are transmitted electronically, the original document shall be mailed and postmarked on or before the date and time of the bid opening.
- C. Withdrawn bids may be resubmitted up until the date and time of the bid opening and in accordance with these Instructions to Bidders.
- D. Bid security shall be in an amount sufficient for the bid as modified or resubmitted.

**10. Opening of Bids**

- A. Bids received on time will be opened and read aloud at the time and place stipulated in the Bid Solicitation. An abstract or tabulation will be made available to Bidders.
- B. Should a Bidder discover an error in his/her bid after submittal, the Bidder may request withdrawal of the bid with the following conditions:
- C. The Bidder must document the error(s) for the Owner. The Owner will review documentation and determine if the bid withdrawal and release of the Bid Security will be allowed.
- D. The Owner must receive the Bidder's intent to withdraw his/her bid submittal in writing no more than 30-hours after the bid opening (faxed notice is acceptable).
- E. The Owner alone will approve or disapprove the request for withdrawal. If approved, the Bidder will no longer be considered for Contract award and the Bid Security will be returned.
- F. If the Bidder fails to notify the Owner in accordance of an error as set forth above, and the Owner awards the Bidder the Contract, the Bidder shall either execute the Contract for the bid amount or withdraw the bid and forfeit the Bid Security.

**11. Rejection of Bids**

- A. The Owner reserves the right to reject any or all bids, reject a bid not accompanied by a proper bid security or other material required by the Bidding Documents, or reject a bid which is in anyway irregular or incomplete.

**12. Acceptance of Bids**

- A. The Owner intends to award the Contract to the lowest responsible responsive bidder whose bid submittal does not exceed available funds and conforms with the requirements described herein. The Owner shall have the right to waive informalities or irregularities in a bid submittal and to accept the bid that, in the opinion of the Owner, is in the Owner's best interest.
- B. After determination of the successful bidder based on the lowest responsible responsive bidder and other factors set forth in these instructions, the award may be made to said successful bidder on its base Bid and any combination of its additive bid items for which Owner determines funds will be available at the time of award.



- C. In evaluating whether a bidder is responsible, Owner will consider the qualifications of the bidder and many consider the qualifications and experience of subcontractors and suppliers purposed for those portions of the work for which the identity of subcontractors and suppliers must be submitted as provided in the bidding documents.

**13. Contract Bond**

- A. Bidders shall provide a contract bond as attached. Contract bond shall be signed by an approved surety or sureties, be in the full contract amount, and cover the faithful performance of the work described in the Contract Documents. The Contract Bond shall be in full effect until one year after Substantial Completion.

**14. Contract Agreement and Award**

- A. Owner's execution of the contract is contingent on the timely receipt of the Contract Bond and other submittals required by the Contract Documents.
- B. The award of the Contract, if it be awarded, shall be made within 45-days of the bid opening to the Bidder deemed by the Owner to be the lowest responsible responsive bidder.
- C. The 45-day period may be extended by mutual consent of the bidder and the Owner. If, after the 45-day period and no agreement to time extension has been made, the Contractor may withdraw his bid.
- D. The Owner reserves the right to award the bid schedules and bid alternates in any combination.

**15. Execution of Contract**

- A. The Bidder to whom the contract has been awarded shall sign the contract and return it and other submittals within 10 working days of the award.
- B. The Owner shall have the right to reject a contract submitted by a bidder if it is qualified by reservations or conditions stipulated by the bidder or its surety.
- C. No bid is binding on the Owner until executed by the Eastsound Sewer and Water District. No work shall be performed within the project site prior to the Notice to Proceed. Material or equipment orders or work undertaken away from the project site prior to contract execution shall be at the sole risk of the bidder.

**16. Failure to Execute Contract**

- A. If the bidder to whom award has been made fails to sign the contract and furnish satisfactory bonds within 10 calendar days of the award, or declares in writing its intent not to execute the contract, the bid security will be forfeited to the Owner and the second lowest responsible bidder will be notified of its receipt of award.
- B. If the second lowest responsible responsive bidder fails to execute the contract and furnish bonds within 20 calendar days after such notification, forfeiture of its bid security shall also be made and the third lowest responsible responsive bidder will be notified of its receipt of award, and in like manner until either (1) the contract and bond are executed by a responsible responsive bidder, (2) or further bid submittals are rejected, or (3) the number of bids submitted is exhausted.
- C. If the contract is not executed by the Contractor and Owner within the stipulated time, and it is evident that circumstances warrant an extension of time, the Owner may extend the time for executing the contract and/or bond for a period not to exceed 10 additional calendar days.

**17. Return of Bid Security**

- A. When bid submittals have been examined, bid securities and deposits accompanying submittals ineligible from further consideration will be returned.
- B. All other bid securities and deposits will be held until the contract has been properly executed, after which bid securities and deposits except those subject to forfeiture will be returned.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 00 24 13 – SCOPES OF BIDS**

### **BID SCHEDULE –**

#### **EASTSOUND SEWER AND WATER DISTRICT – ESWD WWTP UPGRADE - PHASE II**

### **SCOPES OF BID**

This section outlines the individual bid items listed on the Bid Schedule in Section 00 41 00 - Bid Form. The descriptions are not all-inclusive, but generally indicate where costs should be allocated within the bid proposal. Descriptions represent work that shall be complete, in-place, tested, and in full operation prior to Owner's acceptance.

Each item is to be paid on a lump sum or unit price basis and shall include furnishing all necessary planning, labor, equipment, materials, and supplies required to furnish, install and test the improvements covered under the item. Each item shall include, as applicable, work shown on the plans including all excavations, back-fill, back-fill materials, compaction, pavement removal, disposal of waste material at contractor's site, locating and protecting existing utilities and services, base and top course, paving, trenching, imported backfill, pipe bedding, cleaning, testing, surface restoration and landscaping. The scope of each bid item is outlined below. It is not intended to include all of the appurtenances of an item in the description. See appropriate Specification or WSDOT Standard Specifications and as shown on the Drawings for a more complete representation of the work. It is the responsibility of the Bidders to include all costs for the completed project in the bid items listed.

### **BASE BID ITEM**

#### **1. WWTP Upgrade, Lump Sum (LS)**

- A. Measurement for payment for individual items of the WWTP Upgrade will be based upon the unit values listed in the Schedule of Values submitted by the CONTRACTOR and reviewed and approved by the Engineer.
- B. Payment for the WWTP Upgrade will be made at the Lump Sum Price shown on PROPOSAL for Bid Item 1, which will constitute full compensation for all WORK as described in the Contract Documents.

### **UNIT QUANTITY BID ITEMS**

#### **2. Trench Safety System, Lump Sum (LS)**

This work consists of installing trench safety systems in accordance with WSDOT, OSHA, and other applicable rules and regulations.

#### **3. Bollards, price based on Each (EA)**

Construction of bollards (at site locations chosen by the Owner) shall be considered unit quantity work which the Contractor shall be compensated for as described below.

- A. Measurement for payment for bollards will be based on the actual quantity, each, of finished bollards.
- B. Payment for bollards, if any, will be made at the Unit Price shown on Proposal, said payment will constitute full compensation for all WORK which shall be in accordance with the applicable specifications.

4. Preparation of SWPPP, Lump Sum (LS)

This includes all costs associated with determining, developing, preparing, and submitting a Stormwater Pollution Prevention Plan (SWPPP). SWPPP shall be prepared in accordance with Section 31 32 11 – Soil Surface Erosion Control, TESC Plans (see civil sheets), and the NPDES permit. Measurement and partial payments will be based on approximate percentage of completion of SWPPP. This work also includes transferring the NPDES Construction Stormwater General Permit to Contractor's name, and other requirements identified in Section 31 32 11 – Soil Surface Erosion Control.

5. Maintenance Work for SWPPP, Lump Sum (LS)

This Includes all costs associated with implementing, adjusting, inspections, reporting, responding to precipitation events, and maintaining effective erosion and sediment control measures for the WWTP Upgrade throughout the life of the project in accordance with the Stormwater Pollution Prevention Plan and the NPDES permit, including quarry spall construction entrance, track clean plates siltation ponds, silt fencing, straw, and other sediment trapping devices; slope stabilization measures; low-impact construction practices; and project sequencing. Work also includes monitoring stormwater discharges, reporting, and all cost associated with adaptive management of the one site erosion control, dewatering, and water management measures. Work also includes updating the SWPPP and keeping a current version available on-site at all times for reference. Measurement and partial payments will be based on approximate percentage of completion of the WWTP Upgrade.

6. Electrical, Lump Sum (LS)

This includes all work shown on the E sheets and in specifications Division 26. Detailed breakdowns are provided in Sections 26 05 00 and 26 80 00. Measurement and partial payments will be based on approximate percentage of completion of the time period needed for the Electrical work.

7. SCADA/PLC Programmer Services, Force Account (FA)

A. Measurement for payment for SCADA/PLC Programmer Services by District's Programmer (Taurus Power & Controls, contact: Aric Naue, phone 503-572-9186) will be based on the actual force account total of finished SCADA/PLC Programmer Services (including controls improvements) as directed by District Staff. All SCADA/PLC Programmer Services must be agreed on, prior to scheduling the work. Force account work to be per WSDOT Standard Specifications, Section 1-09.6.

B. Payment for Programmer Services will be made at the total sum of the actual force account, said payment will constitute full compensation for all WORK which shall be in accordance with the applicable specifications, including 2024 WSDOT requirements.

**EXTRA WORK ITEMS**

8. HMA Pavement, price based on Tons (TN)

A. Measurement for payment for extra Hot Mixed Asphalt Pavement (HMA Class ½" PG 58H-22 per Section 32 12 16) will be based on the actual quantity, tons, of finished extra HMA Pavement.

B. Payment for extra HMA Pavement, if any, will be made at the Unit Price shown on Proposal, said payment will constitute full compensation for all WORK which shall be in accordance with the applicable specifications.

9. Structural Concrete, price based on Cubic Yards (CY)

- C. Measurement for payment for extra structural concrete (poured in place structural concrete with reinforcing similar to the Train basin walls as directed by the Engineer) will be based on the actual quantity, cubic yards, of finished extra structural concrete.
- D. Payment for extra structural concrete, if any, will be made at the Unit Price shown on Proposal, said payment will constitute full compensation for all WORK which shall be in accordance with the applicable specifications.

10. Over Excavation, price based on Cubic Yards (CY)

- A. Measurement for payment for over excavation (over excavation due to poor subsurface soil conditions), as directed by the Engineer, will be based on the actual quantity, cubic yards, of finished over excavation. Over excavated material is to be hauled off-site and disposed of at a certified disposal site per specifications.
- B. Payment for over excavation, if any, will be made at the Unit Price shown on Proposal, said payment will constitute full compensation for all WORK which shall be in accordance with the applicable specifications

11. Crushed Surfacing Top Course, price based on Tons (TN)

- A. Measurement for payment for extra crushed surfacing top course, as directed by the Engineer, will be based on the actual quantity, tons, of finished material. Includes all costs associated with providing, spreading, and compacting Crushed Surfacing Top Course per WSDOT Section 9-03.9(3) Crushed Surfacing Top Course, minimum density 95%.
- B. Payment for extra crushed surfacing top course, if any, will be made at the Unit Price shown on Proposal, said payment will constitute full compensation for all WORK which shall be in accordance with the applicable specifications

12. Crushed Surfacing Base Course, price based on Tons (TN)

- A. Measurement for payment for extra crushed surfacing base course, as directed by the Engineer, will be based on the actual quantity, tons, of finished material. Includes all costs associated with providing, spreading, and compacting Crushed Surfacing Base Course per WSDOT Section 9-03.9(3) Crushed Surfacing Base Course, minimum density 95%.
- B. Payment for extra crushed surfacing base course, if any, will be made at the Unit Price shown on Proposal, said payment will constitute full compensation for all WORK which shall be in accordance with the applicable specifications.

13. Gravel Base, price based on Tons (TN)

- A. Measurement for payment for extra gravel base, as directed by the Engineer, will be based on the actual quantity, tons, of finished material. Includes all costs associated with providing, spreading, and compacting Gravel Base per WSDOT Section 9-03.10 Gravel Base, minimum density 95%.

- B. Payment for extra gravel base, if any, will be made at the Unit Price shown on Proposal, said payment will constitute full compensation for all WORK which shall be in accordance with the applicable specifications.

14. Gravel Backfill for Pipe Zone Bedding, price based on Tons (TN)

- A. Measurement for payment for extra gravel backfill for pipe zone bedding, as directed by the Engineer, will be based on the actual quantity, tons, of finished material. Includes all costs associated with providing, spreading, and compacting Gravel Backfill for Pipe Zone Bedding per WSDOT Section 9-03.12(3) Gravel Backfill for Pipe Zone Bedding, minimum density 90%.
- B. Payment for extra gravel backfill for pipe zone bedding, if any, will be made at the Unit Price shown on Proposal, said payment will constitute full compensation for all WORK which shall be in accordance with the applicable specifications.

15. Gravel Borrow, price based on Tons (TN)

- A. Measurement for payment for extra Gravel Borrow, as directed by the Engineer, will be based on the actual quantity, tons, of finished material. Includes all costs associated with providing, spreading, and compacting Gravel Borrow per WSDOT Section 9-03.14(1) Gravel Borrow, minimum density 95%.
- B. Payment for extra gravel borrow, if any, will be made at the Unit Price shown on Proposal, said payment will constitute full compensation for all WORK which shall be in accordance with the applicable specifications.

16. Bank Run Gravel for Trench Backfill, price based on Tons (TN)

- A. Measurement for payment for extra Bank Run Gravel for Trench Backfill, as directed by the Engineer, will be based on the actual quantity, tons, of finished material. Includes all costs associated with providing, spreading, and compacting Bank Run Gravel for Trench Backfill per WSDOT Section 9-03.19 Bank Run Gravel for Trench Backfill, minimum density 95%.
- B. Payment for extra bank run gravel for trench backfill, if any, will be made at the Unit Price shown on Proposal, said payment will constitute full compensation for all WORK which shall be in accordance with the applicable specifications.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 00 31 13 – PRELIMINARY PROJECT PHASES**

The following Preliminary Project Phasing Plan is provided for planning purposes. This phasing plan is not meant to dictate means and methods to perspective Bidders or take the place of any required planning on the part of the Bidder to provide a responsive Bid. This phasing plan is simply an outline of the work to be performed that takes into the account the lead-time and critical path nature of the submittals, ordering, and delivery of the project equipment.

### **Permit Schedule**

County Building Permit Application Schedule

1. Submit Application to San Juan County: September 27, 2024

### **Bid Phase**

Preliminary Bid Phase Schedule

1. Advertise For Bids: January 29, 2025
2. Pre-Bid Meeting (on-site): February 12, 2025
3. Open Bids: March 5, 2025
4. Evaluate Bids, Issue Award: April 8, 2025
5. Preconstruction Meeting: April 30, 2025

### **Construction Phasing Plan**

1. Construction Submittals: Beginning after Award (April 2025). Prioritize all long lead items.
2. Mobilize on-site: May 2025
3. Prepare SWPPP and Establish Erosion Control Measures: May 2025
4. Prepare Dewatering Plan for Excavations: May 2025
5. Begin Stage 1 - Take Train 1 Offline: May 2025
6. Take dewatering facilities offline and construct protective plywood shelters over WAS pumps, exposed piping, the horizontal screw press, & vertical screw press: June 2025
7. Begin removal of existing building over Trains 1, 2, & dewatering facilities: June 2025
8. Sawcut and remove existing concrete slab around Trains 1 & 2: June 2025
9. Begins construction of new dewatering building: June 2025
10. Complete new dewatering building and place dewatering equipment back online: Nov 2025
11. Begin Stage 2 – Form and pour new concrete for Train 1: Dec 2025
12. Install new Train 1 equipment: Spring/Summer 2026
13. Train 1 Start Up: Sept 2026
14. Begin Stage 3 – Take Train 2 offline: October 2026

15. Form and pour new concrete for Train 2: Fall/Winter 2027
16. Install new Train 2 equipment: Winter/Spring 2027
17. Train 2 Start Up: July 2027
18. Final Surfacing/Pavement Work (entire site): August 2027
19. Substantial Completion Deadline: August, 2027
20. Punch List Work: September 2027
21. Final Completion Deadline: October 2027

**\*\*\*END OF SECTION\*\*\***



## SECTION 00 41 00 – BID PROPOSAL

Name of Bidder: \_\_\_\_\_

To: Eastsound Sewer and Water District  
Project: ESWD WWTP UPGRADE - PHASE II  
143 Cessna Rd  
Eastsound, Washington 98245

### BASE BID – WWTP Expansion

ITEM		APPROX. QTY	UNIT	UNIT PRICE	AMOUNT
1	WWTP Upgrade	1	LS		
	<b>BASE BID ITEM 1</b>				

### UNIT QUANTITY BID ITEMS

ITEM		APPROX. QTY	UNIT	UNIT PRICE	AMOUNT
2	Trench Safety Excavation Provisions	1	LS		
3	Bollards	12	EA		
4	SWPPP Preparation	1	LS		
5	Maintenance Work for SWPPP	1	LS		
6	Electrical	1	LS		
7	SCADA/PLC Programmer Services	1	FA	\$100,000.00	\$100,000.00
	<b>SUBTOTAL UNIT QUANTITY BID ITEMS 2-7</b>				

**EXTRA WORK ITEMS**

ITEM		APPROX. QTY	UNIT	UNIT PRICE	AMOUNT
8	HMA Pavement	10	TN		
9	Structural Concrete	10	CY		
10	Over Excavation	10	CY		
11	Crushed Surfacing Top Course	10	TN		
12	Crushed Surfacing Base Course	10	TN		
13	Gravel Base	10	TN		
14	Gravel Backfill for Pipe Zone Bedding	10	TN		
15	Gravel Borrow	10	TN		
16	Bank Run Gravel for Trench Backfill	10	TN		
	<b>SUBTOTAL EXTRA WORK ITEMS 8-16</b>				

	<b>SUBTOTAL ITEMS 1-16</b>		\$
	<b>8.4% SALES TAX (Eastsound Sewer and Water District, San Juan County)</b>		\$
	<b>TOTAL BID</b>		\$

## LIST OF MANUFACTURERS

The named manufacturer for some equipment items are listed below. Contractor is to circle his selected manufacturer, when a choice is available. Contractor's Base Bid Item #1 - WWTP Upgrade is to be based on the following:

<u>Equipment</u>	<u>Base Bid Manufacturer</u>
A. Biological Treatment Sys. Equipment	<u>Smith and Loveless</u>
B. Screw Conveyor Equipment	<u>JDV Equipment, FKC Co. LTD.</u>
C. Sludge Box & Cover System	<u>JDV Equipment</u>
D. Dewater Sump Pump Equipment	<u>Flygt</u>

## EQUIPMENT ALTERNATES:

Contractors may submit an approval package for equipment of alternate manufacturers to the base bid manufacturer for review with their bid and included as an Equipment Alternate on this Bid Proposal. A pre-approval review prior to bid will not be done. Contractors proposing alternate manufacturers will be responsible for all costs associated with system evaluation and redesign including all electrical, mechanical, and civil aspects of the installation.

- A. Furnish Biological Treatment System Equipment other than specified.

Lump Sum Deduction \$ - Deduction \_\_\_\_\_

Amount in Words: \_\_\_\_\_

Manufacturer & Model No. \_\_\_\_\_

- B. Furnish Screw Conveyor Equipment other than specified.

Lump Sum Deduction \$ - Deduction \_\_\_\_\_

Amount in Words: \_\_\_\_\_

Manufacturer & Model No. \_\_\_\_\_

- C. Furnish Sludge Box Cover System other than specified.

Lump Sum Deduction \$ - Deduction \_\_\_\_\_

Amount in Words: \_\_\_\_\_

Manufacturer & Model No. \_\_\_\_\_

- D. Furnish Dewater Sump Pump Equipment other than specified.

Lump Sum Deduction \$ - Deduction \_\_\_\_\_

Amount in Words: \_\_\_\_\_

Manufacturer & Model No. \_\_\_\_\_

Note 1: Mobilization items and partial payments for Mobilization shall be in accordance with WSDOT Standard Specifications Section 1-09.7.

Note 2: See Section 00 24 13 –Scopes of Bids for more description of each bid item.

Note 3: Payments will be made for actual quantities of bid items installed on the project. Estimated contract quantities provide contingencies with respect to rock and miscellaneous alignment adjustments; and to establish a not-to-exceed level of construction cost for Owner's planning purposes. If required by actual field conditions, bidders should be prepared to perform all expected and contingency work reflected in the estimated contract quantities and in the quantity ranges identified for additive and deductive unit prices. Bidders should not, however, expect to be paid the total contract price if the contingency quantities are not required to be installed by actual field conditions.

The Owner reserves the right to accept or reject any or all bid prices within sixty (60) days of the bid date.

### **Time for Completion**

See Supplementary Condition 15 - Completion Date for completion time requirements.

### **Liquidated Damages**

The undersigned agrees to pay the Owner as liquidated damages the sum as specified in the General Conditions for each consecutive calendar day that is in default after the Contract Time. Liquidated damages shall be deducted from the contract by change order or from the Contractor's application for payment as determined by Owner in its sole discretion.

Contractor is required to pay Washington State Prevailing Wages and Federal Prevailing Wages. All work performed on this project will be subject to the higher of the prevailing state or federal wage rates.

### **Receipt of Addenda**

Receipt of the following addenda is acknowledged:

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

Name of Firm \_\_\_\_\_

NOTE: If bidder is a corporation, write State of Incorporation; if a partnership, give full names and addresses of all parties below.

*Non-Collusion Declaration: By signing below, I hereby declare that I, firm, association or corporation has (have) not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action restraining free competitive bidding for this project.*

Signed by \_\_\_\_\_, Official Capacity \_\_\_\_\_

Print Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip Code \_\_\_\_\_

Date \_\_\_\_\_ Telephone \_\_\_\_\_ FAX \_\_\_\_\_

State of Washington Contractor's License No. \_\_\_\_\_

Federal Tax ID # \_\_\_\_\_ e-mail address: \_\_\_\_\_

Employment Security Department No. \_\_\_\_\_

**\*\*\* END OF SECTION \*\*\***

## SECTION 00 43 13 – BID BOND FORM

### Deposit Statement

Herewith find a deposit in the form of certified check, or cashier's check, in the amount of  
Five percent (5%) of maximum amount bid (Total for all Bid Items + sales tax) in the attached Proposal.

### Bid Bond

KNOW ALL PEOPLE BY THESE PRESENTS, that \_\_\_\_\_ the  
CONTRACTOR, hereinafter known as PRINCIPAL, and \_\_\_\_\_ hereinafter  
known as SURETY, are held and firmly bound to the Eastsound Sewer and Water District hereinafter known as  
OWNER, in the penal sum of \_\_\_\_\_

\_\_\_\_\_ dollars (not less than 5% of Base Bid plus Additive Alternates including Washington State Sales Tax) for the payment  
of which sum well and truly to be made, we do jointly and severally bind ourselves, our heirs, executors,  
administrators, successors and assigns firmly by these presents.

WHEREAS, the PRINCIPAL has submitted a bid for

(Project Title): Eastsound Sewer and water District WWTP Upgrade – Phase II

NOW, THEREFORE, the condition of this obligation is such that if the OWNER accepts the bid of the PRINCIPAL,  
and

- a. the PRINCIPAL executes such contract documents required by the terms of the bid and provides required  
Bonds for the performance of the contract and for the prompt payment of labor and material furnished for  
the project as may be specified in the bid then this obligation is satisfied, or
- b. in the event of the failure of the PRINCIPAL to execute such contract documents and provide such Bonds  
required by the terms of the bid, the PRINCIPAL shall pay and forfeit to the OWNER the full penal sum  
hereof, then this obligation shall be null and void; otherwise this obligation remains in full force and effect  
and the SURETY shall forthwith pay and forfeit to the OWNER, as a penalty and liquidated damages, the  
amount of this bond.

SIGNED, SEALED AND DATED THIS \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_  
PRINCIPAL

\_\_\_\_\_  
SURETY

\_\_\_\_\_  
By

\_\_\_\_\_  
By

\_\_\_\_\_  
Title

\_\_\_\_\_  
Title

\_\_\_\_\_  
Address of PRINCIPAL

\_\_\_\_\_  
Address of SURETY

Note: If PRINCIPAL is Partnership, all Partners should execute bond. Surety companies executing bonds must  
appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to  
transact business in the State of Washington. A power of attorney must be provided which appoints the  
SURETY's true and lawful attorney-in-fact to make, execute, seal and deliver this bond.

\*\*\* END OF SECTION \*\*\*

## SECTION 00 43 93 – BID SUBMITTAL CHECKLIST

The bidder is advised to use the following list to assemble all forms required to be submitted with their bids. In accordance with RCW 39.30.060, bidders shall submit the required documentation listed below.

Bid must be received prior to **2:00 P.M. PST, Wednesday, March 05, 2025.**

### Bid Submittal Checklist

#### Part 1 – (to be submitted with the bid)

- \_\_\_\_\_ Bid Proposal (Section 00 41 00 BID PROPOSAL).
- \_\_\_\_\_ Bid Guarantee (Section 00 43 13 BID BOND or other type of Bid Guarantee).
- \_\_\_\_\_ Contractors Qualifications (Section 00 45 13).
- \_\_\_\_\_ Non-Collusion Affidavit (Section 00 45 19).
- \_\_\_\_\_ Certification of Compliance with Wage Payment Statutes (Section 00 45 29).
- \_\_\_\_\_ Attachment 3 Certification of Non-Segregated Facilities (See Section 00 53 00, page 24 of 25).
- \_\_\_\_\_ Attachment 4 Notice to Labor Unions or Other Organization of Workers: Non-Discrimination in Employment (See Section 00 53 00, page 25 of 25).

#### Part 2 – (to be submitted either with the bid or within 1-hour of the bid)

- \_\_\_\_\_ List of Subcontractors (Section 00 45 33).
- \_\_\_\_\_ Complete Bidders List (as described in Section 00 53 00, page 6 of 25).
- \_\_\_\_\_ DBE Subcontractor Performance Form (WA Ecology Form 6100-3, See Section 00 53 00, page 5 of 25 and project website: <https://wilsonengineering.com/bidding-documents.aspx/>)
- \_\_\_\_\_ DBE Subcontractor Utilization Form (WA Ecology Form 6100-4, See Section 00 53 00, page 5 of 25 and project website: <https://wilsonengineering.com/bidding-documents.aspx/>)

### Subcontractor Qualifications (within 24 hours of the bid opening)

Within 24 hours of the bid opening, the apparent low bidder shall furnish the Engineer with the Subcontractor Qualifications (Section 00 45 43 SUBCONTRACTOR QUALIFICATIONS). The second and third low bidders shall furnish this information only when requested by the Engineer.

**\*\*\* END OF SECTION \*\*\***

## SECTION 00 45 13 - CONTRACTORS QUALIFICATIONS

### CONTRACTORS QUALIFICATIONS

The below listed reference information shall be submitted with the Bid.

Bidder to list three previous wastewater facility projects with similar value (\$2,000,000+) completed by Bidder as prime contractor. Bidder shall have successfully completed with their own equipment and personnel a minimum of three similar projects in the last ten years to be considered qualified.

1. Project: \_\_\_\_\_  
(Name and Location)  
Contract Amount: \_\_\_\_\_  
Reference: \_\_\_\_\_  
(Company Name, Contact & Telephone)
2. Project: \_\_\_\_\_  
(Name and Location)  
Contract Amount: \_\_\_\_\_  
Reference: \_\_\_\_\_  
(Company Name, Contact & Telephone)
3. Project: \_\_\_\_\_  
(Name and Location)  
Contract Amount: \_\_\_\_\_  
Reference: \_\_\_\_\_  
(Company Name, Contact & Telephone)

Bidder shall provide the following information.

1. Resume of superintendent proposed for project.
2. List and provide references (Owner and Engineer) for any project within the last three years which have involved disputes for which the Contractor filed a claim resulting in formal dispute resolution, third-party mediation or arbitration, or a lawsuit.
3. List and provide references (Owner and Engineer) for all public works contracts in which the Contractor was sued by the Owner.

\*\*\* END OF SECTION \*\*\*



## SECTION 00 45 19 – NON-COLLUSION AFFIDAVIT

### NON-COLLUSION AFFIDAVIT

STATE OF WASHINGTON )  
 ) ss.  
COUNTY OF SAN JUAN )

The undersigned, being duly sworn, deposes and says that the person, firm, association, co-partnership or corporation herein named, has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in the restraining of free competitive bidding in the preparation and submission of a proposal to the Eastsound Sewer and Water District for consideration in the award of a contract on the improvement named above.

---

Contractor

Subscribed and sworn to before me this \_\_\_\_ day of \_\_\_\_\_, 20\_\_.

Notary Public in and for the  
State of Washington, residing at

\*\*\*END OF SECTION\*\*\*

## SECTION 00 45 29 – CERTIFICATION OF COMPLIANCE WITH WAGE PAYMENT STATUTES

The bidder hereby certifies that, within the three-year period immediately preceding the bid solicitation date (January 29, 2025), 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.

I declare under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct.

---

Bidder’s Business Name

---

Signature of Authorized Official\*

---

Printed Name

---

Title

---

Date

---

City

---

State or country

*Check One:*

Sole Proprietorship ☐ Partnership ☐ Joint Venture ☐ Corporation ☐

State of Incorporation, or if not a corporation, State where business entity was formed:

---

If a co-partnership, give firm name under which business is transacted:

---

*\* If a corporation, proposal must be executed in the corporate name by the president or vice-president (or any other corporate officer accompanied by evidence of authority to sign). If a co-partnership, proposal must be executed by a partner.*

**\*\*\*END OF SECTION\*\*\***

## **SECTION 00 45 33 – LIST OF SUBCONTRACTORS - BIDS ON PUBLIC WORKS - IDENTIFICATION, SUBSTITUTION OF SUBCONTRACTORS**

The prime contractor shall submit as part of the bid, or within one hour after the published bid submittal time, the names of the subcontractors with whom the bidder, if awarded the contract, will subcontract for performance of the work of: HVAC; Plumbing; and Electrical, or to name itself for the work. The prime contract bidder shall not list more than one subcontractor for each category of work identified, unless subcontractors vary with bid alternates, in which case the prime contract bidder must indicate which subcontractor will be used for which alternate. Failure of the prime contract bidder to submit as part of the bid the names of such subcontractors or to name itself to perform such work or the naming of two or more subcontractors to perform the same work shall render the prime contract bidder's bid nonresponsive and, therefore, void.

**HVAC Subcontractor:** \_\_\_\_\_

**Address:** \_\_\_\_\_ **Phone:** \_\_\_\_\_

**Plumbing Subcontractor:** \_\_\_\_\_

**Address:** \_\_\_\_\_ **Phone:** \_\_\_\_\_

**Electrical Subcontractor:** \_\_\_\_\_

**Address:** \_\_\_\_\_ **Phone:** \_\_\_\_\_

The prime contractor shall submit as part of the bid, or within 48 hours after the published bid submittal time, the names of the subcontractors with whom the bidder, if awarded the contract, will subcontract for performance of the work of: Structural Steel Installation and Rebar Installation, or to name itself for the work. The prime contract bidder shall not list more than one subcontractor for each category of work identified, unless subcontractors vary with bid alternates, in which case the prime contract bidder must indicate which subcontractor will be used for which alternate. Failure of the prime contract bidder to submit as part of the bid the names of such subcontractors or to name itself to perform such work or the naming of two or more subcontractors to perform the same work shall render the prime contract bidder's bid nonresponsive and, therefore, void.

**Structural Steel Installation Subcontractor:** \_\_\_\_\_

**Address:** \_\_\_\_\_ **Phone:** \_\_\_\_\_

**Rebar Installation Subcontractor:** \_\_\_\_\_

**Address:** \_\_\_\_\_ **Phone:** \_\_\_\_\_

Contractor shall also provide a list of all subcontractors whose work exceeds ten (10) percent of the bid and the name of the Control System Integrator. Additional sheets may be used if necessary. This combined subcontractor list must be submitted with the bid OR within the time frame allotted, as described in Section 00 43 93 – BID SUBMITTAL CHECKLIST.

**Control System Integrator:**

**Name:** \_\_\_\_\_

Address: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Portion of Work: \_\_\_\_\_

**Subcontractors performing more than 10% of the bid price:**

**Name:** \_\_\_\_\_

Address: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Portion of Work: \_\_\_\_\_

**Name:** \_\_\_\_\_

Address: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Portion of Work: \_\_\_\_\_

**Name:** \_\_\_\_\_

Address: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Portion of Work: \_\_\_\_\_

**Name:** \_\_\_\_\_

Address: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Portion of Work: \_\_\_\_\_

**\*\*\* END OF SECTION \*\*\***

## SECTION 00 45 43 – SUBCONTRACTOR QUALIFICATIONS

The below listed reference information will be required 24 hours after the bid opening for all listed subcontractors of the apparent low bidder. The information may also be asked of the subcontractors of the next two low bidders at that time.

Bidder to list the following information for **three** projects for **each** of the subcontractors listed in Section 00 45 33 LIST OF SUBCONTRACTORS. The selected projects must be of equivalent size and scope to the portion of work the subcontractor will complete on the **ESWD WWTP Upgrade - Phase II Project**, and the subcontractor must have completed the work using his/her own personnel and equipment.

*(This sheet shall be duplicated for each Subcontractor)*

Name of Subcontractor: \_\_\_\_\_

1. Project: \_\_\_\_\_  
(Name and Location)

Contract Amount: \_\_\_\_\_

Reference: \_\_\_\_\_  
(Company Name, Contact & Telephone)

2. Project: \_\_\_\_\_  
(Name and Location)

Contract Amount: \_\_\_\_\_

Reference: \_\_\_\_\_  
(Company Name, Contact & Telephone)

3. Project: \_\_\_\_\_  
(Name and Location)

Contract Amount: \_\_\_\_\_

Reference: \_\_\_\_\_  
(Company Name, Contact & Telephone)

\*\*\* END OF SECTION \*\*\*

## **PART 2**

# **CONTRACTING REQUIREMENTS**

## SECTION 00 51 00 – NOTICE OF AWARD

### NOTICE OF AWARD

To: \_\_\_\_\_.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_.

For: Eastsound Sewer and Water District  
ESWD WWTP Upgrade - Phase I Project

The Owner has considered the BID submitted by you for the above described WORK in response to its Advertisement for Bids and Information for Bidders.

You are hereby notified that your BID has been ACCEPTED in accordance with your proposal for the amount of \$\_\_\_\_\_.

You are required by the Information for Bidders to execute the Contract and furnish the required Bond(s) and certificates of insurance within ten (10) calendar days from the date of this Notice of Award.

If you fail to execute said Contract and furnish said Bond(s) within ten (10) working days from the date of this Notice, the District will be entitled to consider all your rights arising out of the District's acceptance of your BID as abandoned and as a forfeiture of your BID BOND. The Owner will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the District within 3 days of its receipt.

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_

Eastsound Sewer and Water District  
Owner

By \_\_\_\_\_  
Title \_\_\_\_\_

---

#### ACCEPTANCE OF NOTICE:

*Receipt of this NOTICE OF AWARD is hereby*

*acknowledged: By* \_\_\_\_\_.

*Dated this* \_\_\_\_\_ *day of* \_\_\_\_\_, 20\_\_

*By* \_\_\_\_\_ *Printed Name*

\*\*\*END OF SECTION\*\*\*

## SECTION 00 52 00 – AGREEMENT FORM

THIS AGREEMENT is made and entered into at Eastsound, Washington, this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by and between Eastsound Sewer and Water District, hereinafter designated as the OWNER, and \_\_\_\_\_, hereinafter designated as the CONTRACTOR.

It is made with reference to the following facts:

1. OWNER has heretofore caused to be prepared certain Contract Documents including Bidding Requirements, Contracting Requirements, Technical Specifications, Miscellaneous Documents and Plans for the construction of the **ESWD WWTP Upgrade - Phase II Project**.
2. CONTRACTOR filed with the OWNER on \_\_\_\_\_, 20\_\_\_\_, a proposal to complete said work.
3. Contractor agreed to accept as payment therefor the sum fully stated and set forth in the Proposal.
4. The Contract Documents fully and accurately describe the terms and conditions upon which the CONTRACTOR proposed to furnish said equipment, labor, material and appurtenances and perform said work, together with the manner and time of furnishing same.
5. Third-Party Beneficiary: The State of Washington shall be, and is hereby, named as an express third-party beneficiary of this contract, with full rights as such.

IT IS THEREFORE AGREED, first, that a copy of said Contract Documents as aforesaid, does in all particulars become a part of the Agreement by and between the parties hereto in all matters and things therein set forth and described; and further, that the OWNER and CONTRACTOR hereby accept and agree to the terms and conditions of said Contract Documents as filed completely as if said terms and conditions and plans were herein set out in full.

This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators and assigns.

IN WITNESS WHEREOF, the parties hereto have execute, or caused to be executed by their duly authorized officials, this Agreement in triplicate each of which shall be deemed an original on the day first above written.

OWNER: EASTSOUND SEWER AND WATER DISTRICT

By: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

(SEAL)

ATTEST:

\_\_\_\_\_

Name: \_\_\_\_\_

TITLE: \_\_\_\_\_



---

CONTRACTOR \_\_\_\_\_

By: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

(SEAL)

ATTEST:

\_\_\_\_\_  
Name: \_\_\_\_\_

Title: \_\_\_\_\_

**\*\*\* END OF SECTION \*\*\***

## **SECTION 00 53 00 – WPCRF INSERTS**

### **WASHINGTON STATE DEPARTMENT OF ECOLOGY WATER POLLUTION CONTROL REVOLVING FUND SPECIFICATIONS INSERT**

Revised 1/22/21

The following clauses will be incorporated into construction contracts receiving financial assistance from the Washington State Department of Ecology Water Pollution Control Revolving Fund. In the event of conflict within the contract these clauses shall take precedence

#### **Required Bid Submittals**

The following submittals are required to be submitted with the bid proposal:

- Certification Of Nonsegregated Facilities (attachment 3)
- DBE Subcontractor Utilization Form (EPA Form 6100-4)
- One copy of DBE Subcontractor Performance Form (EPA Form 6100-3) for each DBE subcontractor.
- Complete Bidders List.

#### **Compliance with State and Local Laws**

The Contractor shall assure compliance with all applicable federal, state, and local laws, requirements, and ordinances as they pertain to the design, implementation, and administration of the approved project.

#### **State Interest Exclusion**

It is anticipated that this project will be funded in part by the Washington State Department of Ecology . Neither the State Of Washington nor any of its departments or employees are, or shall be, a party to this contract or any subcontract.

#### **Third Party Beneficiary**

Partial funding of this project is being provided through the Washington State Department of Ecology Water Pollution Control Revolving Fund. All parties agree that the State of Washington shall be, and is hereby, named as an express third-party beneficiary of this contract, with full rights as such.

#### **Access to the construction site and to records**

The contractor shall provide for the safe access to the construction site and to the contractor's records by Washington State Department of Ecology and Environmental Protection Agency (EPA) personnel.

The Contractor shall maintain accurate records and accounts to facilitate the Owner's audit requirements and shall ensure that all subcontractors maintain auditable records.

These Project records shall be separate and distinct from the Contractor's other records and accounts.

All such records shall be available to the Owner and to Washington State Department of Ecology and EPA personnel for examination. All records pertinent to this project shall be retained by the Contractor for a period of three (3) years after the final audit.

### **Protection of the Environment**

No construction related activity shall contribute to the degradation of the environment, allow material to enter surface or ground waters, or allow particulate emissions to the atmosphere, which exceed state or federal standards. Any actions that potentially allow a discharge to state waters must have prior approval of the Washington State Department of Ecology.

### **Funding Recognition**

All site-specific projects must have a sign of sufficient size to be seen from nearby roadways acknowledging department financial assistance and left in place throughout the life of the project. Department logos must be on all signs and documents. Logos will be provided as needed.

### **Inadvertent Discovery Of Archeological Resources**

The contractor shall obtain a copy of the Inadvertent Discovery Plan from the Project Owner. The contractor shall keep a copy of the inadvertent discovery plan for the project on the work site at all times. The contractor shall immediately stop all work if human remains, cultural, or archeological resources are discovered in the course of construction. The contractor shall follow the inadvertent discovery plan in dealing with the human remains, cultural, or archeological resources.

### **Use Of American Iron And Steel**

This provision applies to projects for the construction, alteration, maintenance, or repair of a "treatment works" as defined in the Federal Water Pollution Control Act (33 USC 1381 et seq.).

This provision does not apply if the engineering plans and specifications for the project were approved by the Ecology prior to January 17, 2014.

The Contractor acknowledges to and for the benefit of the Project Owner and the State of Washington that it understands the goods and services under this Agreement are being funded with monies made available by the Water Pollution Control Revolving Fund which contains provisions commonly known as "American Iron and Steel;" that requires all of the iron and steel products used in the project be produced in the United States ("American Iron and Steel Requirements") including iron and steel products provided by the Contractor pursuant to this Agreement. "Iron and Steel products" means the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials.

The Contractor hereby represents and warrants to and for the benefit of the Project Owner and the State that:

- (a) the Contractor has reviewed and understands the American Iron and Steel Requirements,
- (b) all of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirements, unless a waiver of the requirements is approved, and

(c) the Contractor will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirements, as may be requested by the Project Owner or the State.

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

### **Prevailing Wage**

The work performed under this contract is subject to the wage requirements of the Davis-Bacon Act. The Contractor shall conform to the wage requirements prescribed by the federal Davis-Bacon and Related Acts which requires that all laborers and mechanics employed by contractors and subcontractors performing on contracts funded in whole or in part by SRF appropriations in excess of \$2,000 pay their laborers and mechanics not less than the prevailing wage rates and fringe benefits, and determined by the Secretary of Labor, for corresponding classes of laborers and mechanics employed on similar projects in the area. Attachment 1 to this specification insert and an up to date wage determination shall be included in full into this contract and in any subcontract in excess of \$2,000. Wage determinations can be found at <http://www.wdol.gov>.

The Contractor agrees that the Contractor is legally and financially responsible for compliance with the Davis-Bacon Act wage rules. All laborers and mechanics employed by contractors and subcontractors employed as part of this contract shall be paid wages at rates not less than those prevailing on projects of a character similar in the locality as determined by the Secretary of Labor in accordance with subchapter IV of chapter 31 of title 40, United States Code.

### **Certification Regarding Suspension, Debarment, Ineligibility Or Voluntary Exclusion**

1. The CONTRACTOR, by signing this agreement, certifies that it is not suspended, debarred, proposed for debarment, declared ineligible or otherwise excluded from contracting with the federal government, or from receiving contracts paid for with federal funds. If the CONTRACTOR is unable to certify to the statements contained in the certification, they must provide an explanation as to why they cannot.
2. The CONTRACTOR shall provide immediate written notice to the Department if at any time the CONTRACTOR learns that its certification was erroneous when submitted or had become erroneous by reason of changed circumstances.
3. The terms covered transaction, debarred, suspended, ineligible, lower tier covered

transaction, participant, person, primary covered transaction, principal, proposal, and voluntarily excluded, as used in this clause, have the meaning set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the department for assistance in obtaining a copy of those regulations.

4. The CONTRACTOR agrees it shall not knowingly enter into any lower tier covered transaction with a person who is proposed for debarment under the applicable Code of Federal Regulations, debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction.
5. The CONTRACTOR further agrees by signing this agreement, that it will include this clause titled "Certification Regarding Suspension, Debarment, Ineligibility Or Voluntary Exclusion" without modification in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
6. Pursuant to 2CFR180.330, the CONTRACTOR is responsible for ensuring that any lower tier covered transaction complies with certification of suspension and debarment requirements.
7. CONTRACTOR acknowledges that failing to disclose the information required in the Code of Federal Regulations may result in the delay or negation of this funding agreement, or pursuance of legal remedies, including suspension and debarment.
8. CONTRACTOR agrees to keep proof in its agreement file, that it, and all lower tier recipients or contractors, are not suspended or debarred, and will make this proof available to the Department upon request. RECIPIENT/CONTRACTOR must run a search in <http://www.sam.gov/> and print a copy of completed searches to document proof of compliance.

This term and condition supersede EPA Form 5700-49, "Certification Regarding Debarment, Suspension, and Other Responsibility Matters."

### **Disadvantaged Business Enterprises**

#### General Compliance (40 CFR Part 33).

The contractor shall comply with the requirements of the Environmental Protection Agency's Program for Participation By Disadvantaged Business Enterprises (DBE) 40 CFR Part 33.

#### Non-discrimination Provision (40CFR Appendix A to Part 33).

The contractor shall not discriminate on the basis of race, color, national origin or sex in the performance of this contract. The contractor shall carry out applicable requirements of 40 CFR part 33 in the award and administration of contracts awarded under EPA financial assistance agreements. Failure by the contractor to carry out these requirements is a material breach of this contract which may result in the termination of this contract or other legally available remedies.

The contractor shall comply with all federal and state nondiscrimination laws, including, but not limited to Title VI and VII of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title IX of the Education Amendments of 1972, the Age Discrimination Act of 1975, and

Chapter 49.60 RCW, Washington's Law Against Discrimination, and 42 U.S.C. 12101 et seq, the Americans with Disabilities Act (ADA).

Six Good Faith Efforts (40 CFR Part 33 Subpart C).

The contractor agrees to make the following good faith efforts whenever procuring subcontracts, equipment, services and supplies. The contractor shall retain records documenting compliance with the following six good faith efforts.

1. Ensuring Disadvantaged Business Enterprises are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities. For Indian Tribal, State and Local and Government recipients, this will include placing Disadvantaged Business Enterprises on solicitation lists and soliciting them whenever they are potential sources. Qualified Women and Minority business enterprises may be found on the Internet at [www.omwbe.wa.gov](http://www.omwbe.wa.gov) or by contacting the Washington State Office of Minority and Women's Enterprises at (866) 208-1064.
2. Making information on forthcoming opportunities available to Disadvantaged Business Enterprises and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by Disadvantaged Business Enterprises in the competitive process. This includes, whenever possible, posting solicitations for bids or proposals for a minimum of thirty (30) calendar days before the bid or proposal closing date.
3. Considering in the contracting process whether firms competing for large contracts could subcontract with Disadvantaged Business Enterprises. For Indian Tribal, State and local Government recipients, this will include dividing total requirements when economically feasible into smaller tasks or quantities to permit maximum participation by Disadvantaged Business Enterprises in the competitive process.
4. Encourage contracting with a consortium of Disadvantaged Business Enterprises when a contract is too large for one of these firms to handle individually.
5. Using services and assistance of the Small Business Administration and the Minority Business Development Agency of the Department of Commerce.
6. If the prime contractor awards subcontracts, requiring the subcontractors to take the six good faith efforts in paragraphs 1 through 5 above.

MBE/WBE Reporting (40 CFR Part 33 Parts 33.302, 33.502 and 33.503).

1. The contractor shall complete the DBE Subcontractor Utilization Form (EPA Form 6100-4).
2. The contractor shall require all DBE subcontractors to complete the DBE Subcontractor Performance Form (EPA Form 6100-3). The DBE Subcontractor Performance Form is only required to be completed by certified DBE subcontractors.
3. The contractor shall submit DBE Subcontractor Utilization Form (EPA Form 6100-4) and all completed DBE Subcontractor Performance Form(s) (EPA Form 6100-3) as part of the bid, or within one hour after the published bid submittal time (consistent with RCW 39.30.060)
4. The contractor shall provide DBE Subcontractor Participation Form (EPA Form 6100-2) to all DBE subcontractors. These subcontractors may submit Subcontractor Participation Form (EPA Form 6100-2) to the EPA Region 10 DBE coordinator in order to document issues or concerns with their usage or payment for a subcontract.

The 6100 forms can be found at:

<https://ecology.wa.gov/About-us/How-we-operate/Grants-loans/Find-a-grant-or-loan/Water-Quality-grants-and-loans/Facility-project-resources>

**Bidders List (40 CFR Part 33 part 33.501)**

All bidders shall submit the following information for all firms that bid or quote on subcontracts (including both DBE and non-DBE firms) as part of the bid, or within one hour after the published bid submittal time (consistent with RCW 39.30.060).

1. Firm's name with point of contact;
2. Firm's mailing address, telephone number, and e-mail address;
3. The work on which the firm bid or quoted, and when the firm bid or quoted; and
4. Firm's status as an MBE/WBE or non-MBE/WBE.

**Contract Administration Provisions (40 CFR part 33.302).**

The contractor shall comply with the contract administration provisions of 40 CFR, Part 33.302.

1. The contractor shall pay its subcontractor for satisfactory performance no more than 30 days from the contractor's receipt of payment.
2. The contractor shall notify the owner in writing prior to any termination of a DBE subcontractor.
3. If a DBE subcontractor fails to complete work under the subcontract for any reason, the contractor shall employ the six good faith efforts when soliciting a replacement subcontractor.
4. The contractor shall employ the six good faith efforts even if the contractor has achieved its fair share objectives.

**Equal Opportunity (EEO)**

If this Contract exceeds \$10,000, the Contractor shall comply with Executive Order 11246, "Equal Employment Opportunity," as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and as supplemented by regulations at 41 CFR part 60.

Contractor's compliance with Executive Order 11246 shall be based on implementation of the Equal Opportunity Clause, and specific affirmative active obligations required by the Standard Federal Equal Employment Opportunity Construction Contract Specifications, as set forth in 41 CFR Part 60-4.

**Equal Opportunity Clause (41 CFR part 60-1.4(b))**

During the performance of this contract, the contractor agrees as follows:

1. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other

forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided 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 considerations for employment without regard to race, color, religion, sex, or national origin.
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 advising the said labor union or workers' representatives of the contractor's commitments under this section, 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 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
5. The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
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 or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
7. The contractor will include the portion of the sentence immediately preceding paragraph (1) and 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 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 administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, That in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency the contractor may request the United States to enter into such litigation to protect the interests of the United States.

Federal Equal Employment Opportunity Construction Contract Specifications  
(Executive Order 11246 and 41 CFR part 60-4.3)

1. As used in these specifications:
  - a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;
  - b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;
  - c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.



- d. "Minority" includes:
- i. Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
  - ii. Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
  - iii. Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
  - iv. American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).
2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.
  3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.
  4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7 a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered Construction contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.
  5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.
  6. In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of

employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:
  - a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
  - b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.
  - c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefor, along with whatever additional actions the Contractor may have taken.
  - d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.
  - e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.
  - f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
  - g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General

- Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.
- h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.
  - i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
  - j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.
  - k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR part 60-3.
  - l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.
  - m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.
  - n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
  - o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.
  - p. Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.
8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the

Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized).
10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.
11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.
13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.
14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.
15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

#### Reporting Requirements (EEO-1)

On or before September 30 of each year, a contractor that is subject to Title VII of the Civil Rights Act of 1964, as amended, and that has 100 or more employees, shall file with the EEOC or its delegate an "Employer Information Report EEO-1". Instructions on how to file are available on the EEOC's website at <http://www.eeoc.gov/employers/eeo1survey/howtofile.cfm>. The contractor shall retain a copy of the most recent report filed.

#### Segregated Facilities (41 CFR part 60-1.8)

The contractor shall ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensuring that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. This obligation extends to all contracts containing the equal opportunity clause regardless of the amount of the contract. The term "facilities," as used in this section, means waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, wash rooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees; Provided, That separate or single-user restrooms and necessary dressing or sleeping areas shall be provided to assure privacy between the sexes.

#### **Attachments:**

1. Wage Rate Requirements For Subrecipients
2. Current Wage Rate Determination (to be provided by project owner)
3. Certification Of Nonsegregated Facilities
4. Notice To Labor Unions Or Other Organization Of Workers: Non-Discrimination In Employment

EPA Form 6100-4, EPA Form 6100.3, EPA Form 6100-2

## **ATTACHMENT 1 - WAGE RATE REQUIREMENTS FOR SUBRECIPIENTS.** **(To be included in full in any contract in excess of \$2,000)**

The following terms and conditions specify how recipients will assist EPA in meeting its Davis-Bacon (DB) responsibilities when DB applies to EPA awards of financial assistance under the FY 2013 Continuing Resolution with respect to State recipients and subrecipients that are governmental entities. If a subrecipient has questions regarding when DB applies, obtaining the correct DB wage determinations, DB provisions, or compliance monitoring, it may contact the State recipient. If a State recipient needs guidance, the recipient may contact Lorraine Fleury at [fleury.lorraine@epa.gov](mailto:fleury.lorraine@epa.gov) or at 215-814-2341 of EPA, Region III Grants and Audit Management Branch for guidance. The recipient or subrecipient may also obtain additional guidance from DOL's web site at <http://www.dol.gov/whd/>

### **1. Applicability of the Davis- Bacon (DB) prevailing wage requirements.**

Under the FY 2013 Appropriations Act, DB prevailing wage requirements apply to the construction, alteration, and repair of treatment works carried out in whole or in part with assistance made available by a State water pollution control revolving fund and to any construction project carried out in whole or in part by assistance made available by a drinking water treatment revolving loan fund. If a subrecipient encounters a unique situation at a site that presents uncertainties regarding DB applicability, the subrecipient must discuss the situation with the recipient State before authorizing work on that site.

### **2. Obtaining Wage Determinations.**

(a) Subrecipients shall obtain the wage determination for the locality in which a covered activity subject to DB will take place prior to issuing requests for bids, proposals, quotes or other methods for soliciting contracts (solicitation) for activities subject to DB. These wage determinations shall be incorporated into solicitations and any subsequent contracts. Prime contracts must contain a provision requiring that subcontractors follow the wage determination incorporated into the prime contract.

(i) While the solicitation remains open, the subrecipient shall monitor [www.wdol.gov](http://www.wdol.gov) weekly to ensure that the wage determination contained in the solicitation remains current. The subrecipients shall amend the solicitation if DOL issues a modification more than 10 days prior to the closing date (i.e. bid opening) for the solicitation. If DOL modifies or supersedes the applicable wage determination less than 10 days prior to the closing date, the subrecipients may request a finding from the State recipient that there is not a reasonable time to notify interested contractors of the modification of the wage determination. The State recipient will provide a report of its findings to the subrecipient.

(ii) If the subrecipient does not award the contract within 90 days of the closure of the solicitation, any modifications or supersedes DOL makes to the wage determination contained in the solicitation shall be effective unless the State recipient, at the request of the subrecipient, obtains an extension of the 90 day period from DOL pursuant to 29 CFR 1.6(c)(3)(iv). The subrecipient shall monitor [www.wdol.gov](http://www.wdol.gov) on a weekly basis if it does not award the contract within 90 days of closure of the solicitation to ensure that wage determinations contained in the solicitation remain current.

(b) If the subrecipient carries out activity subject to DB by issuing a task order, work assignment or similar instrument to an existing contractor (ordering instrument) rather than by publishing a solicitation, the subrecipient shall insert the appropriate DOL wage determination from [www.wdol.gov](http://www.wdol.gov) into the ordering instrument.

(c) Subrecipients shall review all subcontracts subject to DB entered into by prime contractors to verify that the prime contractor has required its subcontractors to include the applicable wage determinations.

(d) As provided in 29 CFR 1.6(f), DOL may issue a revised wage determination applicable to a subrecipient's contract after the award of a contract or the issuance of an ordering instrument if DOL determines that the subrecipient has failed to incorporate a wage determination or has used a wage determination that clearly does not apply to the contract or ordering instrument. If this occurs, the subrecipient shall either terminate the contract or ordering instrument and issue a revised solicitation or ordering instrument or incorporate DOL's wage determination retroactive to the beginning of the contract or ordering instrument by change order. The subrecipient's contractor must be compensated for any increases in wages resulting from the use of DOL's revised wage determination.

### **3. Contract and Subcontract provisions.**

(a) The Recipient shall insure that the subrecipient(s) shall insert in full in any contract in excess of \$2,000 which is entered into for the actual construction, alteration and/or repair, including painting and decorating, of a treatment work under the CWSRF or a construction project under the DWSRF financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in § 5.1 or the FY 2012 Appropriations Act , the following clauses:

#### **(1) Minimum wages.**

(i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

Subrecipients may obtain wage determinations from the U.S. Department of Labor's web site, [www.wdol.gov](http://www.wdol.gov).

(ii)(A) The subrecipient(s), on behalf of EPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The State award official

shall approve a request for an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

- (1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and
- (2) The classification is utilized in the area by the construction industry; and
- (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the subrecipient(s) agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), documentation of the action taken and the request, including the local wage determination shall be sent by the subrecipient (s) to the State award official. The State award official will transmit the request, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210 and to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification request within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the subrecipient(s) do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the award official shall refer the request and the local wage determination, including the views of all interested parties and the recommendation of the State award official, to the Administrator for determination. The request shall be sent to the EPA DB Regional Coordinator concurrently. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt of the request and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) Withholding. The subrecipient(s), shall upon written request of the EPA Award Official or an authorized representative of the Department of Labor, withhold or cause to be withheld from the



contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the subrecipient, that is, the entity that receives the sub-grant or loan from the State capitalization grant recipient. Such documentation shall be available on request of the State recipient or EPA. As to each payroll copy received, the subrecipient shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on the weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/whd/programs/dbra/wh347.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the subrecipient(s) for transmission to the State or EPA if requested by EPA, the State, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the subrecipient(s).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

- (1) That the payroll for the payroll period contains the information required to be provided under § 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under § 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;
- (2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;
- (3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the State, EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency or State may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees--

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall

be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended and 29 CFR part 30.

(5) Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the EPA determines may be appropriate, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The

prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and Subrecipient(s), State, EPA, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility.

(i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

#### **4. Contract Provision for Contracts in Excess of \$100,000.**

(a) Contract Work Hours and Safety Standards Act. The subrecipient shall insert the following clauses set forth in paragraphs (a)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by Item 3, above or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (a)(1) of this section the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (a)(1) of this section, in the sum of \$10 for each calendar day on which

such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (a)(1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The subrecipient, upon written request of the EPA Award Official or an authorized representative of the Department of Labor, shall withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (a)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (a)(1) through (4) of this section.

(b) In addition to the clauses contained in Item 3, above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the Subrecipient shall insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Subrecipient shall insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

## **5. Compliance Verification**

(a) The subrecipient shall periodically interview a sufficient number of employees entitled to DB prevailing wages (covered employees) to verify that contractors or subcontractors are paying the appropriate wage rates. As provided in 29 CFR 5.6(a)(6), all interviews must be conducted in confidence. The subrecipient must use Standard Form 1445 (SF 1445) or equivalent documentation to memorialize the interviews. Copies of the SF 1445 are available from EPA on request.

(b) The subrecipient shall establish and follow an interview schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. Subrecipients must conduct more frequent interviews if the initial interviews or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. Subrecipients shall immediately conduct necessary interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence.

(c) The subrecipient shall periodically conduct spot checks of a representative sample of weekly payroll data to verify that contractors or subcontractors are paying the appropriate wage rates. The subrecipient shall establish and follow a spot check schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, if practicable, the subrecipient should spot check payroll data within two weeks of each contractor or

subcontractor's submission of its initial payroll data and two weeks prior to the completion date the contract or subcontract. Subrecipients must conduct more frequent spot checks if the initial spot check or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. In addition, during the examinations the subrecipient shall verify evidence of fringe benefit plans and payments thereunder by contractors and subcontractors who claim credit for fringe benefit contributions.

(d) The subrecipient shall periodically review contractors and subcontractors use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the U.S Department of Labor or a state, as appropriate, and that contractors and subcontractors are not using disproportionate numbers of, laborers, trainees and apprentices. These reviews shall be conducted in accordance with the schedules for spot checks and interviews described in Item 5(b) and (c) above.

(e) Subrecipients must immediately report potential violations of the DB prevailing wage requirements to the EPA DB contact listed above and to the appropriate DOL Wage and Hour District Office listed at <http://www.dol.gov/whd/america2.htm>.

## **ATTACHMENT 2**

### **DAVIS-BACON WAGE RATE DETERMINATION**

[SRF Assistance Recipient to insert applicable wage determinations here]

How to obtain a Wage Determination:

1. [www.wdol.gov](http://www.wdol.gov)
2. Click “Selecting DBA WDs”
3. Select the State and county where the work will be performed
4. Select the “Construction Type”: Heavy, Building, Highway, or Residential
5. Click on one of the wage determinations. Verify that the wage determination displayed is the correct wage determination, and not for “Heavy Dredging”.
6. Select the text box displaying the Wage Determination and copy the text of the Wage Determination.
7. Click “Sign Up for Alert Service” to receive notification if the Wage Determination is updated.

When to update the wage determination:

1. If DOL updates the Wage Determination, you must update the Wage Determination through an addendum to the bid specifications.
2. If the update occurs less than 10 days prior to the date of bid opening, you are not required to update the Wage Determination.

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## **ATTACHMENT 3**

### **CERTIFICATION OF NONSEGREGATED FACILITIES**

(Applicable to federally assisted construction contracts and related subcontracts exceeding \$10,000 which are not exempt from the Equal Opportunity clause.)

The federally assisted construction contractor certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally assisted construction contractor certifies, further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally assisted construction contractor agrees that a breach of this certification is a violation of the Equal Opportunity clause in this contract.

As used in this certification, the term "segregated facilities" means any waiting rooms, work area, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or area, in fact, segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. The federally assisted construction contractor agrees that (except where he has obtained identical certifications from proposed contractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause, and that he will retain such, certification in this file.

Signature

Date

Name and title of signer (please type)

[THIS FORM SHALL BE COMPLETED IN FULL AND SUBMITTED WITH THE BID PROPOSAL]

## **ATTACHMENT 4**

### **NOTICE TO LABOR UNIONS OR OTHER ORGANIZATION OF WORKERS: NON-DISCRIMINATION IN EMPLOYMENT**

TO: \_\_\_\_\_  
(name of union or organization of worker)

The undersigned currently holds contract(s) with \_\_\_\_\_  
(name of applicant)  
\_\_\_\_\_ involving funds or credit of the U.S. Government or (a) subcontract(s)  
with a prime contractor holding such contract(s).

You are advised that under the provisions of the above contract(s) or subcontract(s) and in accordance with Section 202 of Executive Order 11246 dated September 24, 1965, the undersigned is obliged not to discriminate against any employee or applicant for employment because of race, color, creed, or national origin. This obligation not to discriminate in employment includes, but is not limited to, the following:

EMPLOYMENT, UPGRADING, TRANSFER OR DEMOTION

RECRUITMENT AND ADVERTISING

RATES OF PAY OR OTHER FORMS OF COMPENSATION

SELECTION FOR TRAINING INCLUDING APPRENTICESHIP, LAYOFF OR  
TERMINATION

This notice is furnished you pursuant to the provisions of the above contract(s) or subcontract(s) and Executive Order 11246.

Copies of this notice will be posted by the undersigned in conspicuous places available to employees or applicants for employment.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
(contractor or subcontractor(s))

\_\_\_\_\_  
(Date)

## SECTION 00 55 00 – NOTICE TO PROCEED

### NOTICE TO PROCEED

DATE \_\_\_\_\_  
CONTACT \_\_\_\_\_  
CONTRACTOR \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
ADDRESS \_\_\_\_\_

RE: Notice to Proceed  
ESWD WWTP Upgrade - Phase II Project

Dear CONTACT:

The Eastsound Sewer and Water District has reviewed and approved the contract bond and evidence of insurance for the aforementioned Project. Therefore, the contract has been executed.

This notice shall constitute the Notice to Proceed on the above referenced project. Contract time will begin on \_\_\_\_\_, 20\_\_\_\_. The contracted work shall be completed by no later than \_\_\_\_\_, 20\_\_\_\_ per contract requirements.

If you have comments, questions, or require further information, please do not hesitate to contact me at (360) -376-2720 DISTRICT PHONE NUMBER.

Sincerely,

EASTSOUND SEWER AND WATER DISTRICT

NAME  
District Manager

NAME  
Project Manager

CC. file  
Jeff Christner, PE – Wilson Engineering  
Ken Ziebart, PE – Department of Ecology

**\*\*\*END OF SECTION\*\*\***

# SECTION 00 61 13 – PERFORMANCE AND PAYMENT BOND FORMS

## PERFORMANCE BOND to the Eastsound Sewer and Water District

**KNOW ALL PEOPLE BY THESE PRESENTS,** That we \_\_\_\_\_  
\_\_\_\_\_ the Contractor named in the Contract hereinafter referred  
to as PRINCIPAL, and \_\_\_\_\_ as SURETY, are jointly and severally held  
and firmly bound to the Eastsound Sewer and Water District, hereinafter referred to as OWNER named in said  
Contract WWTP UPGRADE – Phase II, EASTSOUND, Washington, for the penal sum of,

\_\_\_\_\_  
DOLLARS (\$ \_\_\_\_\_),  
lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our  
heirs, assigns, administrators and successors jointly and severally, firmly by these presents.

**THE CONDITION OF THIS OBLIGATION IS SUCH,** that Whereas, the Principal entered into a contract with  
the Owner, dated the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, for such construction work with the Eastsound Sewer and  
Water District, Washington.

**NOW, THEREFORE,** if the Principal shall well, truly and faithfully perform all of the provisions and fulfill all of  
the undertakings, covenants, terms, conditions and agreements of said contract during the period of the original  
contract and any extensions thereof that may be granted by the Owner, with or without notices to the surety; and  
during the life of any guaranty required under the contract; and shall also well and truly perform and fulfill all of the  
undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of said  
contract that may hereafter be made; notice of which modifications to the surety being hereby waived, shall indemnify  
and save harmless owner from all cost and damage by reason of the principal's default of failure to do so, and shall  
pay the State of Washington sales and use taxes, and amounts due said state pursuant to Titles 50 and 51 of the Revised  
Code of Washington then this obligation to be void, otherwise to remain in full force and effect.

**IN WITNESS WHEREOF,** the above bonded parties have executed this instrument under their separate seals this  
\_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, the name and corporate seal of each corporate party hereto affixed, and these presents  
duly signed by its undersigned representatives pursuant to authority of its governing body.

Corporate Seal:

\_\_\_\_\_  
PRINCIPAL

ATTEST: (If Corporation)

By: \_\_\_\_\_

Title: \_\_\_\_\_

Corporate Seal:

\_\_\_\_\_  
SURETY

By: \_\_\_\_\_

Title: \_\_\_\_\_

**PAYMENT BOND**  
**to the Eastsound Sewer and Water District**

**KNOW ALL PEOPLE BY THESE PRESENTS: that**

\_\_\_\_\_  
(Name of Contractor)

\_\_\_\_\_  
(Address of Contractor)

a \_\_\_\_\_, hereinafter called Principal,  
(Corporation, Partnership or Individual)

and \_\_\_\_\_  
(Name of Surety)

\_\_\_\_\_  
(Address of surety)

hereinafter called **SURETY**, are held and firmly bound unto \_\_\_\_\_

\_\_\_\_\_  
(Name of Owner)

\_\_\_\_\_  
(Address of Owner)

hereinafter called **OWNER**, in the penal sum of \_\_\_\_\_ Dollars, \$(\_\_\_\_\_)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

**THE CONDITION OF THIS OBLIGATION** is such that whereas, the Principal entered into a certain contract with the **OWNER**, dated the \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_, a copy of which is hereto attached and made a part hereof for the construction of:

**NOW, THEREFORE**, if the Principal shall promptly make payment to all persons, firms, **SUBCONTRACTORS**, and corporations furnishing materials for or performing labor in the prosecution of the **WORK** provided for in such contract, and any authorized extension or modification thereof including all amounts due for materials, lubricants, oil, gasoline, coal, and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such **WORK**, and all Insurance premiums on said **WORK**, and for all labor, performed in such **WORK** whether by **SUBCONTRACTOR** or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

## PAYMENT BOND (cont.)

**PROVIDED, FURTHER**, that the said **SURETY** for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the **WORK** to be performed thereunder or the **SPECIFICATIONS** accompanying the same shall in any wise affect its obligation on this **BOND**, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the **WORK** or to the **SPECIFICATIONS**.

**PROVIDED, FURTHER**, that no final settlement between the **OWNER** and the **CONTRACTOR** shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

**IN WITNESS WHEREOF**, this instrument is executed in \_\_\_\_\_ counterparts, each one of which  
(number)

shall be deemed an original, this the \_\_\_\_\_ day of \_\_\_\_\_

**ATTEST:**

\_\_\_\_\_  
Principal  
\_\_\_\_\_  
(Principal) Secretary

(SEAL) By \_\_\_\_\_(s)

\_\_\_\_\_  
(Address)  
\_\_\_\_\_

\_\_\_\_\_  
Witness as to Principal  
\_\_\_\_\_  
(Address)

\_\_\_\_\_  
(Surety)

**ATTEST:** By \_\_\_\_\_  
(Attorney –in-Fact)

\_\_\_\_\_  
Witness as to Surety  
(Address)  
\_\_\_\_\_  
(Address)

**NOTE:** Date of **BOND** must not be prior to date of Contract.

If **CONTRACTOR** is Partnership, all partners should execute **BOND**.

**IMPORTANT:** Surety companies executing **BONDS** must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the **PROJECT** is locate

\*\*\* END OF SECTION \*\*\*

## SECTION 00 61 23 – RETAINAGE BOND FORM

### EASTSOUND SEWER AND WATER DISTRICT RETAINAGE INVESTMENT OPTION

CONTRACTOR: \_\_\_\_\_

PROJECT NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

Pursuant to Chapter 60.28 RCW, you may choose how your retainage under this contract will be held and invested. Please complete and sign this form indicating your preference. If you fail to do so, the Eastsound Sewer and Water District (the District) will hold your retainage as described in "Current Expense", option 1 below.

\_\_\_\_\_ 1. Current Expense: The District will retain your money in its Current Expense Fund Account until thirty days following final acceptance of the improvement or work as completed. You will not receive interest earned on this money.

\_\_\_\_\_ 2. Interest Bearing Account: The District will deposit retainage checks in an interest-bearing account in a bank, mutual savings bank, or savings and loan association, not subject to withdrawal until after the final acceptance of the improvement or work as completed or until agreed to by both parties. Interest on the account will be paid to you.

**BONDS AND SECURITIES ACCEPTABLE BY THE EASTSOUND SEWER AND WATER DISTRICT :**

1. Bills, certificates, notes or bonds of the United States.
2. Other obligations of the United States or its agencies.
3. Indebtedness of the Federal national Mortgage Association.
4. Time Deposits in commercial banks.

Designate below the type of investment selected:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_ 3. Bond-in-Lieu: With the consent of the District, the contractor may submit a bond for all or any portion of the amount of funds retained by the District in a form acceptable to the District and from a bonding company meeting standards established by the District, if any. Unless otherwise indicated, the contractor elects to submit a bond for the entire 5% retainage amount. Such bond and any proceeds there from shall be made subject to all claims and liens and in the same manner and priority as set forth for retained percentages in Chapter 60.28 RCW. Whenever the District accepts a bond-in-lieu of retained funds from a contractor, the contractor shall accept like bonds from any subcontractors or suppliers from which the contractor has retained funds. The contractor shall then release the funds retained from the subcontractor or supplier, to the subcontractor or supplier, within thirty days of the contractor's receipt of the retained funds from the District.

Retainage is normally released 30 - 45 days after final acceptance of work by the District, or following receipt Employment Security / Department of Revenue clearance, whichever takes longer.

\_\_\_\_\_  
(Contractor's Signature) Date

Title: \_\_\_\_\_

\*\*\* END OF SECTION \*\*\*

## **SECTION 00 73 00 – SUPPLEMENTARY CONDITIONS**

### **SUPPLEMENTAL CONDITIONS**

The following supplementary conditions modify WSDOT Standard Specifications. If there are any conflicts between these Supplemental Conditions and the Standard Specifications, these Supplemental Conditions shall take precedence.

#### **1. DOCUMENTS INCORPORATED BY REFERENCE**

The following documents are incorporated by reference, to include, but not be limited to:

- Specifications
- Proposal
- Drawings
- Contract
- WSDOT Standard Specifications Plans for Road, Bridge and Municipal Construction, 2024 Edition
- Washington State Department of Ecology Water Pollution Control Revolving Fund Specifications Insert revised 1/22/2021 (included in Section 00 53 00)

#### **2. CONFLICT AND PRECEDENCE**

In the event of any conflicting provisions or requirements between the component parts of the Contract Documents, the component parts shall take precedence in the following order:

1. Change Orders
2. Contract Form
3. Addenda
4. Permits and requirements from governmental agencies
5. Drawings
6. Supplemental Conditions
7. Technical Specifications
8. EASTSOUND District Standards
9. WSDOT Standard Drawings & Details
10. WSDOT Standard Specifications

#### **3. CONTRACT PLANS AND SPECIFICATIONS**

Five (5) sets of Contract Documents, three (3) sets of 11"x 17" plans, Two (2) sets of 24"x 36" plans, and a CD with Contract Documents and plans in PDF will be furnished to the Contractor free of charge. Additional sets may be purchased at the advertised price per set.

#### **4. EXAMINATION OF PLANS, SPECIFICATIONS AND SITE OF WORK**

The bidder shall carefully examine the proposed work site (including material sites), and the contract documents. Submittal of a bid shall be conclusive evidence that the bidder has made these examinations and understands all requirements for the performance of the completed work.

The Contractor shall make deductions and conclusions as to the nature of the materials to be excavated, the difficulties which may arise from subsurface conditions, and of doing any other work affected by the subsurface conditions and shall accept full responsibility. The accuracy of information furnished by the Owner and/or Engineer and/or the plans and specifications as to underground structures, foundation conditions, character of soil, position and quantity of surface and ground water, etc., is not guaranteed. Bidders must satisfy themselves by personal examination and by such other means as they desire with respect to actual conditions in regard to existing groundwater or surface structures. Unforeseen conditions shall not constitute a claim for additional payment under the terms of the contract or constitute a basis for cancellation thereof.



The Specifications do not necessarily discuss complete details of construction, work or materials, performance or installation, and do not necessarily cover construction details or other items of work or fixtures of equipment may affect any installation. These details must be ascertained by the Contractor and correlated to bring the parts together to a completed whole.

Where alternate methods have not been brought to the Owner's attention, it is assumed that the Contractor has figured the costlier method or methods.

5. WORK AND MATERIALS

In addition to the requirements stated in this contract document, the following shall apply:

All work and materials under this contract shall conform to the 2024 Edition of *Standard Specifications for Road, Bridge and Municipal Construction* as prepared by Washington State Department of Transportation (WSDOT) and Washington State Chapter of American Public Works Association (APWA), and according to the instructions and recommendations of the manufacturer of the material concerned. In case of a conflict between any of the above referenced Standards, the more stringent shall apply.

References throughout the above mentioned Standard Specifications to "State" or "Owner" shall refer to the Eastsound Sewer and Water District.

6. OMISSIONS AND DISCREPANCIES

Upon receipt of Award of Contract, the Contractor shall carefully study and compare all drawings, specifications and other instructions and shall, prior to ordering material or performing work, report in writing to the Owner any error, inconsistency or omission not discovered at the pre-bid meeting. If during the accomplishment of the work, a discrepancy is found between the drawings and the physical condition of the locality, it shall be the Contractor's duty to inform the Owner in writing, and the Owner shall promptly verify the same. Any work done after such discovery, until authorized, will be done at the Contractor's risk.

Minor items of work or material omitted from the original plans or specifications, but clearly inferable from the information presented and which are called for by accepted good practice, shall be provided and/or performed by the Contractor as part of the original bid.

7. SURVEYS, PERMITS, REGULATIONS

The Contractor is responsible for providing construction staking for the project. The Engineer has established horizontal references and vertical grade datum for the Contractor's use. The Contractor shall be responsible for protection and preservation of the established reference points.

The bidder shall be familiar with all Federal, State, and local requirements that affect the completion of work in any way (such as laws, ordinances, or rules affecting employees, subcontractors, materials, equipment or procedures). In addition, the Contractor must comply with the following Washington State Laws, including without limitation: Chapter 60.28 RCW (retainage); 39.08 RCW (bond requirements); 18.27 RCW (contractor registration); 35.22.650 RCW (equal opportunity); and 70.92 RCW (handicapped). The Owner will not consider any plea of misunderstanding or ignorance of such requirements.

The Owner will assist with coordinating District permit applications, if needed. The Contractor is to pick up the Land Disturbance permit from the District and fill-out remaining information required, prior to mobilization. However, the Contractor will be responsible for providing submittal information, as needed (including shop drawing, mechanical, and plumbing information) to the Engineer/District (if requested). Temporary permits, easements, and other Non-District permits shall be acquired by the Contractor (if needed).

Contractor is required to pick up the Building Permit from San Juan County and fill-out remaining information required, prior to construction. The County is currently processing a building permit and a land use permit for this project. The new Building Permit is #21-0385.

8. EXISTING UTILITIES

The location of all existing utilities shown on the plans is per the best available information, and is therefore approximate only. The Owner/Engineer does not guarantee the accuracy of this information. The contractor shall take whatever measures deemed necessary to verify the accuracy of this information and the cost of such shall be incidental to the bid.

Forty-eight (48) hours prior to starting construction, the Contractor shall contact the Eastsound Sewer and Water District and Underground Utility Locate (if needed). All costs incurred by the Contractor in complying with the requirements of this Section shall be incidental to the entire project and shall be included in the contract price.

9. CONNECTIONS TO EXISTING MAINS (WATER MAINS AND SEWER FORCE MAINS)

Connection to existing mains is the full responsibility of the Contractor. Temporary routing of existing pipelines or services, shoring, temporary thrust blocks, extra fittings required to route the pipe over or under existing or new pipe or other utilities and all other work and materials required for making complete, permanent and workable connections are incidental to other items of work.

The Contractor shall be responsible for determining which residents will be affected by shutoffs, and will notify them in writing (with a copy provided to the District) 24 hours in advance. In addition, the Contractor shall notify private property owners or tenants, by having a representative of the Contractor personally contact the private property owner or tenant. If the property owner or tenant is not available, the Contractor shall leave a door hanger notice indicating the commencement date of work, duration of work, the type of work being done, and the Contractor's and Engineer's phone number and address for questions and concerns. The Engineer shall be provided adequate time to review, comment, and approve the door hanger notice prior to the Contractor placing any notices.

The Contractor shall locate and verify the type of pipe, size and depth prior to making the connection. Detailed sketches and plans of the connection proposed by the Contractor shall be given to the Engineer not less than one week prior to the expected construction. The Eastsound Sewer and Water District shall be notified not less than two (2) working days prior to connection to existing mains.

10. SUBSURFACE CONDITIONS

The CONTRACTOR shall make deductions and conclusions as to the nature of the materials to be excavated, the difficulties which may arise from subsurface conditions, and of doing any other work affected by the subsurface conditions and shall accept full responsibility. The accuracy of information furnished by the OWNER and/or ENGINEER and/or the plans and specifications as to underground structures, foundation conditions, character of soil, position and quantity of surface and ground water, etc., is not guaranteed. Bidders must satisfy themselves by personal examination and by such other means as they desire with respect to actual conditions in regard to existing groundwater or subsurface structures. Unforeseen conditions shall not constitute a claim for additional payment under the terms of the contract or constitute a basis for cancellation thereof.

PLAN AND PROCEDURES FOR THE UNANTICIPATED DISCOVERY OF CULTURAL RESOURCES AND HUMAN SKELETAL REMAINS - The **Inadvertent Discovery Plan (IDP)** is included in Part 4 – Reference Documents, Appendix G.

11. **TRAFFIC CONTROL**  
Traffic shall be maintained in accordance with WSDOT Section 1-07.23 of the WSDOT Standard Specifications and Manual of Uniform Traffic Control Devices. The Contractor shall not close any roadway without first obtaining authorization from the district. The cost for all necessary traffic control by the Contractor shall be incidental to the entire project and shall be included in the contract price.
12. **SUBCONTRACTING**  
The Contractor shall perform work amounting to a minimum of 50% percent of the Awarded Contract Price using his own personnel and equipment. All subcontracting shall be in conformance with WSDOT Section 1-08.1 of the WSDOT Standard Specifications.
13. **PRE-CONSTRUCTION CONFERENCE**  
A Pre-Construction conference shall be held at a time and place fixed by the Owner which will be within two weeks from the date of notification of award of contract. At a minimum, the Contractor's project manager and field superintendent are required to attend. Sub-contractors, suppliers and others interested are encouraged to attend.
14. **HOURS OF WORK**  
The Contractor shall schedule operations so that the work will be performed during the hours of 7AM to 5PM Monday through Friday, excluding holidays. A normal 40-hour Monday through Friday work week (4 – 10hr or 5 – 8hr days) is intended. The Contractor shall compensate the District \$150 per hour for each hour over 40 hours per week worked to pay for additional inspection time. The Contractor shall obtain prior approval from the District for overtime hours and schedules. The District observes the same holiday schedule as San Juan County. The holiday schedule is available here: <https://www.sanjuancountywa.gov/494/County-Holidays>
15. **COMPLETION DATE**  
The contracted work is to be completed by no later than Dec. 3, 2027. The Contractor will be limited to 625 working days (125 weeks) on-site work. The Contractor shall plan accordingly to meet this completion requirement.
16. **SCHEDULE OF CONSTRUCTION & VALUES**  
Within 10 working days of receiving the notice to proceed, the contractor shall furnish to the District a Schedule of Values. In addition, the Contractor shall furnish a Schedule of Construction at the Pre-Construction Meeting. The Schedule shall identify the project start and finish dates with a detailed breakdown of the proposed order of work and completion dates for major phases of the work. The schedule shall be developed by a critical path method. Time required for testing, backfiring, inspections, ordering, punch lists, etc. shall be incorporated into the schedule (although they do not necessarily need to be specifically identified).
17. **RETAINAGE**  
The owner will deduct from the partial pay estimate a retainage of five percent (5%). Upon completion of all work, specified training, final inspection, and acceptance by Owner, the amount retained under the Contract will be paid within thirty (30) days following final acceptance by Owner and receipt by the Owner of the following:
  - State Department of Labor and Industries Release
  - Washington State Department of Revenue Release
  - Washington State Employment Security Department Release
  - Contractor and Subcontractors Affidavit of Wages Paid

The retainage will not be released if any claim has been filed on the project.

18. LIQUIDATED DAMAGES

Liquidated damages will be assessed in accordance with WSDOT 1-08.9 for each working day beyond the Contracted completion date. Liquidated damages for failure to complete the physical Work of a Contract on time shall be as follows:

$$LD = \frac{0.15C}{T}$$

Where:

LD = liquidated damages per working day (rounded to the nearest dollar)

C = original Contract amount

T = original time for Physical Completion

19. PHYSICAL COMPLETION FOR WWTP UPGRADE

Completion of the WWTP UPGRADE shall be defined as follows, with no exceptions:

Substantial completion of the WWTP UPGRADE shall be defined as follows, with no exceptions:

The new wastewater facility shall be able to be put to beneficial use. This shall include construction of the new dewatering building, new screw conveyor, new sludge box cover system, lab room improvements, train 1 upgrade, train 2 upgrade, yard piping, electrical, instruments, controls, SCADA/PLC programming, and misc. wastewater facilities. The new wastewater facility will be on-line and functioning per project requirements.

Final completion of the WWTP UPGRADE shall be defined as follows, with no exceptions:

The entire project shall be complete and put to beneficial use. This shall include removal of temporary pump/process equipment, remaining site work, surfacing, performance testing, and all cleanup complete. In addition, all record drawing information and all affidavits of prevailing wage rate payment are to be provided to the Owner and Engineer.

20. PAYMENT TO CONTRACTOR

At least five (5) working days before the end of the month, the Contractor shall submit to the Engineer an itemized application for payment, supported by receipt or other vouchers, showing payments for materials and labor, payments to sub-contractors, and such other evidence of the Contractor's right to payment as the Engineer may direct. The Owner's progress payment shall be made approximately 30 days after the date of submittal.

The owner will deduct from the partial pay estimate a retainage as defined above. Upon completion of all work, final inspection, and acceptance by Owner, the amount retained under the Contract will be paid at the expiration of the thirty (30) day period following final acceptance by owner provided the following conditions are met:

- A. Releases have been obtained from the State Department of Labor and Industries, the State of Washington Employment Security Department, the Washington State Department of Revenue, and all other departments and agencies having jurisdiction over the activities of the Contractor.
- B. No claims, as provided by law, have been filed against the retained percentage.
- C. Affidavit of Wages Paid is on file with the Owner for the Contractor and all Subcontractors.

- D. All contract work is complete in every respect, including operations and maintenance manuals, as-built drawings, etc.

21. INDEMNIFICATION

The Contractor agrees to protect, indemnify, and hold harmless the Owner, Engineer and their employees, agents, and staff, from all claims, liabilities, damages, expenses, or rights of action, directly or indirectly attributable to the Contractor's activities in connection with this contract, except for the sole negligence of the Owner or Engineer as outlined in Section WSDOT 1-07.14.

22. RECORD DRAWINGS

Before receiving payment for more than 90% of the work or declaring physical completion of the work, the Contractor will provide the Owner with accurate record information of all construction activity for the entire project (red line drawing on a full-size print). This red line drawing shall include, but not be limited to, any changes to the project and the exact location of all constructed utilities and any other existing utilities discovered during construction that are not identified on existing record information. The red line drawing shall be based on accurate field measurements tied to project benchmarks. The Owner will use this information to prepare Record Drawings. The cost for furnishing this record information shall be considered incidental to the entire project and shall be included in the contract price.

23. BARRIER REQUIREMENTS

During construction, the Contractor shall always maintain satisfactory and substantial temporary fencing, railing, barricades or steel plates at all openings, obstructions or other hazards. All such barriers shall have warning signs or lights as necessary for safety. Safe access to and protection of the construction site and the Contractor's records shall be maintained always.

24. CONTROL OF WORK

The presence or absence of an Inspector at the job site will be at the sole discretion of the Owner and such presence, or absence, of an Inspector will not relieve the Contractor of his responsibility to obtain the construction results specified in the Contract Documents. The Owner, inspector and engineer do not purport to be Safety Engineers and are not engaged in that capacity and shall have neither authority nor responsibility to enforce construction safety laws, rules, regulations, procedures or the safety of persons on and about the construction site. Any personal assistance which an Inspector may give the Contractor will not be construed as the basis of any assumption of responsibility in any manner, financial or otherwise, by the Owner, Inspector, or the Engineer. The Inspector is on site to insure the project is completed in accordance with all plans and specification, to insure the Owner is getting what is required. He is not there to do the Contractor's scheduling or contact his subs or deliver messages.

25. BLASTING

Blasting is not anticipated and will not be permitted without expressed written consent of the Owner. If blasting is permitted, contractor is responsible for obtaining all necessary permits and insurance.

26. INSURANCE

The Contractor shall take out and maintain during the life of this contract Public Liability Insurance for bodily injury and property damage liability including without limitation, coverage for explosion, blasting, collapse and destruction of underground utilities (X.C.U.) and contingent liability, including products and completed operations and blanket contractual liability, as shall protect the Contractor, the Owner and the Engineer. The Contractor shall have the Owner and the Engineer specifically added as additional named insured in said policies (on Form B), all at no cost to the Owner or the Engineer. The above insurance shall cover the Owner, the Engineer, Contractor and Subcontractors for claims or damages for bodily injury, including wrongful death, as well as other claims for property damage which may arise from operations under this contract whether such

operations be by themselves or by any subcontractor or anyone directly or indirectly employed by either of them. The Contractor agrees, in addition, to indemnify and save harmless the Owner and Engineer, either or both, from all suits, claims, demands, judgements, and attorney's fees, expenses or losses occasioned by the performance of this Contract by the Contractor or Subcontractor or persons working directly or indirectly for the Contractor or Subcontractor, or on account of or in consequence of any act or omission of any such person, including but not limited to neglect in safeguarding the work, or failure to conform with the safety standards for construction work adopted by the Safety Division of the Department of Labor and Industry of the State of Washington.

The amount of such insurance shall be as follows:

Bodily injury liability insurance in an amount not less than \$1,000,000.00 for injuries, including wrongful death, to any one person and subject to the same limit for each person, in an amount not less than \$2,000,000.00 on account of any one occurrence, and property damage liability insurance in an amount not less than \$1,000,000.00 for each occurrence. Builders Risk (All Risk Insurance) coverage equal to project bid amount.

The Contractor shall not cause any policy to be canceled or permit it to lapse, and all policies shall include a clause to the effect that the policy or certificate shall not be subject to cancellation or to a reduction in the required limits of liability or amounts of insurance or any other material change until notice has been mailed to the Engineer and Owner stating when, not less than thirty (30) days thereafter, such cancellation or reduction or change shall be effective. In the event notice of cancellation is received by the Owner, the Contractor shall immediately obtain other comparable insurance acceptable to the Owner and provide proof thereof to the Owner. In the event the Contractor is unable to obtain and provide such insurance, the Contractor shall immediately cease all work on the project, save and except that which is necessary to secure the site and prevent injury.

All certificates of insurance, authenticated by the proper officer of the insurer, shall state in particular those insured, the extent of the insurance, the location and operations to which the insurance applies, the expiration date, and the above-mentioned notice of cancellation clause.

Provided, however, the Owner may accept insurance covering a Subcontractor in character and amounts less than the standard requirements set forth under this subsection where such standard requirements appear excessive because of the character or extent of the work to be performed by such subcontractor.

A Certificate of Insurance evidencing coverage and a copy of the endorsement naming the Owner and Engineer as additional insured must be submitted to the Engineer prior to the commencement of the Contract in accordance with WSDOT Section 1-03.3.

The following endorsement for additional insured shall be included in all applicable policies and on the Certificate of Insurance:

The Owner and Engineer are additional named insured for all coverages provided by the policy of insurance and shall be fully and completely protected from all claims and risks by this policy and for any and every injury, death, damage, and/or loss of any sort whatsoever, including consequential damages, sustained by any person, organization or corporation in connection with any activity performed by the Contractor or any subcontractors or by anyone directly or indirectly by virtue of the provisions of that contract between the (Owner name), as Owner and (Contractor's name), entitled (Project Title), dated (date).

The coverages provided by this policy to the Owner or any other named insured shall not be terminated, reduced, or otherwise modified in any respect without providing at least 30 days prior written notice by certified mail to the Owner and other additional named insured. The coverages provided by this policy are primary to any insurance maintained by the Owner.

Third-Party Beneficiary: All parties agree that the State of Washington shall be, and is hereby, named as an express third-party beneficiary of this contract, with full rights as such.

27. CHANGES

The Owner reserves the right to make changes in the work within the general scope of the Contract Documents at any time during the progress of the work. The Contractor shall perform all work in accordance with the changes specified by the Owner.

Changes required by the Owner may include but are not limited to:

- (a) Deletion of any portion of the work.
- (b) Increases or decreases in quantities.
- (c) Changes in specifications and/or designs.
- (d) Method or manner of performance of the work.
- (e) Addition of any new work.
- (f) Acceleration or delay in the performance of the work.

The Owner shall have the option of paying for such changes by one or more of the following methods:

- (1) by the lump sum or unit contract prices set forth in the Proposal;
- (2) by equitable adjustment mutually agreed upon by the Contractor and the Owner; or
- (3) by Force Account in accordance with WSDOT Section 1-09.6

In the case that the Contractor and the Owner are unable to agree on the amount of equitable adjustment, the Owner will unilaterally determine the amount to be paid for the change in accordance with WSDOT Section 1-09.4. The Owner's decision concerning such amount to be paid shall be final as provided in WSDOT Section 1-05.1.

All administrative costs associated with change orders shall be considered to be part of the Contractor's overhead for the work as bid and not a direct cost of the change. Such administrative costs shall include, but not be limited to, costs of defining changed work, determining estimated cost of changed work, preparing proposals for change orders and negotiation of the method and amount of compensation for changed work.

The compensation for each change shall include all direct and indirect costs including, but not limited to, costs of impacts on related and indirect operations and of delay or acceleration of other work resulting from the change. Failure of the Contractor to identify all direct and indirect costs at the time of negotiation of compensation for each changed shall preclude subsequent claim, after formal execution of a change order, by the Contractor for any additional costs associated with the change.

No payment for extra work or any other change in the contract will be made unless the extra work or change has been authorized by the Owner prior to start of the extra work by the Contractor.

For (a) Deletion of any portion of the work, above, the following requirements shall apply:

No payment will be made for items which are deleted from the contract and not performed. No payment will be made for any anticipated profits which would have been earned on work deleted. Payment for costs incurred by the Contractor prior to the deletion of the work shall include and be limited to actual documented costs of field labor, equipment and materials and shall not cover and include overhead as defined in WSDOT Section 1-09.6.

Acceptable materials ordered by the Contractor or delivered on the work prior to the date of cancellation of the work will be either purchased from the Contractor by the Owner at the actual

cost and shall become property of the Owner or the Owner will reimburse the Contractor for his actual costs connected with returning these materials to the suppliers.

For (b) Increases or decreases in quantities, above, the following requirements apply:

Payment for all bid items shall be at the unit prices bid, regardless of the actual final quantities of the bid items incorporated into the work and regardless of any increase or decrease from the quantities designated in the Schedule of Contract Prices.

No extra or additional payment will be made for any increase in quantity of any bid item. No extra or additional payment will be made for any decrease in quantity of any bid item. No payment will be made for any anticipated profits which would have been earned on deleted quantities.

For (c) Changes in specifications and/or designs; (d) Addition of any new work; and (e) Acceleration or delay in the performance of the work above, the following requirements shall apply:

If the Engineer determines that the above changes cause an increase or decrease in the Contractor's cost of performance of that portion of the work associated with the change and/or an increase or decrease in the contract time required for performance of the work, the increase or decrease in compensation and/or contract time will be determined by agreement of the parties.

28. INCREASED OR DECREASED QUANTITIES

The Contractor shall not purchase or place orders for full quantities of materials until the work has advanced to a state permitting the determination of the exact quantities required. The original bid item quantities designated on the Proposal and other estimates of quantities of materials furnished by the Engineer shall be considered as approximate and not indicative of the actual quantities required. The Owner will not be responsible for any materials purchased in excess of actual requirements and will not be responsible for any increased costs or extra expense that the Contractor may have on account of materials or work not being ordered at some earlier date.

29. SALES TAX

The work is within the Eastsound Sewer and Water District in San Juan County. The Contractor shall correctly reference on payments of sales tax to the Washington Department of Revenue EASTSOUND's tax code.

30. GUARANTEES

Except where special longer warranties are required, the Contractor shall guarantee all materials and workmanship for a period of one year from the date of Substantial Completion of the project.

Neither final acceptance by the Owner nor partial and final payment nor any provision in the Contract Documents shall relieve the Contractor of responsibility for faulty materials or workmanship.

If, prior to the expiration of one year after the date of the District's acceptance of all work or such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Contract Documents, any work is found to be defective or not in compliance with the Contract Documents, the Contractor shall promptly, without cost to Owner, either correct such work, or, if it has been rejected by Owner, remove and replace it with acceptable work. If the Contractor does not promptly comply with the notification issued by the Owner for correction of defective and/or non-complying work and have the defect completely repaired within 30 calendar days, the Owner may have the work corrected or removed and replaced and all direct and indirect costs of such removal and replacement, including costs of all professional services, shall be paid by Contractor.



The guarantee shall apply to all elements and parts of the work, regardless of knowledge by the Owner, engineer and inspector(s) of defects or deficiencies and regardless of failure of the Owner, Engineer and/or inspector(s) to inform the Contractor of known or suspected defects or deficiencies prior to Substantial Completion of the work by the Owner.

All subcontractor's, manufacturers', and suppliers' warranties and guarantees, express or implied, for any part of the work, materials and equipment shall be deemed obtained and shall be enforced by the Contractor for the benefit of the Owner without the necessity of formal transfer or assignment thereof. Warranties and guarantees by subcontractors, manufacturers, and suppliers shall begin on and extend for one year after the date of Substantial Completion of all work.

All work (including materials and equipment) repaired or replaced in accordance with this Section shall be guaranteed for a period of one year after the date of District's acceptance of the repair/replacement work.

31. ECOLOGY CLAUSE

It is anticipated that this project will be funded in part by the Washington State Department of Ecology. Neither the State of Washington nor any of its departments or employees are, or shall be, a party to this contract or any subcontract.

32. THIRD-PARTY BENEFICIARY CLAUSE

All parties agree that the State of Washington shall be, and is hereby, named as an express third-party beneficiary of this contract, with full rights as such.

33. ENVIRONMENTAL PROTECTION CLAUSE

**Protection of the Environment:** No construction related activity shall contribute to the degradation of the environment, allow material to enter surface or ground waters, or allow particulate emissions to the atmosphere, which exceeds State or Federal standards. Any actions that potentially allow a discharge to State waters must have prior approval of the Washington State Department of Ecology.

34. DAVIS BACON CLAUSE

The Successful bidder will be required to conform to the wage requirements prescribed by the federal Davis-Bacon and Related Acts which requires that all laborers and mechanics employed by contractors and subcontractors performing on contracts funded in whole or in part by SRF appropriations in excess of \$2,000 pay their laborers and mechanics not less than the prevailing wage rates and fringe benefits, as determined by the Secretary of Labor, for corresponding classes of laborers and mechanics employed on similar projects in the area.

35. PREVAILING WAGE RATE CLARIFICATION

All work performed on this project will be subject to the higher of the prevailing state or federal wage rates.

\*\*\* END OF SECTION \*\*\*

## **PART 3 - TECHNICAL SPECIFICATIONS**

## **SECTION 01 11 10 – SUMMARY OF WORK**

### **PART 1. GENERAL**

#### **1.01 WORK COVERED BY CONTRACT DOCUMENTS**

- A. The work covered by the Contract Documents consists of furnishing all labor, equipment and materials necessary for the construction of all of the WWTP improvements and miscellaneous site improvements as shown on the plans and specified herein.
- B. Contractor shall furnish all labor, tools, equipment and materials not pre-purchased or supplied by the Owner. In addition, the Contractor shall provide demolition, shoring, bracing, sheeting, cribbing, falsework, pumping, dewatering, drainage, forms, and all material as required or necessary to demolish, excavate, backfill, grade, construct, lay, erect, install, test, and clean-up site. The work shall consist of, in general, the expansion of the existing wastewater treatment plant.

A more detailed summary of the work is included in Section 00 24 13 SCOPES OF BID.

#### **1.02 WORK AND RESPONSIBILITIES**

- A. Unless otherwise indicated, work and responsibilities include, but are not limited to the following:
  - 1. Providing and paying for labor, materials, equipment, tools, machines, facilities, and services necessary for execution and completion of work.
  - 2. Paying required taxes.
  - 3. Giving required notices.
  - 4. Enforcing strict discipline and good order among employees.
  - 5. Using new materials, except as noted.
  - 6. Maintaining required egress and other requirements in accordance with governing Codes and Ordinances throughout the work.
  - 7. Obtaining and paying for required permits, fees and notices, see General Conditions.

#### **1.03 SEQUENCE/PHASING**

- A. These documents are not to be interpreted implicitly or explicitly as definition of procedure and sequence of operations. Order as to procedure and sequence of operations are Contractor options, consistent with contract documents and as approved by Owner. A preliminary construction phasing plan is included in Section 00 31 13 PRELIMINARY PROJECT PHASING.
- B. Site Work: Proposed stockpiling areas must be approved by the Owner.

#### **1.04 COOPERATION AND COORDINATION**

- A. Contractor is responsible for coordinating and scheduling work of subcontractors to expedite progress of the Project.
- B. Subcontractor Instructions: Subcontractors to become familiar with Conditions of the Contract and the work of other Sections related to their own work.
- C. Project Coordination and Scheduling Control: Responsibility for coordination and close adherence to time schedules rests solely with the General Contractor who shall maintain coordination and scheduling control at all times.

- D. Each separate contractor and each subcontractor responsible to the General Contractor shall cooperate diligently with the General Contractor in the execution of their work so as to cause no delay in the completion of the Project. This responsibility includes the completion of all work in a timely manner and all items of equipment connected and fully operating at the time of Substantial Completion. Each separate contractor and each subcontractor shall diligently comply with the following requirements:
1. Inform other trades of requirements at proper time to prevent delay or revisions.
  2. Be informed on the requirements of other trades and check own work for conflicts with the work of other trades.
  3. Insure delivery of materials and performance of work on coordinated schedule with other trades.
  4. Contractor is to ensure the subcontractors and equipment suppliers are responsible for compatibility and completeness of the installation and operation of the equipment in their respective Specification Sections including conformance with code requirements. If power, piping, conduit, or other work required for complete installation is not provided by others to equipment location or is not adequate for complete installation, the subcontractor or equipment supplier shall be responsible for providing the necessary connections.
- E. Notification and Correction of Defective Work: Before starting a section of work, each contractor and subcontractor shall carefully examine all preparatory work that has been executed to receive his work. Check carefully, by whatever means required, to ensure that the work and adjacent, related work will finish to proper contours, planes, and levels. Promptly notify the Contractor of any defects or imperfections in preparatory work which will in any way affect satisfactory completion of the work. Under no condition shall a section of work proceed prior to preparatory work having been completed, cured, dried, or otherwise made satisfactory to receive such related work. Correction of defective work shall be the responsibility of the contractor or subcontractor providing the defective work. Correction of work due to underlying defects shall be the responsibility of the contractor or subcontractor providing work.
- F. Intent of Drawings: The work of each contractor and subcontractor shall conform to the intent of the contract drawings. Drawings showing work of other trades are partly diagrammatic and do not intend to show in details all features of work. Each contractor shall carefully review and compare related drawings and shall thoroughly understand the building conditions affecting their work. All changes required in the work caused by failure to do so shall be at no expense to the Owner. The design is based upon dimensions and requirements for the equipment of the "first-named" manufacturer. All changes required in the work caused by the use of an approved "substitute" to the first-named manufacturer shall be at no expense to the Owner.
- G. Interference's and Right-Of-Way: Make proper provisions to minimize interference's. Where conflicts occur, gravity drainage improvements have right-of-way over mechanical and electrical work; electrical work has right-of-way over landscaping work. Submit conflicts which cannot be resolved by right-of-way to Engineer for instructions.
- H. Cooperate and coordinate with any other separate Contractors under Contract with the Owner.

#### **1.05 CONSTRUCTION STAGING AREA**

- A. Coordinate staging areas with the District.

## **1.06 EXISTING UTILITIES**

### **A. Administrative Requirements**

1. The Contractor is advised that underground excavation is regulated under RCW Chapter 19.122. Included therein are the following requirements:
  - a. 48-hours before beginning any excavation work, the Contractor shall inform local utilities through the utility one-call locator service at (800) 424-5555 or 811;
  - b. Protect existing utilities in the vicinity of excavation work;
  - c. In the event of any damages, notify the utility purveyor and the utility one-call locator service immediately;
  - d. Immediately repair any damaged utilities deemed to be an emergency;
  - e. Coordinate non-emergency repairs with the utility purveyor;
  - f. Provisions for assigning the financial liability of any repair work.
  - g. Further, the Contractor is required to contact the Engineer, Wilson Engineering, LLC (Jeff Christner, P.E.), 48-hours before starting construction at (360) 733-6100.

### **B. Field Protection Requirements**

1. Utilities of record are shown on the Drawings insofar as possible to do so. These, however are shown for convenience only and the Owner and his representatives assume no responsibility for improper locations or failure to show utility locations on the Drawings. At Contractor's expense, immediately repair utilities damaged during construction.

## **1.07 MISCELLANEOUS**

### **A. Additional work items include, but are not limited to:**

1. Maintaining a pedestrian and vehicular access to and around existing projects.
2. Not unreasonably encumbering site with materials or equipment.
3. Assuming full responsibility for protection and safekeeping of products stored on premises.
4. Moving any stored products interfering with any other Contractors.
5. Obtaining and paying for use of additional storage or work areas needed for operations.
6. Restoration of any damage to existing improvements adjacent to work site.
7. Moving and replacing items incidental to completion of the work including mailboxes, fences, small shrubs and trees, street signs, yard decorations, etc.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 01 31 00 – PROJECT COORDINATION**

### **PART 1. GENERAL**

#### **1.01 DESCRIPTION OF WORK**

- A. Project meetings will be held to accomplish the following:
  - 1. Coordinate the work of the project and resolve any conflicts or construction problems.
  - 2. Establish a sound working relationship between the Contractor, Owner, and Engineer.
  - 3. Establish sound working procedures.
  - 4. Review job progress and quality of work.
  - 5. Expedite the work to completion within the scheduled time limit.
- B. Representatives of Contractors, subcontractors, and suppliers attending the meetings shall be qualified and authorized to act on behalf of the entity each represents.

#### **1.02 RELATED SECTIONS:**

- A. Related work specified elsewhere:
  - 1. Section 00 25 13 – Pre-Bid Conference
  - 2. Section 00 31 13 – Preliminary Project Phases
  - 3. Section 01 11 00 – Summary of Work
  - 4. Section 01 33 00 – Submittals:

#### **1.03 PRECONSTRUCTION MEETING**

- A. The pre-construction meeting will be scheduled within the time frame identified in the General Conditions after the Notice to Proceed has been issued. The Owner will notify the Contractor as to the time and place of the meeting.
- B. Present at the meeting shall be a representative of the Owner, the Engineer, the Contractor, Project Superintendent, and major subcontractors.
- C. The Contractor must be prepared for a thorough discussion and review, as well as revisions which may be deemed necessary in the opinion of the Owner, of the following:
  - 1. General project information
  - 2. Responsibilities of all involved parties
  - 3. Content of the contract
  - 4. Contractor's schedule
  - 5. Project Phasing and Schedule of construction
  - 6. Penalties and Liquidated Damages
  - 7. Subcontracts
  - 8. Status of Owner furnished materials
  - 9. Change order procedures
  - 10. Staking of work

11. Project inspection
12. Acceptance of work
13. Labor standards requirements
14. Rights-of-way and easements
15. Placement of project signs and posters
16. Handling of disputes
17. Additional issues as required.

#### **1.04 PROGRESS MEETINGS**

- A. Unless otherwise required, progress meetings will be held by the Owner on a weekly basis at a location near the site. Present at these meetings shall be the Contractor, subcontractors and suppliers as required, the Owner and other interested parties, i.e., material suppliers, public utility, etc.
- B. The Contractor must be prepared for a thorough discussion and review, as well as revisions which may be deemed necessary in the opinion of the Owner, of the following:
  1. Review work since previous meeting.
  2. Make field observations and address any conflicts or problems.
  3. Review material delivery schedules
  4. Review work progress including any issues that may impact project schedule.
  5. Review submittal schedule.
  6. Maintenance, testing and quality standards.
  7. Review any proposed changes.
  8. Review pay requests and procedures.
- C. The Owner shall preside over progress meetings. The Engineer shall be responsible for taking minutes, recording all significant proceedings and decisions. Copies of minutes shall be distributed within one week after the meeting.

#### **1.05 SCHEDULE**

- A. The Contractor shall develop and submit a preliminary construction progress schedule for the contracted work. This schedule shall be submitted to the Owner within 10 days of Contract Award.
- B. Schedule shall be a critical path diagram depicting the first day of each week and sized to be legible and permit notations and future revisions.
- C. Schedule shall be arranged chronologically by the start date of each item, and consider the following:
  1. The estimated construction progress schedule shall:
    - a. Show complete sequence of construction by activity.
    - b. Show start and stop dates of each major construction element.
    - c. Show projected percent completion for each major construction element at the first of each month.
  2. Through construction, the Contractor shall record progress of each major construction element.

3. Revisions shall show changes relative to previously submitted schedules and updated projections of progress and completion.
  4. The schedule shall be updated on a monthly basis and submitted with the pay estimate.
- D. The schedule and all subsequent revisions shall be kept at the Contractor's field office with copies available for the Engineer and Owner.

**\*\*\*END OF SECTION\*\*\***



## **SECTION 01 33 00 – SUBMITTAL PROCEDURES**

### **PART 1. GENERAL**

#### **1.01 DESCRIPTION OF WORK**

- A. Summarize, but not necessarily a complete listing, submittals required of the Conditions of the Contract and the General Requirements.
- B. General procedures for specification submittals. Specific requirements for submittals are included in the individual sections.

#### **1.02 RELATED SECTIONS**

- A. Related work specified elsewhere:
  - 1. Section 00 73 00 – Supplementary Conditions
  - 2. Section 01 70 00 – Contract Closeout

#### **1.03 SUBMITTAL SCHEDULE**

This listing of submittals is a checklist for the Contractor's convenience and is not an exhaustive listing of provisions of any law or the requirements of these Contract Documents. The Owner reserves the right to amend this list.

- A. With his bid, the Contractor shall furnish the following:
  - 1. Bid Proposal (Section 00 41 00 BID PROPOSAL)
  - 2. Bid Guarantee (Section 00 43 13 BID BOND or other type of Bid Guarantee),
  - 3. Certification of Nonsegregated Facilities (Attachment 3 of Section 00 73 00 SUPPLEMENTAL CONDITIONS),
  - 4. EPA Form 6100-3 DBE Program Subcontractor Performance Form (Attachment 6 in Section 00 73 00 SUPPLEMENTAL CONDITIONS) for all DBE subcontractors.
  - 5. EPA form 6100-4 DBE Program Subcontractor Utilization Form (Attachment 7 in Section 00 73 00 SUPPLEMENTAL CONDITIONS).
- B. Within 1-hour of the bid, the Contractor shall furnish the following:
  - 1. List of Subcontractors (Section 00 43 36 – PROPOSED SUBCONTRACTORS FORM).
- C. Within 24-hours of bid opening, Bidders so directed shall furnish the following:
  - 1. Contractors Qualifications, (as described in Section 00 22 13 – SUPPLEMENTAL BIDDER RESPONSIBILITY CRITERIA).
  - 2. Subcontractors Qualifications, (as described in Section 00 45 14 – SUBCONTRACTOR QUALIFICATIONS).
- D. Prior to executing the Contract Agreement, (Section 00 52 00 – AGREEMENT FORM), the Contractor shall furnish the following:
  - 1. Payment and Performance Bonds, (Section 00 61 13 – PERFORMANCE AND PAYMENT BONDS FORMS).
  - 2. Insurance Certificates.
  - 3. Prevailing wage rate requirements.

- E. 10 days after execution of the Agreement, the Contractor shall furnish the following:
  - 1. Construction schedule.
  - 2. Requests for material substitutions.
  - 3. Schedule of Values for the work.
- F. After starting construction, each month the Contractor shall furnish the following:
  - 1. Application for Payment on Owner approved form with breakdown of work performed organized in accordance with the Schedule of Values.
  - 2. Updated construction schedule (submitted with each monthly pay request)
- G. 14-days prior to beginning any work at the WWTP which will necessitate a shutdown, the Contractor shall furnish a bypass pumping and emergency response plan for the site.
- H. Certified Payroll in accordance with current federal wage requirements of the Davis-Bacon Act, (per requirements of Section 00 73 00 SUPPLEMENTAL CONDITIONS).
- I. With the final application for payment, the Contractor shall furnish the following:
  - 1. Contractor's affidavit stating payment of subcontractors
  - 2. Subcontractors' statements of being paid
  - 3. Final location, by each property, of all items on private property for which payment is requested.
- J. Before releasing retained funds, the Contractor shall furnish the following:
  - 1. Record drawings and related contract closeout documents
  - 2. Affidavits of Payment (wages, subcontractors, taxes, etc.)

#### **1.04 GENERAL SUBMITTAL REQUIREMENTS**

- A. Identification of Submittals
  - 1. Identify each submittal with Project title and number; clearly define location of submittal in the project and/or its location in the Contract Documents.
  - 2. It is the responsibility of the Contractor to coordinate the work of the various trades involved with the work under this agreement. Contractor shall check all submittals by his subcontractors and mark them with his approval prior to submittal.

#### **1.05 SUBMITTAL OF SHOP DRAWINGS & SAMPLES**

- A. General
  - 1. Provide submittals in pdf format.
  - 2. Submittal of shop drawings and samples shall be accompanied by a transmittal letter containing project name, Contractor's name, number of drawings and samples, titles and other pertinent data.
  - 3. Shop drawings shall be at a convenient size. A space shall be provided in the lower right-hand corner for the review stamp.
  - 4. The Contractor is responsible for obtaining and distributing required prints of shop drawings to his subcontractors and suppliers.
  - 5. Contractor shall maintain a complete material list and file of approved submittals at the project site for use as reference by interested parties.

B. Samples

1. Form of Submittal: When samples are specified to be submitted, furnish two samples, except as noted herein, of sufficient size to indicate general visual effect or as otherwise specified in the specifications, and in as nearly the form in which the material will appear on the project as practicable; i.e., submit paint on samples of actual material for which they are specified as a finish; one set of reviewed and selected samples will be retained by the owner.
2. Review:
  - a. The Owner will check submitted samples against file samples and project requirements, will make final selection of colors and finishes from samples, and will approve sample for application on the project in conformance with the Specifications.
  - b. Should a submitted sample not be in conformance with the specifications, resubmit sample which conforms with the requirements of Contract Documents.

C. Catalog Cuts, Data & Brochures

1. Where indicated in the Specifications, catalog cuts and similar data will be accepted in lieu of shop drawings, provided they contain required information and are clearly printed. Submit manufacturer's descriptive data including catalog sheets for materials, equipment and fixtures, showing dimension, performance characteristics and capacities, wiring diagrams and controls, schedules, and other pertinent information as required.

D. Submittal of Product Certificates

1. Where manufacturer certificates are specified to be furnished attesting to conformance with specification requirements, submit certificates in triplicate prior to acceptance of the Work.

E. Test Reports

1. Submittal is classified either as "shop drawing" or "product data", depending upon whether the report is uniquely prepared for the project or a standard publication of regular product or workmanship control testing at the point of production (respectively).
2. Refer to individual sections of the Specifications for specific requirements; furnish 3 copies when required.

F. Warranties

1. Provide warranties, guarantees and/or maintenance agreements where the Specifications require a period longer than the Contractor warranty period.

G. Operation & Maintenance Data

Furnish instructions and data on materials and equipment installed in the work in accordance with requirements of the technical provisions of the specifications and assemble as specified below. These manuals shall be submitted prior to application for payment exceeding 90% of the total contract amount.

1. Provide four (4) hard copy sets and two (2) electronic copy sets of Operation and Maintenance Data. Each hard copy set shall be bound in separate commercial quality three-ring binders with durable and cleanable plastic covers. The words "Operation and Maintenance Manual (or Instruction)" along with the type of

equipment covered shall be typed or neatly printed on the cover. The electronic copy sets shall be in PDF format and stored on either CD or flash drive units.

2. Each set shall be complete with an index and, as a minimum, cover the following items:
  - a. Name, location and telephone number of manufacturer and product's model number.
  - b. Name, location and telephone number of nearest supplier and spare parts warehouse.
  - c. Start-up procedures and normal operating characteristics and instruction.
  - d. Regulation, control, shut-down and emergency instructions.
  - e. Recommended preventative maintenance procedures including a lubrication schedule with recommended lubricants.
  - f. Trouble-shooting guide.
  - g. Complete nomenclature and commercial number of all parts including exploded views of each assembly.
  - h. List of recommended spare parts.
  - i. Complete as-built elementary wiring and outline diagrams.
  - j. Statements of warranty or guarantee.
3. Operation and Maintenance Manuals shall be submitted in at least draft form for Engineer's review with Shop Drawings, Catalog Cuts and other material submittal data. Final drafts, incorporating Engineer's comments, shall be submitted prior to Contractor's application of payment for 75 percent or more of the work.
4. Contractor shall maintain a complete file of all Engineer reviewed Operation and Maintenance Manuals at the project site for use as a reference by interested parties.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 01 41 00 – REGULATORY REQUIREMENTS**

### **PART 1. GENERAL**

#### **1.01 SECTION INCLUDES**

As required by General Conditions: "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." Except where otherwise expressly required by applicable Laws and regulations, neither OWNER nor ENGINEER will be responsible for monitoring CONTRACTOR'S compliance with any Laws and Regulations. Contractor is responsible for keeping the District, Labor & Industries and other authorities completely informed of any changes in the work in a timely manner, and is responsible for informing them of any changes in the work which may affect codes and laws. This includes contract modifications, amendments, additions, shop drawings, and the like, current as of Project Manual date.

- A. Make any and all adjustments and modifications as required to conform to ordinances, and regulations.
- B. Referenced codes establish minimum requirement levels. Where provisions of various codes or standards conflict, the more stringent provisions govern. Promptly submit to Engineer written notice of observed contract document variations from legal requirements.
- C. Compliance requirements include, but are not limited to following:
  - 1. International Building Code and Related Standards, most recent edition, published by the International Conference of Building Officials.
  - 2. State Rules and Regulations for Barrier Free Design/WAC 51-10.
  - 3. The Americans with Disabilities Act (ADA) "Accessibility Guidelines for Buildings and Facilities."
  - 4. Washington State Department of Labor and Industries Regulations.
  - 5. Electrical Work:
    - a. Underwriters' Laboratories (UL).
    - b. National Electrical Manufacturers' Association (NEMA).
    - c. NFPA, National Electric Code (NEC), National Electric Safety Code, and above electrical listings, as applicable.
    - d. State Electrical Construction Code.
  - 6. Environmental Requirements: All work to be performed in compliance with relevant statutes and regulations dealing with prevention of environmental pollution and preservation of public natural resources.
  - 7. Standard Specifications for Road and Bridge Construction, Washington State Department of Transportation, (WSDOT) latest edition.
  - 8. Standard Specifications for Municipal Public Works Construction, Washington State Chapter, American Public Works Association, latest edition.
  - 9. San Juan County Standards, latest editions.
  - 10. Eastsound Sewer and Water District Standards, latest edition.

## 1.02 MISCELLANEOUS EXPLANATIONS/INTENT

- A. Number of Specified Items Required: Wherever in these Specifications an article, device, or piece of equipment is referred to in the singular number, the reference applies to as many such articles as are shown on the Drawings or required to complete the installation.
- B. Drawings/Diagrammatic:
  - 1. Drawings are in part diagrammatic and do not necessarily show complete details of construction, work or materials, performance or installation. And they do not necessarily show how construction details, other items or work, fixtures, and equipment may affect any particular installation. Contractor is required to ascertain and correlate the work to bring the parts together into a satisfactory and completed whole.
  - 2. Furnish and install work not covered under any heading, Section, branch, class or trade of the project manual, but shown on or reasonably inferable from the Drawings. This includes all work necessary to produce the intended results. Install similarly for items more positively indicated.
- C. Wording of these Specifications: These Specifications are of the abbreviated or streamlined type and may include incomplete sentences.
  - 1. Words such as "shall", "the Contractor shall", "shall be", and similar mandatory phrases, are required to be supplied by inference in the same manner as they are in a note on the Drawings.
  - 2. Provide all items, articles, materials, and operations listed, including all labor, materials, equipment and incidentals, required for their completion.
- D. Tense, Gender, Singular, Plural: Present tense words include future tense. Words in masculine gender include feminine and neuter genders. Words in the singular include plural. Plural words include singular.
- E. All, Entire, and the Like: For brevity throughout the documents, these words may be omitted. Read their implications into all work.
- F. Specifications by Reference: Any material specified by reference or number, symbol or title of a specified standard, such as commercial standard, ANSI and ASTM documents, Federal Specifications, trade association standard, or the like, shall comply with the following:
  - 1. The latest revision requirements thereof, and any amendment or supplement thereto, in effect on Bid date or date of Owner-Contractor Agreement when there are no bids.
- G. Dimensions and Measurements on Drawings: Dimensions govern. Do not scale. Contractor is to check all dimensions in the field and verify them with respect to adjacent or incorporated work. Large scale drawings take precedence over plans, elevations, and cross sections.
- H. First Class Workmanship: First Class Workmanship is expected.
  - 1. Prior to installing any item or material, verify that receiving surfaces are plumb, level, true to line, and straight to the degree necessary to achieve tolerances specified or required. Perform without extra cost all shimmering, blocking, grinding, or patching required to make such surfaces plumb, level, true to line, and straight.

2. Take care in attention to details and fitting at intersections and junctures of materials. All joints are to be tight, straight, even, and smooth.
- I. Presence of Engineer/Owner: Do not misconstrue presence of this person or any of his representatives at the site as assuring compliance with Contract Documents.

**PART 2. MATERIALS (NOT USED)**

**PART 3. EXECUTION (NOT USED)**

**\*\*\*END OF SECTION\*\*\***

## **SECTION 01 45 00 – QUALITY CONTROL**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION OF WORK**

- A. Inspection and testing laboratory qualifications, duties and responsibilities.
- B. Contractor's quality control requirements.

#### **1.02 RELATED SECTIONS**

- A. Related Requirements Specified Elsewhere:
  - 1. Section 01 33 00 – Submittal Procedures
  - 2. Section 01 66 00 – Product Storage and Handling Requirements
  - 3. Section 01 70 00 – Execution and Closeout Requirements
  - 4. Technical Specifications include quality control requirements for certain portions of the work.

#### **1.03 APPLICABLE PUBLICATIONS AND REGULATORY REQUIREMENTS**

- A. ASTM E329: Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as used in Construction.
- B. WSDOT and ASHTO: Applicable sections that pertain to compaction testing for subgrade, base and top course, and asphalt testing.
- C. Washington State Building Code and International Building Code Standards.
- D. Nothing in the Drawings or Specifications shall be construed to permit Work not conforming to applicable laws, ordinances, rules or regulations.
- E. When Drawings or Specifications exceed requirements of applicable laws, ordinances, rules, or regulations, comply with documents establishing the more stringent requirements.

#### **1.04 DEFINITIONS**

- A. Factory Tests: Tests made on various products and component parts prior to shipment to the job site, including but not limited to such items as pumps, valves, miscellaneous piping equipment, electrical equipment, and precast concrete.
- B. Field Tests: Tests or analyses made at, or in the vicinity of the job site in connection with the actual construction.
- C. Product: The term "product" includes the plural thereof, and means a type or a category of manufactured goods, constructions, installations and natural and processed materials or those associated services whose characterizations, classification or functional performances determination is specified by standards.
- D. Person: The term "person" means associations, companies, corporations, educational institutions, firms, government agencies, at the Federal, State and Local level, partnerships, and societies, as well as divisions thereof, and individuals.



- E. Testing Laboratory: The term "testing laboratory" means and "person", as defined above, whose functions include testing, analyzing, or inspecting "products" as defined above, and/or evaluating the designs or specifications of such "products" according to the requirements of applicable standards.
- F. Certified Test Reports: Certified test reports are reports of tests signed by a qualified professional attesting that tests were performed in accordance with the test method specified, that the test results reported are accurate, and that items tested either meet or fail to meet the stated minimum requirements. These test reports include those performed by Factory Mutual, Underwriter's Laboratories, Inc., and others.
- G. Certified Inspection Reports: Certified inspection reports are those signed by approved inspectors attesting that the items inspected meet the specification requirements other than any exceptions included in the report.
- H. Manufacturer's Certificate of Conformance or Compliance: A certificate signed by an authorized manufacturer's official attesting that the material or equipment delivered meets the specification requirements.

## 1.05 QUALITY CONTROL REQUIREMENTS

- A. All work under the contract shall be inspected and tested as specified herein. The Contractor shall maintain records of all inspections and tests. Approvals shall be obtained before delivery of materials to the project site.
- B. Responsibility for field testing is defined below. The contractor is responsible for notifying Owner/Engineer and coordinating test requests as discussed elsewhere in these documents. The contractor is responsible for the costs of any repeat tests required where failed tests were obtained, including those tests that were originally the responsibility of the Owner/Engineer.
  - 1. **Contractor Responsibility** – Services to be coordinated by the Contractor, performed by the Contractor's Testing Agency, and Paid by the Contractor:
    - a. Pipe Pressure Testing – Per Specs
    - b. Potable Water Pipe Disinfection & Testing – Per Specs
    - c. Equipment Testing – Per Equipment Specs
    - d. Clean Water Leakage Testing
    - e. Clean Water Mechanical Testing (pumps, diffusers, mixers, air lift assemblies, etc.)
  - 2. **Owner/Engineer Responsibility** – Services to be coordinated by the Contractor, performed by the Owner's Testing Agency, and Paid by the Owner / Engineer:
    - a. Special Inspections for Buildings
      - (i) Concrete Work
      - (ii) Structural Steel and Bolting, where needed.
    - b. Earthwork
      - (i) Inspection / Testing soils below footings for adequate subgrade bearing conditions
      - (ii) Perform sieve / proctor tests for each source of fill and native soils

- (iii) Test in-place density of fills/backfills for buildings, pavement bases and utilities.
  - c. Concrete
    - (i) Review concrete batch tickets and verify compliance with approved mix design.
    - (ii) Periodic inspection of placement of reinforcing steel.
    - (iii) Continuous inspection during placement, including sampling, slump, air, temperature, and taking concrete specimens.
    - (iv) Continuous inspection during grouting of bolts, rebar dowels, and anchors.
    - (v) Test concrete for compressive strength.
  - d. Asphalt Pavement
    - (i) Rice density tests. Compaction tests. Lab: Asphalt extraction/gradation
  - e. Painting / Coating Systems
    - (i) Periodic inspection of field work
  - f. Structural Steel
    - (i) Periodic inspection of field welding and bolted connections.
- C. If required, contractor responsibility for quality control testing shall be as follows:
  - 1. Factory Tests: Unless otherwise specified, the Contractor will arrange and pay for factory tests when required by the contract documents.
  - 2. Factory Inspection: Unless otherwise specified, the Contractor will arrange and pay for factory inspection when required by the contract documents.
  - 3. Field Inspection and Tests by the Contractor: Unless otherwise specified, the Contractor shall furnish all equipment, instruments, qualified personnel, and facilities necessary to inspect all work and perform all tests when required by the contract documents. All inspections and tests performed and test results shall be promptly submitted to the Owner.
  - 4. Approval of Testing Laboratories: All laboratory work under this contract shall be performed by a laboratory approved by the Owner.
- D. Laboratory Reports: Reports shall cite the contract requirements, the test or analysis procedures used, the actual test results, and include a statement that the item tested or analyzed conforms or fails to conform to the specifications requirements. All test reports shall be signed by a representative of the testing laboratory authorized to sign certified test reports. The Contractor shall arrange for immediate and direct delivery of the signed original of all reports, certifications, and other documentation to the Owner.
- E. Repeated Tests and Inspections: The Contractor shall repeat tests and inspections after each failed test until passing test results are obtained. The retesting and reinspection shall be performed at no additional cost to the Owner and the Contractor shall reimburse the Owner for their, or their representative's, time and expenses due to the failed test results, including those tests that were originally the responsibility of the Owner/Engineer.

## 1.06 CONTRACTOR'S RESPONSIBILITY

- A. Access. Furnish free access to various parts of the work and assist testing inspection personnel in performance of their duties at no additional cost to the Owner.
- B. Concealed Work. When directed by the Owner, the Contractor shall open for inspection any part of the work which has been concealed. Should the Contractor refuse or neglect such a request, the Owner may employ any other person to open up the same or do so himself. If any part of the work has been concealed in violation of the Owner's instruction or, if on being opened, it is found not to be in accordance with the terms of the Contract Documents the expense of opening and recovering, whether done by the Contractor or not, shall be charged to the Contractor. If the work has been concealed but not in violation of the Owner's instructions and is found to be in accordance with the terms of the Contract Documents the actual necessary expense of opening and recovering is done by the Contractor it shall be considered as extra work and paid for accordingly.
- C. Notices. The Contractor shall notify the Owner not less than 48 hours, unless otherwise noted, before work requiring inspection is started. The Contractor shall schedule portions of the work requiring inspection and testing, so that the agency's time on the project is continuous and as brief as possible.

#### **1.07 CONSTRUCTION SURVEILLANCE BY OWNER**

- A. Appointment. The Owner may appoint an on-site representative for surveillance of any and all portions of the work. Such surveillance may extend to any or all parts of the work, and to the preparation or manufacture of materials to be used.
- B. Authority of On-Site Representative.
  - 1. On-site representative is not authorized to revoke, alter, enlarge or relax the provisions of the Contract Documents, and is placed on the work site to keep the Owner informed as to the progress of the work and the manner in which it is being done.
  - 2. On-site representative may also call the attention of the Contractor to any deviations from the plans or specifications. Failure of the Owner or his representative to call the attention of the Contractor to faulty work or deviation from the Contract Documents shall not constitute acceptance of said work.
  - 3. The representative is not authorized to approve or accept any portions of the work or to issue instructions contrary to the Contract Documents.
  - 4. The representative will exercise only such additional authority as may be specially delegated to him by the Owner, notice of which will be given in writing to the Contractor.

#### **1.08 DEFECTIVE WORK**

- A. Remove and replace any work found defective or not complying with requirements of Contract Documents, at no additional cost to Owner. Work will be checked as it progresses, but failure to detect any defective work or materials shall not in any way prevent later rejection when such defect is discovered, nor shall it obligate the Owner for final acceptance.

#### **1.09 CLEAN WATER LEAKAGE TESTING**

- A. Prior to startup, the Contractor is responsible for obtaining water and piping water to each newly constructed structures as necessary for a clean water leakage test. Contractor shall

completely fill to the rim each structure, and the structure shall remain filled for 2 hours with no visible leakage. Structures requiring clean water leakage test include:

1. Influent Pump Station
2. Flow Splitter
3. Aeration Basins
4. Anoxic Basins
5. Clarifier
6. UV Disinfection Chamber
7. Digester
8. 2W Water System Pump Station

**PART 2 - MATERIAL (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

(Summary of Quality Control Testing Services Follows)

QUALITY CONTROL TESTING SERVICES									
<b>Services to be coordinated by the Contractor, performed by Owner's Testing Lab, and Paid by Owner/Engineer.</b>									
<b>Special Inspections for Buildings</b>									
- Concrete Work.									
- Structural Steel and Bolting, where needed.									
- Air Barrier Testing per WA Energy Code Section 402.									
<b>Earthwork</b>									
- Inspect/test soils below footings for adequate subgrade bearing conditions.									
- Perform sieve/proctor tests for each source of fill and native soils.									
- Test in-place density of fills/backfills for buildings, pavement bases and utilities.									
<b>Concrete</b>									
- Review concrete batch tickets and verify compliance with approved mix design.									
- Periodic inspection of placement of reinforcing steel.									
- Continuous inspection during placement, including sampling, slump, air, temperature and taking concrete specimens.									
- Continuous inspection during grouting of bolts, rebar dowels and anchors.									
- Test concrete for compressive strength.									
<b>Asphalt Pavement</b>									
- Rice Density Tests. Compaction Tests. Lab: asphalt extraction/gradation.									
<b>Coating Systems</b>									
- Periodic inspection of field work.									
<b>Structural Steel</b>									
- Periodic inspection of field welding and bolted connections.									
<b>Services to be provided by the Contractor</b>									
<b>Pipe Pressure Testing</b>									
- See Specifications									
<b>Potable Water Pipe Disinfection Testing</b>									
- See Specifications									
<b>Equipment Testing</b>									
- See Division 46 - Equipment Specifications									

\*\*\*END OF SECTION\*\*\*

## **SECTION 01 50 00 – TEMPORARY FACILITIES**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION OF SECTION**

- A. The Contractor shall provide all arrangements, material and labor needed for obtaining temporary utility services.
- B. The Contractor is encouraged but not required to maintain a field office, but water and sanitation facilities must be provided for the Contractor's employees and subcontractors.
- C. Make all connections to the utility purveyor's requirements and in accordance with code requirements; remove from site upon completion of all work or when directed.
- D. Providing Temporary Facilities:
  - 1. Provide temporary construction, devices, equipment, power and convenience utilities for use, convenience and safety of personnel engaged in the work of the contract.
  - 2. Provide wastewater bypass systems for both effluent and influent wastewater.
  - 3. Provide temporary utilities and access during construction to existing home owners at all times.

#### **1.02 RELATED SECTIONS**

- A. Related Requirements Specified Elsewhere:
  - 1. Section 01 11 00 – Summary of Work
  - 2. Section 01 70 00 – Execution and Closeout Requirements
  - 3. Section 31 32 11 – Soil Surface Erosion Control

#### **1.03 REGULATIONS**

- A. Health and Safety: Conform with "Safety Standards for Construction Work, Chapter 296-155 WAC" by State of Washington Department of Labor and Industries.
- B. Construction Codes: Comply with regulatory construction codes as applicable.
- C. Washington State Department of Health: Comply with all applicable codes for temporary sewer and water service.

#### **1.04 TEMPORARY FACILITIES**

- A. Temporary Electrical Light & Power:
  - 1. Provide all temporary lighting and power, including pole or poles, transformer if required, for construction purposes.
  - 2. Provide temporary connections to closest utility source.
  - 3. Provide all required extension cords, lighting outlets and power outlets (grounding type), lamps, and other required equipment and accessories necessary only for adequate temporary lighting and power for construction purposes.

4. Remove temporary lighting and power equipment and their connections at completion of the work or sooner if approved or directed.
- B. Water for Construction Purposes:
1. The Contractor is responsible for obtaining and providing water as required for the work and for testing.
  2. If agreed, Contractor to make temporary connections with metered connection with backflow preventers to utility piping as required for the work and provide meter, piping, hoses, nozzles and other accessories required.
  3. At completion, or before as directed, disconnect temporary connections and piping and remove from site.
  4. Provide secure system to prevent unauthorized use during Contractor's absence.
- C. Clean Water Testing
1. Prior to startup, the Contractor is responsible for obtaining water and piping water to each newly constructed structure as necessary for a clean water leakage test. Contractor shall completely fill to the rim each structure, and the structure shall remain filled for 2 hours with no visible leakage. Structures requiring clean water leakage test include:
    - a. Train #1 (including Aeration Basins, Anoxic Basins, and Clarifier)
    - b. Train #2 (including Aeration Basins, Anoxic Basins, and Clarifier)
- D. Sanitary Facilities:
1. The Contractor shall provide temporary restroom services at the field office location, or other centrally located site. Service may be provided by contract service. Facilities shall be regularly serviced and maintained, and kept reasonably clean. Facilities shall be promptly removed at the conclusion of the work.
- E. Drinking water:
1. Provide from proven safe source, for all those connected with the work in accordance with WISHA and Health Department requirements.
  2. Pipe and transport in such manner as to keep it clean and fresh; serve in single containers or provide sanitary drinking fountains.
- F. Residential and Commercial Access:
1. Provide access to residential homes and commercial facilities (wastewater treatment plant and water treatment plant facilities) at all times.
  2. Provide access to the area at all times for emergency and service vehicles.
  3. Provide through access to emergency service vehicles to the helicopter pad.
- G. Equipment Storage
1. Contractor is fully responsible for safe storage of all materials and equipment.
  2. Provide all fences, gates, locks, covers, weather protection, surveillance, etc. to assure safe storage.
  3. Protect all materials and equipment from the weather.

H. Temporary Wastewater Systems

1. Contractor shall maintain continuous oversight any temporary process equipment at all times using either onsite personnel or the implementation of an alarming system with an automatic cellular notification system, which informs the Contractor when an alarm is in progress.
2. The Contractor shall have personnel available for call out during problems or emergencies. Call out personnel shall be familiar and experienced with the system(s), and sufficiently qualified to make necessary repairs or adjustments to ensure the operation performs suitably when backups or overflows occur. Call out personnel shall be available 24-hours per day, 7 days per week and able to respond on-site within 30 minutes of receiving an alarm.
3. Additionally, backup alarms and 'Normal' or 'Running' equipment status shall be wired to the District's existing control system at the WWTP. Programming and other work related to the PLC and SCADA for these temporary status and alarm monitoring will be provided by the PLC/SCADA Programmer and will be considered incidental to work required for this project.

I. First Aid

1. In accordance with requirements of 296-24 WAC, furnish personnel trained in first aid and certified as approved by Washington Department of Labor and Industries.

**1.05 MISCELLANEOUS PROVISIONS**

A. Cleaning Up:

1. General: The Contractor and each subcontractor at all times shall keep the premises free from accumulation of waste materials or rubbish caused by his operations. Clean up work areas as required at the end of each day's work.
2. Trash removal: Remove all trash and debris from site and dispose of at Contractor's expense. Allow no debris, broken or open cartons, or other refuse to collect in the project or around it; allow no inflammable or hazardous materials to be stored on the site without approved protection precautions and procedures.
3. Street and parking area cleaning: Immediately clean all spilled material which results from the work of this contract and waste hauling operations; use motorized equipment and hand labor as required. Remove from streets, driveways or parking areas in time to prevent such materials from affecting traffic or clogging street drainage system; clean any drains contaminated.
4. Any equipment that is out of service or not in use for any extended period of time should be stored. Stored equipment should not impede access into, out of, or through the site or staging area.

B. Noise Control: During the period of construction, provide satisfactory means, as approved by the Owner, of controlling noise originating from construction work and equipment.

C. Dust Control: During the period of construction, provide satisfactory means of controlling dust and dirt, including application of water to control dust but not cause erosion.

D. Temporary Erosion and Sedimentation Control: The Contractor shall provide sedimentation and erosion control in accordance with the Contract Plans and Section 31 32 11 SOIL SURFACE EROSION CONTROL in the Contract Specifications



#### **1.06 DEBRIS CONTROL**

- A. Cleaning during construction: Maintain all areas free of extraneous debris.
- B. Prevent accumulation of debris at construction site, storage and parking areas, and along access roads and haul routes.
- C. Keep storm sewers free of debris or extraneous materials.
- D. Offsite Cleanup: Prevent any leaking of materials from the vehicle used to haul offsite and clean haul routes daily.

#### **1.07 POLLUTION CONTROL**

- A. Provide all method, means and facilities required to prevent any contamination of adjacent areas, drainages, waterways, and/or tidal areas adjacent to the project site. Contractor will be expected to respond immediately to any spills and to take whatever measures are necessary to prevent further contamination and clean up accidental contamination. Contractor will be solely responsible for any and all costs of clean up in the event of discharge (of any kind). In the event that the Contractor is slow in responding, the Owner may elect to pay for clean-up costs directly, and all costs incurred from this, including labor, overhead, materials, management, etc., will be deducted from the next pay request.
- B. Provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere. Allow no discharge of noxious substances from construction operations.
- C. Provide systems for control of atmospheric pollutants in accordance with Federal/State/Local published rules and regulations.

#### **1.08 BARRIER REQUIREMENTS**

- A. During construction, the Contractor shall at all times maintain satisfactory and substantial temporary fencing, railing, barricades or steel plates at all excavations, obstructions or other hazards. All such barriers shall have warning signs or lights as necessary for safety.

#### **PART 2 - PRODUCTS (NOT USED)**

#### **PART 3 - EXECUTION (NOT USED)**

**\*\*\*END OF SECTION\*\*\***

## **SECTION 01 60 00 – PRODUCT REQUIREMENTS**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION OF SECTION**

- A. General requirements for providing transportation, handling, storage, and protection of materials and equipment.
- B. Contractor's options in selection of products and manufacturers, and procedures for consideration of proposed substitutions.
- C. All material and equipment incorporated into the work:
  - 1. Shall be new, free from defects and of equal or superior quality as specified herein and on the drawings.
  - 2. Shall be the products of established manufacturers regularly engaged in the fabrication of such equipment.
  - 3. Shall comply with the size, type and quality specified and shall be designed for use in the particular application.
  - 4. Shall be designed, fabricated and assembled in accordance with standard engineering and shop practice.
  - 5. Shall be complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and for intended use and effect.

#### **1.02 RELATED SECTIONS**

- A. Related Requirements Specified Elsewhere:
  - 1. Section 01 30 00 – Submittals
  - 2. Section 01 45 00 – Quality Control

#### **1.03 MANUFACTURER'S INSTRUCTIONS**

- A. Installation of all materials and equipment shall comply with manufacturer's printed instructions. The Contractor shall have the responsibility to distribute copies of such instructions to all parties involved in the installation, including the Owner. One complete set of instructions shall be maintained on the job site during installation and until completion.
- B. All materials and equipment shall be handled, installed, connected, cleaned, conditioned and adjusted in strict accordance with such instructions and in conformance with the specified requirements. The Owner should be immediately notified should job conditions or specified requirements conflict with the manufacturer's instructions.

#### **1.04 TRANSPORTATION AND HANDLING**

- A. All materials and equipment shall be transported and handled in such a manner as to prevent any damage.

- B. Deliveries of products shall be in accordance with construction schedules as to cause no delay in the work or to conflict with work and conditions at the site.
- C. Products shall be delivered in the manufacturer's original containers with identifying labels intact and legible. Where materials are specified to conform to ASTM, Federal or other reference specifications, the materials shall be delivered to the site bearing the manufacturer's label stating that the materials meet the requirement of such referenced specifications.
- D. Products shall be inspected immediately upon delivery to assure compliance with specified requirements and approved submittals and that products are properly protected and undamaged.
- E. The Contractor shall provide personnel and equipment to receive and unload products delivered to the site. No products shall be delivered to the site unless such forces are available.

#### **1.05 STORAGE AND PROTECTION**

- A. Contractor is fully responsible for safe storage of all materials and equipment.
- B. All products shall be stored in strict accordance with the manufacturer's instructions, with seals and labels intact and legible.
- C. All products shall be arranged in a neat order and protected from damage from the weather, traffic and construction operations. Easy access for periodic inspection shall be provided.

#### **1.06 PRODUCTS AND SUBSTITUTIONS**

- A. Products:
  - 1. Where available, provide standard products of types which have been produced and used previously and successfully on other projects and in similar application.
  - 2. Where additional amounts of a product, by nature of its application, are likely to be needed by Owner at a later date for maintenance and repair or replacement work, provide a standard, domestically produced product which is likely to be available to Owner at such later date.
  - 3. For Products specified only by a reference standard, the Contractor may select any product meeting that standard.
  - 4. Where the make or name of a material is specified in the written documents or on the drawings, it is to establish a quality standard in that particular field of manufacture. Requests for substitutions of materials of other makes or names must be submitted to the Owner and must receive favorable written response from the Owner prior to ordering, furnishing or installing the proposed substitution item.
- B. Requests for Substitutions:
  - 1. For a period of thirty (30) days after the Contract Date, the Owner will consider written requests from the Contractor for substitution of Products.
  - 2. Requests for each Product substitution shall be submitted separately. Requests for substitutions will be received and considered when revisions to contract documents are not required, and the product or material is in keeping with the general intent of the Contract Documents.

3. A request for substitution by the Contractor constitutes a representation that the Contractor:
    - a. Will provide the same warranties or bonds for the substituted item as for the Product specified.
    - b. Will coordinate the installation of an accepted substitution into the work and make all other changes as required to make the work complete in all respects.
  4. Submit six (6) copies of requests for substitutions, fully identified for Product or method being replaced by substitution, including related specification section and drawing number(s), and fully documented to show compliance with requirements for substitutions.
  5. Include product data/drawings, description of methods, samples where applicable, Contractor's detailed comparison of significant qualities between specified item and proposed substitution, statement of effect on construction time and coordination with other affected work, cost information or proposal, and Contractor's statement to the effect that proposed substitution will result in overall work equal-to-or-better-than work originally indicated.
  6. The contractor agrees to pay all Engineering costs accruing as a result of checking and/or redesign due to substitutions. These costs will be charged to the Contractor and will be considered incidental to the contract price.
- C. Owner's Review
1. Within two weeks of receipt of request, or within one week of receipt of requested additional information or documentation (whichever is later), the Owner will notify the Contractor of either his acceptance or his rejection of the proposed substitution. Rejection will include statement of the reasons for rejection (non-compliance with the requirements for requested substitutions, or other reasons as detailed.)

## **PART 2 - MATERIALS (NOT USED)**

## **PART 3 - EXECUTION (NOT USED)**

**\*\*\*END OF SECTION\*\*\***

## **SECTION 01 66 00 – PRODUCT STORAGE AND HANDLING REQUIREMENTS**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION OF SECTION**

- A. General requirements for providing transportation, handling, storage, and protection of materials and equipment.
- B. Contractor's options in selection of products and manufacturers, and procedures for consideration of proposed substitutions.
- C. All material and equipment incorporated into the work:
  - 1. Shall be new, free from defects and of equal or superior quality as specified herein and on the drawings.
  - 2. Shall be the products of established manufacturers regularly engaged in the fabrication of such equipment.
  - 3. Shall comply with the size, type and quality specified and shall be designed for use in the particular application.
  - 4. Shall be designed, fabricated and assembled in accordance with standard engineering and shop practice.
  - 5. Shall be complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and for intended use and effect.

#### **1.02 RELATED SECTIONS**

- A. Related Requirements Specified Elsewhere:
  - 1. Section 01 30 00 – Submittals
  - 2. Section 01 45 00 – Quality Control

#### **1.03 MANUFACTURER'S INSTRUCTIONS**

- A. Installation of all materials and equipment shall comply with manufacturer's printed instructions. The Contractor shall have the responsibility to distribute copies of such instructions to all parties involved in the installation, including the Owner. One complete set of instructions shall be maintained on the job site during installation and until completion.
- B. All materials and equipment shall be handled, installed, connected, cleaned, conditioned and adjusted in strict accordance with such instructions and in conformance with the specified requirements. The Owner should be immediately notified should job conditions or specified requirements conflict with the manufacturer's instructions.

#### **1.04 TRANSPORTATION AND HANDLING**

- A. All materials and equipment shall be transported and handled in such a manner as to prevent any damage.
- B. Deliveries of products shall be in accordance with construction schedules as to cause no delay in the work or to conflict with work and conditions at the site.

- C. Products shall be delivered in the manufacturer's original containers with identifying labels intact and legible. Where materials are specified to conform to ASTM, Federal or other reference specifications, the materials shall be delivered to the site bearing the manufacturer's label stating that the materials meet the requirement of such referenced specifications.
- D. Products shall be inspected immediately upon delivery to assure compliance with specified requirements and approved submittals and that products are properly protected and undamaged.
- E. The Contractor shall provide personnel and equipment to receive and unload products delivered to the site. No products shall be delivered to the site unless such forces are available.

#### **1.05 STORAGE AND PROTECTION**

- A. Contractor is fully responsible for safe storage of all materials and equipment.
- B. All products shall be stored in strict accordance with the manufacturer's instructions, with seals and labels intact and legible.
- C. All products shall be arranged in a neat order and protected from damage from the weather, traffic and construction operations. Easy access for periodic inspection shall be provided.

#### **1.06 PRODUCTS AND SUBSTITUTIONS**

- A. Products:
  - 1. Where available, provide standard products of types which have been produced and used previously and successfully on other projects and in similar application.
  - 2. Where additional amounts of a product, by nature of its application, are likely to be needed by Owner at a later date for maintenance and repair or replacement work, provide a standard, domestically produced product which is likely to be available to Owner at such later date.
  - 3. For Products specified only by a reference standard, the Contractor may select any product meeting that standard.
  - 4. Where the make or name of a material is specified in the written documents or on the drawings, it is to establish a quality standard in that particular field of manufacture. Requests for substitutions of materials of other makes or names must be submitted to the Owner and must receive favorable written response from the Owner prior to ordering, furnishing or installing the proposed substitution item.
- B. Requests for Substitutions:
  - 1. For a period of thirty (30) days after the Contract Date, the Owner will consider written requests from the Contractor for substitution of Products.
  - 2. Requests for each Product substitution shall be submitted separately. Requests for substitutions will be received and considered when revisions to contract documents are not required, and the product or material is in keeping with the general intent of the Contract Documents.
  - 3. A request for substitution by the Contractor constitutes a representation that the Contractor:

- a. Will provide the same warranties or bonds for the substituted item as for the Product specified.
    - b. Will coordinate the installation of an accepted substitution into the work and make all other changes as required to make the work complete in all respects.
  4. Submit six (6) copies of requests for substitutions, fully identified for Product or method being replaced by substitution, including related specification section and drawing number(s), and fully documented to show compliance with requirements for substitutions.
  5. Include product data/drawings, description of methods, samples where applicable, Contractor's detailed comparison of significant qualities between specified item and proposed substitution, statement of effect on construction time and coordination with other affected work, cost information or proposal, and Contractor's statement to the effect that proposed substitution will result in overall work equal-to-or-better-than work originally indicated.
  6. The contractor agrees to pay all Engineering costs accruing as a result of checking and/or redesign due to substitutions. These costs will be charged to the Contractor and will be considered incidental to the contract price.
- C. Owner's Review
1. Within two weeks of receipt of request, or within one week of receipt of requested additional information or documentation (whichever is later), the Owner will notify the Contractor of either his acceptance or his rejection of the proposed substitution. Rejection will include statement of the reasons for rejection (non-compliance with the requirements for requested substitutions, or other reasons as detailed.)

## **PART 2 - MATERIALS (NOT USED)**

## **PART 3 - EXECUTION (NOT USED)**

**\*\*\*END OF SECTION\*\*\***

## **SECTION 01 70 00 – EXECUTION AND CLOSEOUT REQUIREMENTS**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION OF SECTION**

- A. Specific administrative procedures, and closeout submittals at substantial completion and at final acceptance of the work.
- B. Requirements for record documents and start-up procedures.
- C. The listing of procedures and submittals is given generally as a checklist for the Contractor's convenience. The Owner reserves the right to add to this list. This list is not an exhaustive listing of either all applicable laws or of the provisions of any law.
- D. The Contractor shall comply with all contract requirements prior to contract closeout. Specific administrative procedures, and closeout submittals at substantial completion and at final acceptance of the work.

#### **1.02 RELATED SECTIONS**

- A. Related Requirements Specified Elsewhere:
  - 1. Section 01 33 00 – Submittal Procedures

#### **1.03 SUBSTANTIAL COMPLETION**

- A. Prior to submitting for substantial completion, the Contractor shall have:
  - 1. Delivered tools, spare parts, extra stocks of materials, and similar physical items to Owner.
  - 2. Made final changeover of locks and transmit keys to Owner.
  - 3. Completed start-up testing of systems, and performed instructions for Owner's operating/maintenance personnel. Discontinued (or change over) and removed from project site temporary facilities and services.
  - 4. Provided record information to the owner of the as-constructed facilities.
  - 5. Completed final cleaning up requirements, including but not limited to, touch-up of marred surfaces, grading, installation of handrails, etc.
  - 6. Provided O&M Manuals for all equipment, controls, telemetry and SCADA.
  - 7. Provide Compliance Documentation per 2015 Washington State Energy Code (WSEC) close out requirements per section C103.6.3 as follows:
  - 8. C103.6.3 Compliance Documentation. All energy code compliance forms and calculations shall be delivered in one document to the building owner as part of the project record drawings, manuals, or as a standalone document. This document shall include the specific energy code year utilized for compliance determination for each system, NFRC certificates for the installed windows, list of total area for each NFRC certificate, the interior lighting power compliance path (building area, space by space) used to calculate the lighting power allowance. For projects complying with Section C401.2 item 1, the documentation shall include:



- (i) The envelope insulation compliance path (prescriptive or component performance).
  - (ii) The completed code compliance forms, and all compliance calculations including, but not limited to those required by section C402.1.5, C403.2.12.1, C405.4, and C405.5.
- B. When the Contractor considers the work to be substantially complete, he shall submit to the Owner:
  - 1. Written notice that the work, or designated portion thereof, is substantially complete. (The term "substantially complete" shall be defined as in accordance with the WSDOT General Specifications and Sections 00 72 00 and 00 73 00a of these documents).
  - 2. List of items to be completed or corrected and reasons for being incomplete. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all work in accordance with the Contract Documents.
  - 3. Progress payment request coincident with or first following date claimed, show either 100% completion for portion of work claimed as "substantially complete", or list incomplete items and the value of the incomplete work.
  - 4. Submit statement showing accounting of changes to the Contract Sum.
  - 5. Specific warranties, workmanship/maintenance bonds, maintenance agreements, final certification and similar documents.
  - 6. Obtain and submit releases enabling Owner's full and unrestricted use of the work and access to services and utilities, including (where required) certificate of occupancy permits, operating certificates, and similar releases.
  - 7. Record (as-built) drawings, project manual, manual of materials, operation and maintenance manuals, and similar final record information.
- C. Upon receipt of Contractor's request, the Owner will either proceed with inspection or advise Contractor of prerequisites not fulfilled. Following initial inspection, Owner will either prepare certificate of substantial completion, or advise Contractor of work which must be performed prior to issuance of certificate; and repeat inspection when requested and assured that work has been substantially completed. Results of completed inspection will form the initial "punch list" for final acceptance.
- D. When the Engineer, on the basis of an inspection, concurs that the work is substantially complete, he will:
  - 1. Prepare and deliver to the Contractor a certificate of Substantial Completion accompanied by the Contractor's list of items to be completed or corrected. The Certificate of Substantial Completion shall state the responsibilities of the Contractor for security, maintenance, heat, damages to the work and insurance and shall fix the time within which the Contractor shall complete the items listed therein. Warranties and guarantees required by the Contract Documents shall commence on the Date of Substantial Completion.
  - 2. The Certificate of Substantial Completion is submitted to the Contractor for their written acceptance of their responsibilities as stated therein.

#### **1.04 FINAL INSPECTION**

- A. When the Contractor considers the work to be complete, he shall submit written notice to the Owner that the work has been completed and inspected in compliance with the Contract Documents including punchlist items, and equipment and systems have been tested and are operational; and requesting a contract completion inspection.
- B. When the Engineer, on the basis of an inspection, concurs that the work is acceptable under the Contract Documents, he will notify the Contractor in writing and request the Contractor to provide remaining submittals.
- C. Should the Engineer determine that the work is not acceptable under the Contract Documents:
  - 1. The Engineer will promptly notify the Contractor in writing giving the reasons therefor.
  - 2. The Contractor shall remedy the deficiencies in the work and submit a new written notice for final inspection to the Owner.

## **1.05 FINAL PAYMENT**

- A. When the Contractor has satisfied all requirements of this section and all other conditions of the Contract Documents, the Contractor may submit a final Application for Payment. Should the Owner determine the Work acceptable under the Contract Documents and the Agreement fully performed, he will promptly issue a final Certificate for Payment stating that to the best of his knowledge, the Work has been completed in accordance with the terms and conditions of the Contract Documents and that the entire balance due the Contractor, and as noted in the final certificate, is due and payable.
- B. The accumulated retainage shall not be paid until the Contractor submits to the Owner:
  - 1. Affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the work for which the Owner might in any way be responsible, have been paid or otherwise settled.
  - 2. Release of Lien. One will be required from each lien holder who has duly filed a notice of claim with the Owner. If any liens remain unsatisfied after the expiration of the statutory lien period, the Contractor shall refund the Owner all amounts that the Owner may be compelled to pay in discharging such lien including all costs and reasonable attorney's fees.
  - 3. State Department of Revenue form that all taxes have been paid.
  - 4. State Department of Labor and Industry affidavit of wages paid.
  - 5. State Department of Employment Security Contractor release.
- C. The making of final payment shall constitute a waiver of all claims by the Owner except those arising from:
  - 1. Unsettled liens or disputes.
  - 2. Faulty or defective work appearing after Substantial Completion under the project guarantee and equipment warranty period.
  - 3. Failure of the work to comply with the requirements of the Contract Documents.
  - 4. Terms of any special warranties required by the Contract Documents.
- D. The acceptance of final payment shall constitute a waiver of all claims by the Contractor except those previously made in writing and identified by the Contractor as unsettled at the time of the final Application for Payment.

## **1.06 FIELD TESTS AND ADJUSTMENTS**

- A. All mechanical and electrical equipment, as required under the separate section headings, shall be tested by the Contractor to the satisfaction of the Engineer before any facility is put into operation. Tests shall be as specified herein and shall be made to determine whether the equipment has been properly assembled, aligned and connected. Any changes, adjustments or replacements required to make the equipment operate as specified shall be performed by the Contractor as part of the Work.
- B. At least 14 days before the time allowed in the construction schedule for commencing testing and start-up procedures, the Contractor shall submit to the Engineer details of the procedure proposed for testing and start-up of all mechanical and electrical equipment, except when such procedures have been covered in the specifications.
- C. The Contractor's testing and start-up procedures shall include detailed descriptions of all preoperational electrical, mechanical and instrumentation testing work. Each control device, item of mechanical, electrical and instrumentation equipment, and all control circuits shall be considered in the testing procedures, which shall be designed, in a stepwise, logical sequence to ensure that all equipment has been properly serviced, aligned, connected, calibrated and adjusted prior to operation. The Contractor is advised that failure to observe these precautions may place the acceptability of the subject equipment in question, and he may either be required to demonstrate that the equipment has not been damaged, or replace it as determined by the Engineer. Testing procedures shall be designed to duplicate as nearly as possible all conditions of operations, and shall be carefully selected to ensure that the equipment is not damaged. Once the testing procedures have been accepted by the Engineer, the Contractor shall produce checkout, alignment and adjustment, and calibration sign-off forms for each item of equipment, which shall be used in the field by the Contractor and the Engineer jointly, to ensure that each item has been properly installed and tested. All testing must be performed in the presence of the Engineer.
- D. During the testing of the mechanical, instrumentation and electrical equipment, the Contractor shall make available, as necessary, representatives of the manufacturers of all the various pieces of equipment, or other qualified persons, who shall instruct the Owner's personnel in the operation and care thereof. Instructions shall include written step-by-step operation and trouble-shooting procedures with a complete description of all necessary test equipment and all protective device settings. Upon completion of testing, the manufacturer's representative shall provide the Engineer with a letter stating that the specific piece of equipment has been properly installed and tested and will satisfy the requirements of the Contract Documents.

## **1.07 RECORD (AS-BUILT) DRAWING INFORMATION**

- A. During the construction period, the Contractor shall maintain a complete set of prints for the sole purpose of maintaining a day-by-day record of installed information. This information shall include, but not limited to: the size and location of all concealed or underground piping, conduit, and ductwork; all approved deviations from the specifications and drawings; the location of any visible objects relocated due to interference's or requested relocations submitted and approved on shop drawings. Such relocations shall be dimensioned.
- B. Addenda, bulletins, field orders, and change orders shall be posted and referenced in the record set of prints.

#### **1.08 RECORD PROJECT MANUALS**

- A. Maintain one copy of the Contract Documents, including addenda, change orders and similar modifications issued in printed form during construction, and mark-up variations (of substance) in actual work in comparison with text of the Project Manual and modifications as issued.
- B. Give particular attention to substitutions, selection of options, and similar information on work where it is concealed or cannot otherwise be readily discerned at a later date by direct observation. Not related record drawing information and product data, where applicable.

#### **1.09 MISCELLANEOUS RECORD SUBMITTALS**

- A. Refer to other sections of these specifications for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the work. Immediately prior to date(s) of substantial completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to Engineer for Owner's records.

#### **1.010 FINAL CLEAN-UP**

- A. At the completion of the work, the Contractor shall leave the premises in a neat and unobstructed condition, ready for Owner occupancy. The buildings shall be left in a dust free condition and all equipment and materials in perfect repair and adjustment.
- B. After all trades have completed their work and just before final acceptance and occupancy by owner, thoroughly clean all surfaces of project. Clean lighting fixtures and electrical equipment, including washing and polishing lenses inside and out. Wash and polish all exposed metal surfaces. Broom clean exterior paved areas and rake clear other surfaces of the grounds. All waste building materials, pipe, etc. shall be removed from the site and disposed of.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 01 91 00 – COMMISSIONING**

### **PART 1 - GENERAL**

#### **1.01 GENERAL**

- A. Related Requirements Specified Elsewhere:
  - 1. Section 01 33 00 – Submittals Procedure
  - 2. Section 01 70 00 – Execution and Closeout Requirements
- B. Description of Section:
  - 1. Specific commissioning procedures and start-up requirements.
  - 2. Requirements for equipment settings and field verification.
  - 3. The listing of procedures and field tests is given generally as a checklist for the Contractor's convenience. The Owner reserves the right to add to this list. This list is not an exhaustive listing of all applicable settings and requirements to achieve specified results.
  - 4. The Contractor shall comply with all contract requirements prior to contract closeout. Specific administrative procedures, and closeout submittals at substantial completion and at final acceptance of the work.

#### **1.02 COMMISSIONING BIOLOGICAL TREATMENT (TRAINS 1 & 2) PROCESS EQUIPMENT:**

- A. The Biological Treatment process equipment supplier is to provide a minimum of two (2) weeks of start-up supervision and operator training. Supervision and training duties to include the following:
  - 1. Inspect installation for concurrence to design
  - 2. Check the amperage draw from all motors (clarifier drive, mixers, etc.)
  - 3. Make sure equipment is installed to allow easy access.
  - 4. Make sure all operations of the controls, including valves, dissolved oxygen sensors, pH sensors, and air lift pumps are working properly
  - 5. Verify weirs and baffles are installed level and configured for smooth and even flow throughout the clarifier perimeter.
  - 6. Review Operation and Maintenance Manual with personnel
  - 7. Demonstration and Training on controls

#### **1.03 COMMISSIONING MAGNETIC FLOW METER EQUIPMENT:**

- A. The Flow Meter equipment supplier is to provide a minimum of two (2) days of start-up supervision and operator training. Supervision and training duties to include the following:
  - 1. Inspect installation for concurrence to design
  - 2. Check the amperage draw from the flow meters.

3. Make sure equipment is installed to allow easy access.
4. Verify all units are configured for specified environments. Some units may be submerged in water, and it is critical that units are sealed and rated for environments.
5. Make sure all operations of the controls are working properly
6. Review Operation and Maintenance Manual with personnel
7. Demonstration and Training on controls

**\*\*\*END OF SECTION\*\*\***

## SECTION 02 41 00 - DEMOLITION

### PART 1 - GENERAL

#### 1.01 DESCRIPTION

- A. Related Work Specified Elsewhere
  - 1. Section 00 24 13 – Scopes of Bids
  - 2. Section 01 11 00 – Summary of Work
- B. Description of System: The work covered by this section includes the furnishing of all labor, equipment, and materials necessary for the demolition, removal, rehabilitation and equipment salvage of all construction as specified herein and as shown on the drawings.

#### 1.02 JOB CONDITIONS

- A. All removed equipment, materials, and debris, unless otherwise noted or requested by the Owner, shall become the property of the Contractor. The Contractor shall deliver all items to be salvaged (as directed by the Owner), to the storage area designated by the Owner. **The items that the Owner has selected for retention include the following:** any miscellaneous valves, piping and electronic components as directed by Owner.
- B. Protection: Ensure the safe passage of persons around the area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and people and livestock.

### PART 2 - PRODUCTS

- A. Not Used.

### PART 3 - EXECUTION

#### 3.01 DEMOLITION

- A. Pollution Controls:
  - 1. Use water sprinkling, temporary enclosures, and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level.
  - 2. Comply with governing regulations pertaining to environmental protection.
- B. Removal Requirements:
  - 1. Provide complete removal and disposal of all structures identified for demolition. All pipes connected to abandoned structures are to be plugged/grouted in an approved manner, preventing any potential water and/or sewer leaks. Salvage items as directed by the Owner.
  - 2. Proposed wastewater equipment is to be purchased and on-hand, prior to removal of specified structures. Contractor is to coordinate removal/demolition with Owner's staff (a minimum of 2 week) prior to all removal/demolition work.

- C. Structures to be Removed (demolished):
1. Existing structure over trains 1 & 2.
  2. Existing concrete slab around trans 1 & 2.
  3. Train 1
  4. Train 2
  5. Existing miscellaneous valves, piping, concrete, and accessories as detailed on the Contract Plans. (salvage items as directed by Owner's staff).
  6. See electrical drawings and specifications for additional demolition items/requirements.

### **3.02 DISPOSAL OF DEMOLISHED MATERIALS**

- A. General. Remove from the site debris, rubbish, and other materials resulting from demolition operations. Burning of removed materials from demolished structures will not be permitted on the site. Comply with all federal, state and local regulations regarding hauling and disposal.
- B. Removal. Transport materials removed from demolished structures and dispose of at a legal disposal site.

**\*\*\*END OF SECTION\*\*\***



## **SECTION 02 83 00 – CHAIN LINK FENCES AND GATES**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION OF WORK**

- A. Work consists of furnishing all labor, materials, and incidentals necessary to erect all 6-foot-high and 8-foot-high galvanized chain-link fence the locations shown on the drawings. Construction is to provide a rigid, taut fence closely conforming to the surface of the ground. It is noted that bottom rails are to be included for preventing access under fence fabric.
- B. Work included
  - 1. Fabric, line posts, end, corner and pull posts, gate posts, gate frames, top rails, bottom rails, and post braces and accessories.

#### **1.02 RELATED SECTIONS**

- A. Section 05500 - Metal Fabrications

#### **1.03 REFERENCE STANDARDS**

- A. American Society for Testing and Materials (ASTM)
  - 1. A 53 Standard Specification for Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses.
  - 2. A 153 Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.
  - 3. A 392 Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.

#### **1.04 SUBMITTALS**

- A. Three samples, approximately 6 inches long, or 6 inches square, of fabric material (standard galvanized), post section and typical accessories.
- B. Submit shop drawings showing fence height, type of fabric, and location and size of posts and gates, including details of post tops, rails, braces, foundations, footings, gate posts, hinges, frames, latches, ties and other accessories.

## 1.05 QUALIFICATION OF INSTALLER

- A. Installer must be experienced in fence installations and must examine conditions under which fence and gates are to be installed. The Contractor shall notify the Engineer in writing of improper conditions of work, and shall not proceed with work until unsatisfactory conditions have been corrected.

## 1.06 QUALITY ASSURANCE

- A. Certifications

# **PART 2 - PRODUCTS**

## 2.01 FENCES, POSTS, RAILS AND BRACES

- A. All steel tubular members shall comply with provisions of ASTM A 53, Schedule 40, for weight and coating.

## 2.02 FABRIC

- A. Chain link fabric to conform to ASTM A 392, No. 9 gage wire, 2-inch mesh, Class II galvanizing.
- B. Fabric galvanized after weaving.
- C. Fabric knuckled at bottom selvage and twisted.

## 2.03 LINE POSTS

- A. Posts of galvanized steel.
- B. Posts round in section, with 2.375-inch outside diameter and weighing 3.65 lb/ft.

## 2.04 END, CORNER PULL POSTS

- A. Posts of galvanized steel.
- B. Posts round in section, with 2.875-inch outside diameter and weighing 5.79 lb/ft.

## 2.05 GATE POSTS

- A. Posts of galvanized steel.
- B. Gate leaves over 6 feet - 0 inch and up to and including 13 feet - 0 inch wide: 4 inches O.D. Schedule 40 pipe and weighing 9.1 lb/ft.

- C. Gate leaves over 13 feet 0 inch and up to and including 18 feet 0 inch: 6-5/8-inch O.D. Schedule 40 pipe and weighing 18.97 lb/ft.

## 2.06 GATE FRAMES FOR CHAIN LINK FENCING

- A. Frames of galvanized steel.
- B. Frames round in section, with 1.9-inch outside diameter, and weighing 2.72 lb/ft.
- C. Frames shall have intermediate members and/or diagonal truss rods for gate leaves more than 8 feet wide.
- D. Gate frame joints shall be made by welding or by means of heavy fittings making rigid and watertight connections.

## 2.07 TOP RAILS, BOTTOM RAILS, AND POST BRACES

- A. Top rails, bottom rails, and post braces of galvanized steel.
- B. Top rails, bottom rails, and post braces round in section, with 1.66-inch outside diameter, and weighing 2.27 -lb/ft.

## 2.09 ACCESSORIES AND ATTACHMENTS

- A. Stretcher bars: Galvanized steel 3/16 by 3/4-inch in cross section, or equivalent cross section with length equal to full height of fabric.
- B. Truss rods: Galvanized steel, 3/8-inch-diameter, or equivalent cross section, and shall have suitable adjustment.
- C. Post tops: Caps of pressed galvanized steel. Provide with a hole suitable for through-passage of the top rail. Fit snugly to the post, have means for attaching securely to the post and exclude moisture from tabular posts.
- D. Gates swing: Swing type, complete with latches, stops, keepers, hinges, locks and fabric. Fabric to match fence. Hinges of adequate strength to support gate and not twist or turn under action of gate. Latches of plunger bar type and full gate height located in a manner that will engage the gate stop. Forked latches used for single gates less than 10 feet wide. Latches shall provide for locking. Stops shall consist of a flush plate with anchor placed in concrete to engage the plunger bar of the latch. Other approved types of stops may be used for single gates less than 10 feet wide. Keepers shall be substantial devices for securing and supporting the free end of the gate in open position.
- E. Rolling Gates: Non motorized rolling type, complete with latches, stops, keepers, locks and fabric. Fabric to match fence.

- F. Top rail and bottom rail couplings: Outside sleeve type at least 6 inches long. At least 20% of the couplings shall have an internal heavy spring to take up expansion and contraction.
- G. Brace wire, tie wire, and tension wire:
  - 1. Galvanized wire meeting requirements of ASTM A 12 1, Class 3 coating.
  - 2. Unless otherwise designated, size of wire shall not be smaller than the following:
 

Tension wire	No. 7
Brace wire	No. 9
Tie wires or clips for fastening field fence to steel posts	No. 12
  - 3. Tie wires for chain-link fence of size and type recommended by manufacturer, but not smaller than No. 9 for post ties or No. 12 for rail and brace ties. Equivalent galvanized steel clips or aluminum wire or clips may be used as accepted by the Engineer.
- H. Galvanizing: All pipe sections galvanized after fabrication shall be in accordance with ASTM A 53. All other items incidental to erection of fence except fabric and wire fabric ties galvanized after fabrication in accordance with ASTM A 153. Wire fabric ties will have not less than 0.8 ounce of zinc per square foot.

## 2.10 CONCRETE FOOTINGS

- A. Concrete shall be mixed and placed in strict accord with Section 03300.

## PART 3 - EXECUTION

### 3.01 CLEARING AND GRADING

- A. Contractor shall perform such clearing and grading as necessary to construct fence to required alignment and provide a reasonably smooth ground profile at the fence line.

### 3.02 POST ASSEMBLIES

- A. End, corner, gate, and pull or intermediate anchor posts placed at designated locations.
- B. Posts securely braced and holes filled with concrete. Form not required for post encasement

### 3.03 HORIZONTAL DEFLECTION

- A. At points of deflection where fence changes alignment by more than 5 degrees provide a post brace and truss rod in each fence panel to the post located at the angle point.

- B. Footings for all posts located at points where the change in alignment exceeds 5 degrees shall be constructed as specified for end posts.

### 3.04 LINE POSTS

- A. Line posts spaced at not more than 10-foot centers.

### 3.05 POST BRACES

- A. A brace and truss assembly shall support each gate, comer, pull, or end post for chain link fencing. Brace shall extend to each adjacent line post at mid-height of fabric. Truss shall extend from line post back to gate, corner, pull, or end post.

### 3.06 FABRIC

- A. Fabric shall not be erected until 5 days after the time of setting the posts in concrete. Fabric shall be fastened to line posts with clips or bands spaced approximately 12 inches apart and to top rail with bands or tie wires at approximately 24-inch intervals. Pull fabric taut and tie to posts, rails and tension wires. Install fabric on security side of fence and anchor to framework so that fabric remains in tension after pulling force is released.

### 3.07 TENSION WIRES

- A. Tension wires installed at bottom of fabric before stretching fabric and tied to each post with wire ties or clips.

### 3.08 ELECTRICAL GROUNDS

- A. Chain-link fence which crosses beneath any primary electrical power transmission line, other than a secondary feeder line for individual customer service, shall be properly grounded. Grounding shall consist of placing one ground rod at point of crossing and one 25 to 50 feet in each direction from the crossing.
  - 1. Chain-link fence erected adjacent to and within 50 feet of a primary power line shall be grounded by placing ground rods at not more than 500-foot intervals.
  - 2. Each applicable straight section of fence shall have at least one ground. Engineer may require installation of an additional ground at terminus of a section of fence or at other locations near areas of pedestrian traffic.
  - 3. Ground rod shall be connected to fence.

\*\*\*END OF SECTION\*\*\*

## **SECTION 02 92 00 – LANDSCAPING**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION OF WORK**

- A. Work in this section shall include all labor, equipment and materials necessary for re-establishing grass vegetation in areas disturbed during construction. Work shall include stripping, excavation, hauling, stockpiling, placing topsoil, placing compost, and hydro-seeding.

#### **1.02 RELATED SPECIFICATIONS**

- A. Section 31 20 00 – *Earthwork*
- B. Section 31 32 11 – Soil surface Erosion Control

#### **1.03 SEEDING GUARANTEE**

- A. During the one (1) year guarantee period should any seeded area show signs of failure such as dead or dying areas of grass, bare spots, dead or dying plants, etc., the Contractor shall repair or replace all deficient items to the satisfaction of the Engineer.
- B. All graded areas not seeded or paved by October 15 shall be covered with two (2) inch depth straw to prevent erosion. Straw to be provided and installed by the Contractor. Do not perform planting or seeding when ground is frozen, snow covered, muddy or in an otherwise unsatisfactory condition. When unforeseen conditions detrimental to plant growth are encountered, such as adverse drainage conditions, obstructions, compaction, or toxified soils, notify the Engineer before proceeding.

#### **1.04 SUBMITTALS**

- A. The Contractor shall submit product specifications and installation recommendations for all materials to be provided under this section.
- B. Submit seed vendor's blue tag certification for required grass seed mixture, indicating percentage by weight, and percentages of purity, germination, and weed seed for each grass species.
- C. Upon seeded areas acceptance, submit written maintenance instructions recommending procedures for maintenance of seeded areas.

### **PART 2 - PRODUCTS**

#### **2.01 TOPSOIL MATERIAL**

- A. Topsoil shall conform to Section 9.14.1(2) of the Standard Specifications.

#### **2.02 GRASS SEED**

- A. Seed shall conform to Table 1 and Table 2 below.
- B. Seed mix for R.I. Galleries and Site Restoration Areas (including constructed slopes, disturbed areas, and field behind recreation center) shall be:

Seed of the following composition, proportion, and quality shall be applied at a rate of 8 pounds per 1000 square feet:

<b>Table 1</b>	
<b>COMMON NAME</b>	<b>% by Weight</b>
NOBILITY PERENNIAL RYEGRASS	30
Amazing GS Perennial Ryegrass	30
Longfellow II Chewings Fescue	20
Gibilbralter Creeping Red Fescue	20

This mixture is provided by Sunmark Seeds under the name DOT Multipurpose Mixture. Seeds shall be certified "Weed Free" indicating there are no noxious or nuisance weeds in the seed.

## **2.03 FERTILIZER**

- A. Fertilizer shall be a granular, non-burning product composed of not less than 50% organic, slow acting, guaranteed analysis professional fertilizer. Seeded area starter fertilizer containing 20% nitrogen, 26% phosphoric acid, and 6% potash by weight, or similar approved composition applied at a rate of 6.5 lbs/1000 SF.

## **2.04 WOOD FIBER MULCH FOR HYDRO-SEEDING**

- A. Hydro-seeding to be applied to all areas disturbed and/or regraded (which will not be protected with quarry spalls, gravel, and/or pavement) during construction. Commercially prepared wood fiber mulch specifically manufactured for hydro-seeding application shall be used.
- B. Dispersing agents may be added at Contractor's option provided that the additive is not harmful to the mixture.

## **2.05 WATER**

- A. The Contractor shall furnish water as required for planting and establishing vegetation in seeded areas. Provide all necessary hoses, equipment, attachments, and accessories for adequate watering of seeded areas.

# **PART 3 - EXECUTION**

## **3.01 SEEDING**

- A. Inspect all subgrades for debris and adverse drainage conditions. Remove all debris including rocks 1-inch in diameter and larger, sticks, roots, sod and other deleterious material. Notify the Owner of any grades or conditions which might create adverse or undesirable drainage patterns.
- B. Smoothly blend and feather topsoil into existing surrounding grades. Rake or lightly harrow topsoil until the soil is friable and of uniform texture and satisfactory for seed placement.
- C. After seeding, topsoil shall be rolled for compaction and shall be minus ½-inch below all adjacent paved or graveled surfaces. Irrigate immediately until soil is damp to about 6".

- D. The hydro-seeding operation shall include the installation of seed, fertilizer, mulch, and tackifier with a tracer to verify uniform application.
- E. Hydro-seeding shall be done in accordance with WSDOT Spec. 8-01.3(2)B.
- F. Seed immediately after preparation of seed bed. Seeding may occur August 15 to October 15.
- G. Seed shall be applied at a rate listed above.
- H. Mulch shall be applied at a rate of 2,000 pounds per acre.

### **3.02 MAINTENANCE AND WATERING**

- A. Patch, repair and re-seed any and all damaged or barren areas observed prior to final project acceptance at no additional cost to the Owner.
- B. The Contractor shall protect and care for all seeded areas until fully established and hearty. Care shall include equipment and labor necessary to provide sufficient and continuous watering of all seeded areas until final acceptance.

**\*\*\*END OF SECTION\*\*\***



## SECTION 03 30 00 – CAST-IN-PLACE CONCRETE

### PART 1 - GENERAL

#### 1.01 DESCRIPTION

- A. Work includes but is not limited to the following:
  - 1. All material, labor, and equipment to prepare subgrade, build forms, install rebar, and place concrete for all cast-in-place concrete shown on the Plans. Compensation for all costs associated with cast-in-place concrete shall be incidental to the lump sum bid items in which the work is identified.

#### 1.02 RELATED SECTIONS

- A. Coordinate related work specified in other parts of the Project Manual, including but not limited to following:
  - 1. Section 31 20 00 - Earthwork
  - 2. Section 03 40 00 - Precast Concrete
  - 3. Section 07 26 10 - Vapor Retarder

#### 1.03 REGULATORY REQUIREMENTS

- A. Comply with the requirements of Section 01 41 00 - REGULATORY REQUIREMENTS, and the following. Note that where conflicts may arise, comply with the most stringent requirement:
  - 1. WSDOT Standard Specifications for Road, Bridge and Municipal Construction, M41-10, 2024 Edition.
  - 2. Washington State Department of Ecology, *Stormwater Management Manual for Western Washington*, 2005.
  - 3. Codes and Standards listed in Section 1.05 below are incorporated as regulatory requirements by reference.

#### 1.04 CODES AND STANDARDS

- A. Comply with the Drawing Structural Notes, they are part of the contract documents and take precedence over less specific requirements in these specifications.
- B. American Concrete Institute (ACI)
  - 1. ACI-301-16 – *Specifications for Structural Concrete*
  - 2. ACI-318-19 – *Building Code Requirements for Structural Concrete*
  - 3. ACI-117-10 – *Specification for Tolerances for Concrete Construction*
  - 4. ACI-347-04 – *Recommended Practice for Concrete Formwork*
  - 5. ACI-350R-06 – *Requirements for Environmental Engineering Concrete Structures*
  - 6. ACI-SP-066-04 – *ACI Detailing Manual*
  - 7. ACI-305.1-14 – *Specification for Hot Weather Concreting*

8. ACI-306 – *Guide to Cold Weather Concreting*
9. ACI-306.1-90 – *Standard Specification for Cold Weather Concreting (Reapproved 2002)*
- C. Concrete Reinforcing Steel Institute (CRSI), *Manual of Standard Practice*, 27<sup>th</sup> Edition.
- D. International Code Council, *International Building Code*, 2021.
- E. American Society for Testing and Materials (ASTM)
  1. ASTM-C-94 / 94M – *Standard Specification for Ready-Mixed Concrete*
  2. ASTM-E-329 – *Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection*
  3. ASTM-C-1077 – *Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation*
  4. ASTM-E-1643 – *Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs*
  5. ASTM-E-1745 – *Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs*
- F. National Ready Mixed Concrete Association (NRMCA), *Certification of Ready Mixed Concrete Production Facilities*

## 1.05 SUBMITTALS

- A. Submit shop drawings that conform to ACI-SP-066-04 detailing standards. Failure to conform to ACI detailing standards may constitute grounds for rejection without review, with resubmittal required.
- B. Submit mix design, to meet criteria per the Structural Notes, minimum of two (2) weeks ahead of placement schedule
- C. Material Certificates: Signed by manufacturer and Contractor; Submit in lieu of laboratory test reports as acceptable to Engineer, demonstrate compliance with requirements.
  1. Certification of admixtures compatibility by Contractor's approved technician.
- D. Mix Design: Written proposal for each concrete mix to meet criteria per the Structural Notes. Submit each design a minimum 15 working days prior to start of Work that includes the mix. Each mix design shall include following:
  1. All materials and admixtures and their proportions.
  2. Water-cement ratio, slump, aggregate grading, and maximum aggregate size.
  3. Evidence that mix design meets the strength requirements and other requirements. Compression and other test data (field experience method) or results of testing (trial batch method) used to establish mix proportions.
  4. State (WSDOT) materials sources for principal constituents, including cement and aggregate.
  5. Certificates signed by manufacturer and Contractor stating compatibility of admixtures

- E. The contractor shall submit a detailed plan for dealing with hot and cold weather work, prepared by a registered Professional Engineer. The plan shall be subject to review by the Engineer of Record. ACI 305 and 306 shall be the basis of the plan. At a minimum, the plan shall include
  - 1. Protect concrete with curing blankets or by other means for a minimum of 72 hours when temperatures are expected to be below 38 degrees F for more than 3 hours. The plan shall include specific measures for securing the protection against wind, rain, snow, or other inclement weather.
  - 2. When temperatures are expected to be above 85 degrees F for more than 12 hours, use curing compound or continuous wetting techniques to reduce cracking. The plan shall include specific measures dealing with hot, sunny, and windy weather.
- F. The contractor shall submit plans and calculations for formwork necessary for concrete walls over 15'-0" tall, sealed by a Washington State Structural Engineer. These shall comply to ACI 347R-14, Guide to Formwork for Concrete. The submittal of these documents is intended to show good faith in planning and execution of the work. It does not relieve the contractor of its responsibility for diligent and safe prosecution of the work at all times.
- G. The contractor shall submit plans indicating locations and types of all proposed construction, control and expansion joints. Spacing shall not exceed the maximum allowable spacing indicated on the plans. If control joint spacing limits are not indicated on the plans, control joint spacing shall not exceed 30 times the slab thickness unless approved in writing by the Engineer of Record.

#### **1.06 QUALITY ASSURANCE**

- A. Regulatory Requirements: See referenced Codes, ordinances and the like as well as Section 01 45 00 - QUALITY CONTROL.
- B. Manufacturer Qualifications: A firm experience in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
  - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing and Inspection. Owner will provide independent testing and inspection outside of the contract. Contractor shall coordinate and cooperate with Owner's independent testing and inspection agency. The independent testing agency shall be qualified according to ASTM C 1077 and ASTM E 329 for testing indicated per Authorities Having Jurisdiction (AHJ) permit. The Contractor shall give adequate notice of upcoming work to the testing agency and/or the on-site agent of the Engineer of Record. Owner's independent testing and inspection agency will perform the following tasks:
  - 1. Compaction and Moisture Control Tests on foundation subgrade prior to placement reinforcing.
  - 2. Reinforcing placement, lap length, cover, and bar sizes, concrete placement taking of test cylinders, and cylinder testing.

## **1.07 PROJECT SITE CONDITIONS**

- A. Coordination: Notify the Engineer upon completion of preparatory work and of intended schedule for placement.
- B. Establish and maintain required lines and elevations.
- C. Follow ACI requirements for hot and cold weather work including the following:
  - 1. Cold-Weather Placement: Comply with ACI 306.1.
    - a. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
  - 2. Hot-Weather Placement: Comply with ACI 301.

## **PART 2 - PRODUCTS**

### **2.01 GENERAL**

- A. Comply with "Quality Assurance" provisions, "References," and Specifications. Where these may be in conflict, the more conservative requirements govern.
- B. All products to be installed in accordance with "Quality Assurance" provisions, "References," Specifications, and Manufacturer's directions. Where these may be in conflict, the more conservative requirements govern.
- C. Concrete to comply with the following ACI publications ACI 301 and ACI 117 unless modified by requirements in contract documents.

### **2.02 FORM-FACING MATERIALS**

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints. Applies to slabs and interior exposed concrete wall conditions and raised concrete stem walls.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit. Applies to concrete surface conditions hidden below grade.
- C. Form Liner Finish Concrete: Coordinate with drawings for locations, and Section 3.02 for installation requirements.

### **2.03 STEEL REINFORCEMENT**

- A. See the Structural Notes and the Structural Drawings for reinforcing materials.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

## **2.04 CAST-IN-PLACE CONCRETE MATERIALS**

- A. Aggregates: All aggregates shall be from Washington Department of Transportation approved sources, and shall be free from marine life shells and residues of salt.
- B. Concrete: Mix design shall be per the Structural Notes (per Section 1.06, Submittals).
- C. Reinforcing steel shall be as per the Structural Notes.
- D. Joint Sealant. Joint Sealant shall be GREY IN COLOR approximating matching color of concrete and meet WSDOT Standard Specification 9-04.2.
- E. Premolded Joint Filler for Expansion Joints. Pro-Flex manufactured by Oscoda, or approved; 100 percent recycled vinyl.
- F. Waterstop Hydrophilic bentonite or modified chloroprene rubber; Cetco Waterstop – RX101T Greenstreak Hydrotite CJ0725, or equal. Maintain 3” minimum cover from face of waterstop to face of concrete. Remove all dirt, coatings, and debris from concrete surface. Install waterstop per manufacturer’s instructions.
- G. Adhesive Doweling Accessories: Accepted products shall be as stated in the Structural Notes in the Contract Plans.

## **2.05 MOISTURE RETARDERS FOR INTERIOR SLABS-ON-GRADE**

- A. Sheet Vapor Retarder: ASTM E 1745, Class. Include manufacturer's recommended adhesive or pressure-sensitive tape and in accordance with Section 07 26 00.
  - 1. Stegowrap Vapor Barrier, 15 mil sheeting and associated tape and accessories for complete installation.

## **2.06 CURING MATERIALS FOR INTERIOR SLABS-ON-GRADE**

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
  - 1. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

## **2.07 RELATED MATERIALS**

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

## **2.08 CONCRETE MIXTURES, GENERAL**

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

- B. Cementitious Materials: Use fly ash and/or slag cement as needed to reduce the total amount of portland cement, which would otherwise be used, as specified in Structural Notes.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
  - 1. Use water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
  - 2. Contingent upon field placement conditions (i.e., wind), use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verify installation conditions as satisfactory to receive work of this Section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.
- B. Follow the plan for hot and cold weather work per Section 1.06.
  - 1. The Owner shall have authority to require such protections based on National Weather Service hourly forecasts.

### **3.02 FORMWORK INSTALLATION**

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork of well-fitted, strong, rigid, and leak-proof materials so bulges, fins, or voids are not created in the finished work, and concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Chamfer exterior corners and edges of permanently exposed concrete.

### **3.03 EMBEDDED ITEM INSTALLATION**

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
- B. Anchor bolts for steel columns, foundation bolts, and anchor rods for machinery (including but not limited to the skimmer on the clarifiers) shall be set to the tolerances of ANSI/AISC 303-16, Code of Standard Practice for Steel Buildings, Section 7.5 by a Registered Land Surveyor. The Owner's designated representative for construction shall conduct a survey of the as-built locations of the other embedded items, and shall verify that all items covered in Section 7.5 meet the corresponding tolerances.

### **3.04 VAPOR-RETARDER INSTALLATION**

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
  - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.
  - 2. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

### **3.05 STEEL REINFORCEMENT INSTALLATION**

- A. Bar detailing not shown otherwise on drawings shall comply with the CRSI Manual of Standard Practice.
- B. Lap all bars 40 diameters unless shown otherwise on the drawings. Bars parallel to the line of the wall shall be continuous, i.e. lapped or with corner "L" bar laps, or otherwise terminated at the ends of the wall with 90-degree x 12 bar diameter hooks.
- C. Support reinforcing bars on chairs or other purpose-made devices so that they are securely held in place and maintain tolerances during placement and consolidation of concrete. Pulling up reinforcing to "float" in slabs as concrete is placed is unacceptable, and any such work is subject to rejection, demolition, and rework.

### **3.06 JOINTS IN BUILDING SLABS**

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect or Engineer of Record.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
  - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

### **3.07 CONCRETE PLACEMENT**

- A. All work associated with the manufacture, transport, and placement of concrete shall comply with References listed in parts 1.04 and 1.05 of this specification section.
  - 1. Contractor to plan for and accommodate any embedded items such as wall pipe, railings, ladders, hatches etc. which are not or may not be suitable for subsequent installation into cured concrete.

2. This plant is designed for a long service life with a minimum of maintenance. Penetrations of concrete walls or slabs require prior approval to core drill through. It is the responsibility of the contractor to coordinate work and provide sleeves as required. Failure in coordination of piping with concrete work may result in rejection of work to be demolished and redone at no cost to the Owner.
- B. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
  1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

### **3.08 FINISHING FORMED SURFACES**

- A. General: Vibrate to compact, screed, level, and tamp with a grid tamper to raise a thin mortar bed to the surface. Trowel after concrete has hardened sufficiently to prevent drawing moisture to the surface. Do not dust with dry materials.
- B. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie-holes, defects, and depressions 1/16-inch or larger in depth or width repaired and filled with mortar. The mortar shall consist of 1 part cement and 1-1/2 parts fine (passing No. 100 screen) mixed with enough water and an emulsified bonding agent to have the consistency of a thick cream. The surfaces shall be brush sandblasted prior to filling holes to expose all holes near the surface. Thoroughly wet surfaces and rub mortar on with burlap, sponge rubber floats, or trowels while surface is damp. Wipe surface clean and moist cure. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  1. Apply to concrete surfaces not exposed to public view.
- C. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Tie-holes, defects, and depressions 1/16-inch or larger in depth or width repaired and filled with mortar. The mortar shall consist of 1 part cement and 1-1/2 parts fine (passing No. 100 screen) mixed with enough water and an emulsified bonding agent to have the consistency of a thick cream. The surfaces shall be brush sandblasted prior to filling holes to expose all holes near the surface. Thoroughly wet surfaces and rub mortar on with burlap, sponge rubber floats, or trowels while surface is damp. Wipe surface clean and moist cure. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  1. Apply to concrete surfaces exposed to public view.
- D. Form Liner Finish: As cast texture imparted by reusable Form Liners with a minimum of joints.
- E. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.
- F. Sandblast: Provide light sand blasted finish at non-form liner wall finishes at exterior ramp walls.



### 3.09 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces.
  - 1. Interior Floor Slabs: Steel trowel and install joints straight and true. Do not apply curing compounds. Damp cure only. Slope concrete slabs with Portland Cement Grout 1/8" per foot to sumps or as indicated on plans. Apply slip-resistant rake finish to wetwell bottoms.
  - 2. Sidewalks, Exterior Slabs on Grade and Curbs: Steel trowel and medium broom finish.
- B. Float Finish: Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power-driven floats. Re-straighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.
- C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighen until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
  - 1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
  - 2. Finish and measure surface, so gap at any point between concrete surface and an unveled, freestanding, 10-ft.-long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch.
- D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
  - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

### 3.010 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
  - 1. Leave forms in place until the following are met:
    - a. Suspended work: Concrete has reached 100% of design f'c.
    - b. Walls up to 9'-0" tall: Concrete has reached 50% of design f'c.

- c. Walls up to 13'-0" tall: Concrete has reached 80% of design f'c.
  - d. Walls over 13'-0" tall: Concrete has reached 100% of design f'c
- D. Curing period:
  - a. Hydraulic structures: Cure for a minimum of 14 days.
  - b. All other concrete: Cure for a minimum of seven (7) days.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
  - 1. Moisture Curing: Keep concrete surfaces continuously wet by covering with water.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
  - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
    - a. Removal where floor coverings will be installed: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.
  - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

### **3.011 CONCRETE SURFACE REPAIRS**

- A. Defective Concrete: Repair and patch defective areas when directed by Engineer of Record (EOR). Remove and replace concrete that cannot be repaired and patched to EOR's approval.

**\*\*\*END OF SECTION\*\*\***

## SECTION 03 40 00 – PRECAST CONCRETE

### PART 1 - GENERAL

#### 1.01 SECTION INCLUDES

- A. Work includes but is not limited to the following:
  - 1. All material, labor, and equipment to design, prepare, furnish, deliver, and install all precast concrete structures shown on the drawings, including but not limited to concrete vaults, top slabs, and the effluent wet well.
  - 2. Includes seals, coatings, or other related accessories per the drawings.

#### 1.02 RELATED SECTIONS

- A. Coordinate related work specified in other parts of the Project Manual, including but not limited to the following:
  - 1. Section 03 30 00 - Cast-in-Place Concrete

#### 1.03 REFERENCES

- A. Comply with the requirements of Section 01 41 00 - REGULATORY REQUIREMENTS, and as listed herein.
- B. Comply with the following references (C – D). Where conflicts may arise, comply with the more stringent requirements.
- C. WSDOT Standard Specifications for Road, Bridge and Municipal Construction, M 41-10, 2024 Edition.
- D. Washington State Department of Ecology August 2012 Stormwater Management Manual for Western Washington.

#### 1.04 CODES AND STANDARDS

- A. *American Concrete Institute (ACI) ACI-318-19, Building Code Requirements for Structural Concrete.*
- B. *ACI 117-10 Specification for Tolerances for Concrete Construction.* Note that where there may be conflicts regarding tolerances between this standard and WSDOT Standard Specifications for Road, Bridge and Municipal Construction, M 41-10, the more stringent will govern.
- C. ACI SP-066 2004, ACI Detailing Manual.
- D. Precast/Prestressed Concrete Institute (PCI) MNL 116 Manual for Quality Control for Plants and Production of Structural Precast Concrete Products, 4<sup>th</sup> Edition.
- E. PCI Design Handbook 7<sup>th</sup> Edition.

## **1.05 SUBMITTALS**

- A. Shop drawings and calculations sealed by an engineer registered in the State of Washington are required for all precast concrete structures. The calculations shall consider dead, live, soil, hydraulic, and other loadings, as well as the stresses of transportation and handling. Minimum force requirements given in the contract documents are unfactored loads.
- B. Shop drawings shall include lifting loops, hangers, and other accessories and are subject to the requirements of paragraph A, above. In addition, the locations of embeds and anchor bolts shall be coordinated to eliminate conflicts.
- C. Shop drawings shall conform to ACI SP-066 detailing standards.
- D. Submit mix design, showing adequate strength to meet the loadings per the calculations (paragraph A, above). The mix shall meet all criteria per the Structural Notes.
- E. Material Certificates: Signed by manufacturer and Contractor; Submit in lieu of laboratory test reports as acceptable to Engineer, demonstrate compliance with requirements.
  - 1. Certification of admixtures compatibility by Contractor's approved technician.
- F. Mix Design: Written proposal for each concrete mix and strength required submit 15 days prior to start of Work. The mix design shall list the following
  - 1. All materials and admixtures and their proportions.
  - 2. Water-cement ratio, slump, and aggregate grading.
  - 3. Evidence that mix design meets the strength requirements: Compression test data (field experience method) or results of testing (trial batch method) used to establish mix proportions.

## **1.06 QUALITY ASSURANCE**

- A. The producer shall submit certificates showing compliance with the National Precast Concrete Association (NPCA) quality control program, for the last five years.
- B. The Owner and the Engineer reserve the right to inspect or observe fabrication at the precast plant.

## **PART 2 - PRECAST STRUCTURES**

### **2.01 GENERAL**

- A. Comply with "Quality Assurance" provisions, "References," and Specifications. Where these may be in conflict, the more stringent requirements govern.

### **2.02 PRECAST STRUCTURES**

- A. Sizes and configurations are noted on drawings. Do not use alternate sizes without approval of the Engineer.
- B. Design all components of the system for the loads given on the structural notes.

- C. Details of precast framing and connections on the contract documents depict the intent. Mild reinforcing shown on the drawings is the minimum required; determine additional reinforcing per the above requirements.
- D. Precast Wet Wells and Vaults
1. Precast manhole and vault components shall have 28-day compressive strength of 4,000 psi. Rebar shall be ASTM A615 Grade 60. Mesh reinforcing, if any, shall be ASTM A-185 Grade 65. Design shall be per ACI 318-83 and ASTM C-857 "Minimum Structural Design Loading for Underground Precast Concrete Utility Structures."
- E. Sealant Gaskets:
1. The sealant gaskets shall be pre-formed, continuous rope form plastic material, protected by a removable two-piece wrapper.
  2. Sealing compound shall be reinforced hydrocarbon resins blended with plasticizing compounds and reinforced with inert mineral filler. The sealing compound shall have no solvents, irritating fumes or obnoxious odors.
  3. The adhesive and cohesive strength of the sealant gaskets shall not be dependent upon oxidizing, evaporating or chemical action.
  4. Sealant Gasket shall conform to Federal Specification SS-S-210.
  5. Sealant gaskets shall be RAM-NEK as manufactured by K.T. Snyder Company, Inc. of Houston, TX; QUIKSEAL as supplied by Associated Concrete Products, Santa Ana, CA; or approved equal.
- F. External Precast Vault Joint Sleeves –
1. Joint sleeves shall be heat-shrinkable sleeves constructed of irradiated and cross-linked polyethylene impermeable backing coated with protective heat-activated adhesive.
  2. Joint sleeves shall be capable of bonding to primed concrete, metal, and fiberglass surfaces.
  3. Joint sleeve material shall be compatible with concrete, steel, iron, and fiberglass.
  4. Joint sleeves shall be supplied with a separate closure seal to secure sleeve in place during installation and seal overlap area.
  5. Joint sleeve primer of the same manufacturer as the joint sleeve material shall be provided to prime concrete and steel surfaces prior to joint sleeve installation.
  6. Joint sleeves shall be WrapidSeal Manhole Encapsulation System as manufactured by Canusa, Division of Shaw Resource Services, Inc. of The Woodlands, TX.; or approved equal.
- G. Waterproofing Grout –
1. Any grout applications that may be in contact with groundwater, stormwater, or process water shall use a waterproofing grout per Section 04 60 00.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verify installation conditions as satisfactory to receive work of this Section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.

### **3.02 PRECAST CONCRETE - INSTALLATION**

- A. Install in accordance with "Quality Assurance" provisions, "References," Specifications, and Manufacturer's directions. Where these may be in conflict, the more stringent requirements govern.
- B. Where indicated on the drawings, set precast units on cast-in-place bases level and true.
- C. Apply primer to joint surfaces in accordance with manufacturer's instructions. Make all joints watertight with sealant gaskets.
- D. Apply primer and heat-shrinkable joint sleeves in accordance with manufacturer's instructions. Ensure surfaces are clean, dry, and free of frost, surface rust, foreign objects, sharp edges, and projections that could damage manhole encapsulation systems. The Contractor shall provide a minimum of 3-days' notice prior to the beginning application of the joint sleeves. Joint sleeve installer shall be experienced with the required installation techniques and have attended a minimum of 1 day of training at the manufacturer's facility or on-site with manufacturer's representative.
- E. Backfill with approved gravel backfill material. Compact the backfill material to 95% of relative density from the pipe bedding and base slab up to final finish grade, over an area defined as being within a distance of 4 feet from the exterior walls of the structure.
- F. Accurately locate vault frames to within 1/4-inch vertical elevation. Coordinate the activities of all trades so that this tolerance is achieved.
- G. Install the vault hatches and frames. Machine as necessary to obtain a solid fit, without rattling under load.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 04060 – BASIN BOTTOM AND OTHER GROUT**

### **PART 1. GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Work includes but is not limited to the following:
  - 1. All material, labor, and equipment to install grout as shown on the drawings.

#### **1.02 RELATED SECTIONS**

- A. Coordinate related work specified in other parts of the Project Manual, including but not limited to following:
  - 1. Section 03 30 00 Cast-in-place Concrete
  - 2. Section 03 40 00 Precast Concrete

#### **1.03 REFERENCES**

- A. International Concrete Repair Institute 310.2 : Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays

#### **1.04 DEFINITIONS**

- A. Base plate grout: Non-shrink grout placed in relatively thin layers (generally less than 1 inch) to provide an even bearing surface between concrete structures and mechanical devices.
- B. Miscellaneous grout: Grout to fill anchor bolt pockets, handrail pockets, and under non-mechanical equipment base plates
- C. Basin bottom grout: Cementitious material used over reinforced concrete to provide slope in process basins.
- D. Grout that has not bonded: Grout that, after placing and setting, has hollow sound when tapped with 4-foot long, nominal, 2-inch by 4-inch piece of lumber.
- E. Jitterbug: An expanded or grate tamper designed for finishing concrete surfaces with a rough surface profile.

#### **1.05 REGULATORY REQUIREMENTS**

- A. Comply with the requirements of Section 01060 REGULATORY REQUIREMENTS, and the following. Note that where conflicts may arise, comply with the most stringent requirement:
  - 1. WSDOT Standard Specifications for Road, Bridge and Municipal Construction, M41-10, 2012 Edition.
  - 2. Washington State Department of Ecology, Stormwater Management Manual for Western Washington, August 2012.
  - 3. Codes and Standards listed in Section 1.05 below.

#### **1.06 CODES AND STANDARDS**

- A. Comply with the Drawing Structural Notes, they are part of the contract documents and take precedence over less specific requirements in these specifications.
- B. American Concrete Institute (ACI)

1. ACI-318-14 Building Code Requirements for Structural Concrete
  2. ACI-117-10 Specification for Tolerances for Concrete Construction
  3. ACI-347-04 Recommended Practice for Concrete Formwork
  4. ACI-350R-06 Requirements for Environmental Engineering Concrete Structures
  5. ACI-305.1-14 Specification for Hot Weather Concreting
  6. ACI-306.1-90 Standard Specification for Cold Weather Concreting (Reapproved 2002)
- C. International Concrete Repair Institute 310.2 : Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays
- D. International Code Council, International Building Code, 2016.

#### **1.07 SUBMITTALS**

- A. Submit mix designs or manufactures for each type of grout, per section 2.02 following. Submittals shall be made a minimum of 21 days before commencing grouting.

#### **1.08 QUALITY ASSURANCE**

- A. Regulatory Requirements: See referenced Codes, ordinances and the like as well as Section 01 45 00 QUALITY CONTROL.
- B. Testing and Inspection. Owner will provide independent testing and inspection outside of the contract. Contractor shall coordinate and cooperate with Owner's independent testing and inspection agency which will verify placement thickness / slopes.

#### **1.09 PROJECT SITE CONDITIONS**

- A. Coordination: Notify the Engineer upon completion of preparatory work and of intended schedule for placement.
- B. The General Contractor shall verify that where base plates are to be set on grout, the surface is level to within tolerances demanded by the grout manufacturer. He shall also verify that the elevation(s) match the project drawings.
- C. The General Contractor shall verify that where basin bottom grout is to be used to provide slope in basins handling wastewater in all stages, that surfaces of concrete are well prepared, of the proper elevations, and free of spalls or other defects.

### **PART 2. PRODUCTS**

#### **2.01 GENERAL**

- A. Comply with "Quality Assurance" provisions, "References," and Specifications. Where these may be in conflict, the more stringent requirements govern.

#### **2.02 MATERIALS**

- A. Mechanical Base Plate Grout:
1. Grout to be used for mechanical equipment base pads such as pump bases. Material shall be a moisture-tolerant three-component mix: two-part epoxy resin and aggregate. Epoxy grout shall be specifically labeled for long-term support and precision alignment of machinery and conform to ASTM C 881, TYPE IV,



Grade 1, such as Master Builders Technologies MASTERFLOW 648 CP PLUS or Sika Corporation SIKADUR 42 GROUT PAK.

B. Waterproofing Grout:

1. Waterproofing Grout:

Contractor shall use waterproofing grout for all grout applications that may be in contact with groundwater, stormwater, or process water. Waterproofing grout shall be Xypex or approved equal.

C. Miscellaneous Cement Grouts (voids in concrete or around pipe, dry locations only):

1. Cement grout which shall be non-shrinking, non-staining, non-metallic grout with a minimum 6,000 psi compressive strength in seven days. Allow for ¾" grout where not shown otherwise. Clean all contact surfaces and place grout completely without voids.

D. Basin Bottom Grout (Clarifier Bottom Areas):

1. Portland cement grout shall be used to provide slopes shall be one part portland cement to two parts clean sand with a minimum 4,000 psi 28 day compressive strength. Aggregate shall not exceed size #4. The grout shall demonstrate a direct bond pull-off strength of at least 300 psi per ASTM C1583 from a substrate prepared to SSPC SP13 (water blast).
2. Portland cement shall have tricalcium aluminate (C3A) restricted to lower than 5 % and (2 C3A + C4AF) to lower than 25%.
3. Admixtures: Pozzolith 200N manufactured by BASF Construction Chemicals, Cleveland, OH water-reducing admixture, or approved equal, shall be included in the mix. Dose at a minimum rate of 3.5 oz/cwt.
4. Polypropylene fibers shall be included in the mix, manufactured by MasterFiber M100 manufactured by BASF Construction Chemicals, or approved equal, dosed at 1.0 pound per cubic yard of grout.
5. Water content shall be sufficient to allow workability for spreading grout with screeds attached to arms of equipment mechanism, but not excessive, to prevent formation of surface water, laitance, segregation, and to allow grout to stay in place after screeding.

## **PART 3. EXECUTION**

### **3.01 EXAMINATION**

- A. Verify installation conditions as satisfactory to receive work of this Section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.
- B. Observe restrictions for hot and cold weather work. The Owner shall have authority to require necessary protection based on National Weather Service hourly forecasts.
- C. Surface preparation:
  1. Basin bottom slab surface preparation:
    - a. Concrete slab surfaces shall have rough texture, suitable for bonding grout.

- b. During concrete placement: finish concrete surface with jitterbug. Do not provide a smooth troweled surface.
  - c. Roughen top of slab surface to a ICRI 310.2 surface profile of CSP-5 or rougher using one of the following methods:
    - (i) Abrasive blasting.
    - (ii) Steel shotblasting.
    - (iii) Ultra high-pressure water jetting.
  - d. Clean entire slab surface as required to remove dirt, oil, curing compound, laitance, dust, and other matter that may prevent proper grout bonding.
  - e. Saturate concrete slabs with water for minimum of 3 days just before placing grout. At time grout is placed, concrete shall be saturated and surface damp.
- D. Equipment preparation:
- 1. Preparation of equipment for grouting basin bottom slabs:
    - a. Setting the screeds:
      - (i) Bolt nominal 2-inch by 4-inch section of lumber blades on arms of equipment mechanism.
      - (ii) Locate leading edge of lumber approximately 2 inches in front of blade and cut it parallel to centerline of arm.
      - (iii) Securely nail nominal 2-inch by 6-inch screed board to ends of 2 by 4 lumber, in manner such that screed runs parallel to centerline of arm.
      - (iv) Nail bent sheet metal to lower edge of screed board.
      - (v) Ensure that bottom of screed board is 1-1/2 inches below steel blades on arms of equipment mechanism.

### **3.02 APPLICATION**

- A. Grouting basin bottom slabs:
- 1. Placement, general:
    - a. Place grout in accordance with equipment manufacturer's instructions and in accordance with limitations and precautions given in such instructions.
    - b. Bring promptly to attention of the Engineer, conflicts between manufacturer's instructions and this Section.
  - 2. Placing grout:
    - a. Use grouting equipment to apply grout for basin bottom slabs.
    - b. Perform grouting continuously without interruptions until basin slab is covered.

- c. Place ring of grout approximately 3 feet wide on outer edge of slab and gradually widened towards center following spiral pattern until basin bottom slab is covered.
  - d. Unacceptable placing procedure: Following procedures will not be accepted:
    - (i) Grouting by circular sectors or "pie" sections.
    - (ii) Grouting from center outward.
  - e. Use finishing workers to control area immediately in front of screed boards in manner so that:
    - (i) Grout is installed to specified thickness.
    - (ii) No low areas occur.
    - (iii) No excessive amount of grout accumulates.
    - (iv) Grout surface has uniform wood trowel finish without ridges, gouges, or other defect.
  - f. Coordinate grout placement rate and number of finishing workers with travel speed of arms of equipment mechanism.
  - g. Last grout area to be grouted in center may be finished by worker operating from 1 of the arms.
  - h. Use misters or means acceptable to Engineer to keep grout from drying out before start of curing.
3. Following grout placement:
- a. After completion of slab grouting, allow mechanism to run continuously until there is no more danger that grout sloughing may occur.
  - b. Prevent dry clumps of grout or rocks from being caught under screed board and gouging finish surface of grout.
4. Corrections:
- a. Before grout has set:
    - (i) Where sloughing has occurred, remove grout from sloughed areas and place grout in low areas.
    - (ii) Repair gouges in grouted surface.
5. Curing:
- a. After grout has set, water cure grout for 10 days.
  - b. Keep grout surface continuously wet for duration of curing period.
- B. Tolerances:
- 1. For grouting basin bottom slabs:
    - a. Tolerance in elevation of finished grout surface: Plus or minus 1/8 inch.
      - (i) Specified tolerance is more exacting than customary industry standards for slab finish.

- (ii) Tolerance is required for proper operation of equipment.
- b. Thickness of grout layer:
  - (i) Not less than 1 inch at any point.
  - (ii) Provide average thickness of grout as indicated on the Drawings.

### **3.03 FIELD QUALITY CONTROL**

#### **A. Inspection:**

- 1. Verify grout elevation tolerance on basin bottom slabs as follows:
  - a. After grout has set, operate grouting equipment with blades set to clear grout surface.
  - b. Under these conditions, blades shall not clear grout surface by more than 1/4 inch at any point.
    - (i) For excess clearance: correct as specified in article titled "Adjusting" in this Section.

### **3.04 ADJUSTING**

#### **A. Grouting basin bottom slabs:**

- 1. After grout has set:
  - a. Where clearance between blades of mechanical equipment and grouted surface exceeds tolerance specified in this Section, grind high points in grout surface using terrazzo machine until specified tolerance is met.
  - b. Grout that has not bonded to concrete slab is not acceptable. Remove and replace such grout.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 05 12 00 – STRUCTURAL STEEL FRAMING**

### **PART 1 - GENERAL**

#### **1.1 RELATED SECTIONS**

- A. Bird Control: Section 10 29 01.

#### **1.2 REFERENCES**

- A. American Institute of Steel Construction (AISC).
  - 1. "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings."
- B. ASTM International (ASTM):
  - 1. A 36 - "Specification for Carbon Structural Steel."
    - a. A992 "Standard Specification for Structural Steel Shapes"
  - 2. A 53 - "Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless."
  - 3. A 325 - "Specification for High-Strength Bolts for Structural Steel Joints."
  - 4. A 490 - "Specification for Structural Bolts, Alloy Steel, Heat-Treated, 150 ksi Minimum Tensile Strength."
  - 5. A 500 - "Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes."
  - 6. A53 "Specifications for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless"
  - 7. F1554 "Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength"
  - 8. ASTM A-193 – "Standard Specifications for Alloy-Steel and Stainless Steel Boltins for High Temperature or High Pressure Service or Other Special Purpose Applications."
- C. American Welding Society (AWS).
  - 1. D1.1 - "Structural Welding Code."
- D. International Building Code (IBC).
- E. The Society for Protective Coatings (SSPC).
  - 1. Painting Manual.
    - a. SSPC-SP6 - Commercial Blast Cleaning.

#### **1.3 SUBMITTALS**

- A. Shop Drawings showing fabrication and erection details.
- B. Certification of compliance for steel and welding.
- C. Inspection reports.

## **1.4 QUALITY ASSURANCE**

- A. Qualifications: Welding shall be performed by certified welders.
- B. Regulatory Requirements: Conform with applicable requirements of IBC Chapter 22, and as noted on Structural Drawings.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Structural Steel: Conform to ASTM A 36 or ASTM A992.
- B. Structural Tubing: Conform to ASTM A 500, Grade B.
- C. Steel Pipe: Conform to ASTM A 53, Type E, Grade B.
- D. High Strength Bolts: ASTM 325, Type 1 or ASTM A193, Grade B8M, Class 2.
- E. Anchor Rods/Bolts: ASTM F1557, Grade 36 or ASTM A307 or ASTM A193, Grade B8M, Class 2.
- F. Welding Filler Metal: Conform to AWS recommendations for base metal and welding methods.
- G. Grout: Manufactured, high-strength, non-shrink grout.

### **2.2 FABRICATION**

- A. Conform to rules and practices set forth in AISC.
- B. Before starting Work or proceeding with fabrication, verify measurements, lines, grades, and elevations in the field so steel Work will conform to actual conditions.
- C. Shop Painting:
  - 1. Do not paint items of steel and iron work to be embedded in concrete, contact surfaces in friction type connections and surfaces within 2 inches of field welds, and surfaces receiving fireproofing.
  - 2. Clean all steel Work to be shop painted or field painted as specified in Section 09 90 00. Remove loose mill scale, loose rust, accessible weld slag or flux deposit, dirt, and other foreign matter. Remove oil and grease deposits by solvent. Clean steel in accordance with SSPC recommendations.
  - 3. Apply sufficient primer to provide a wet film of 4 mils.
  - 4. Paint erection marks on primed surfaces.

## **PART 3 - EXECUTION**

### **3.1 ERECTION**

- A. Erect items plumb, square, true to lines, levels or elevations indicated, free from twists, bends, open joints or faulty connections. Provide and maintain shoring and guying as required.
- B. Peen exposed bolts after installation is complete.
- C. Field Painting: Touch up all abraded areas and surfaces where welding, grinding of welds, joints, etc., is done in the field. Leave in condition for field painting as specified in Section 09 90 00.

END OF SECTION

## **SECTION 05 21 00 - STEEL JOIST FRAMING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. K-series steel joists.
  - 2. K-series steel joist substitutes.
  - 3. LH- and DLH-series long-span steel joists.
  - 4. Joist girders.
  - 5. Joist accessories.

#### **1.2 ACTION SUBMITTALS**

- A. Product Data: For each type of joist, accessory, and product.
- B. Sustainable Design Submittals:
  - 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
- C. Shop Drawings:
  - 1. Include layout, designation, number, type, location, and spacing of joists.
  - 2. Include joining and anchorage details; bracing, bridging, and joist accessories; splice and connection locations and details; and attachments to other construction.

#### **1.3 INFORMATIONAL SUBMITTALS**

- A. Welding certificates.
- B. Manufacturer certificates.
- C. Mill Certificates: For each type of bolt.
- D. Field quality-control reports.

#### **1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications."
  - 1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.



- B. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Valley Joist, Inc.
- B. New Millennium Building Systems
- C. Vulcraft

### **2.2 PERFORMANCE REQUIREMENTS**

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

### **2.3 K-SERIES STEEL JOISTS**

- A. Manufacture steel joists of type indicated according to "Standard Specification for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.
- B. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.

### **2.4 LONG-SPAN STEEL JOISTS**

- A. Manufacture steel joists according to "Standard Specification for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members; of joist type and end and top-chord arrangements as indicated.

### **2.5 JOIST GIRDERS**

- A. Manufacture joist girders according to "Standard Specification for Joist Girders" in SJI's "Specifications," with steel-angle top- and bottom-chord members; with end and top-chord arrangements as indicated.

### **2.6 PRIMERS**

- A. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.
- B. Primer: Provide shop primer that complies with Section 09 90 00 "Paints and Coatings."

## **2.7 JOIST ACCESSORIES**

- A. Bridging: Provide bridging anchors and number of rows of diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.
- B. Bridging: Schematically indicated. Detail and fabricate according to SJI's "Specifications." Furnish additional erection bridging if required for stability.
- C. Bridging: Fabricate as indicated and according to SJI's "Specifications." Furnish additional erection bridging if required for stability.
- D. Furnish ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within **1/2 inch (13 mm)** of finished wall surface unless otherwise indicated.
- E. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts; ASTM A 563 (ASTM A 563M) heavy hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers.
  - 1. Finish: Hot-dip zinc coating, ASTM A 153 Class C.
- F. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

## **2.8 CLEANING AND SHOP PAINTING**

- A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories.
- B. Apply one coat of shop primer to joists and joist accessories.
- C. Shop priming of joists and joist accessories is specified in Section 09 90 00 "Paints and Coatings."

# **PART 3 - EXECUTION**

## **3.1 INSTALLATION**

- A. Do not install joists until supporting construction is in place and secured.
- B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written instructions, and requirements in this Section.
  - 1. Before installation, splice joists delivered to Project site in more than one piece.
  - 2. Space, adjust, and align joists accurately in location before permanently fastening.
  - 3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.

- C. Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- D. Bolt joists to supporting steel framework using carbon-steel bolts.
- E. Bolt joists to supporting steel framework using high-strength structural bolts. Comply with RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.
- F. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

### **3.2 FIELD QUALITY CONTROL**

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Visually inspect field welds according to AWS D1.1/D1.1M.
- C. Visually inspect bolted connections.
- D. Prepare test and inspection reports.

END OF SECTION 052100

## **SECTION 05 40 00 - COLD-FORMED METAL FRAMING**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### **1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Exterior non-load-bearing wall framing.

#### **1.3 PERFORMANCE REQUIREMENTS**

- A. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions," as directed on the construction drawings

#### **1.4 SUBMITTALS**

- A. Submittals shall be in accordance with Division 1 Section 013300, "Submittal Procedures."
- B. Product Data: For each type of cold-formed metal framing product and accessory indicated.
- C. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
  - 1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Welding certificates.
- E. Qualification Data: For testing agency.
- F. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
  - 1. Steel sheet.
  - 2. Expansion anchors.

3. Mechanical fasteners.
  4. Vertical deflection clips.
  5. Horizontal drift deflection clips
  6. Miscellaneous structural clips and accessories.
- G. Research/Evaluation Reports: For cold-formed metal framing.

## **1.5 QUALITY ASSURANCE**

- A. that are similar to those indicated for this Project in material, design, and extent.
- B. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.
- C. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, ductility, and metallic-coating thickness.
- D. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- E. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- F. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

## **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:
  1. Allied Studco.
  2. AllSteel Products, Inc.
  3. California Expanded Metal Products Company.

4. Clark Steel Framing.
5. Consolidated Fabricators Corp.; Building Products Division.
6. Craco Metals Manufacturing, LLC.
7. Dale/Incor.
8. Dietrich Metal Framing; a Worthington Industries Company.
9. Quail Run Building Materials, Inc.
10. SCAFCO Corporation.
11. Southeastern Stud & Components, Inc.
12. Steel Construction Systems.
13. United Metal Products, Inc.

## **2.2 MATERIALS**

- A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
  1. Grade: ST33H (ST230H) As required by structural performance.
  2. Coating: G60 (Z180), A60 (ZF180), AZ50 (AZ150), or GF30 (ZGF90).
- B. Steel Sheet for Vertical Deflection Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
  1. Grade: 50 (340), Class 1 or 2 As required by structural performance.
  2. Coating: G90 (Z275).

## **2.3 EXTERIOR AND INTERIOR NON-LOAD-BEARING WALL FRAMING**

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated on the construction drawings.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated on the construction drawings.

## **2.4 FRAMING ACCESSORIES**

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
  1. Supplementary framing.
  2. Bracing, bridging, and solid blocking.
  3. Web stiffeners.
  4. Anchor clips.
  5. End clips.
  6. Foundation clips.
  7. Gusset plates.
  8. Stud kickers, knee braces, and girts.

9. Joist hangers and end closures.
10. Hole reinforcing plates.
11. Backer plates.

## **2.5 ANCHORS, CLIPS, AND FASTENERS**

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Anchor Bolts: Refer to the Construction Drawings.
- C. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
  1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- D. Welding Electrodes: Comply with AWS standards.

## **2.6 FABRICATION**

- A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
  1. Fabricate framing assemblies using jigs or templates.
  2. Cut framing members by sawing or shearing; do not torch cut.
  3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
  4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
  1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
  2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 PREPARATION**

- A. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.
- B. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

### **3.3 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION**

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:
  - 1. Stud Spacing: As indicated on drawings.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
  - 1. Install single-leg deflection tracks and anchor to building structure.
  - 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
  - 3. Connect vertical deflection clips to infill studs and anchor to building structure.
  - 4. Connect drift clips to cold formed metal framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches (1220 mm) apart. Fasten at each stud intersection.
  - 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches (305 mm) of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
    - a. Install solid blocking at 96-inch (2440-mm) centers.



2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
  3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
  4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

### **3.4 FIELD QUALITY CONTROL**

- A. Testing: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Remove and replace work where test results indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

### **3.5 REPAIRS AND PROTECTION**

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

## SECTION 05 50 00 – METAL FABRICATIONS

### 1.01 DESCRIPTION

- A. Work consists of furnishing labor, materials and equipment for the fabrication and erection of metal fabrications shown which are not part of structural steel or other metal systems specified in this document.
- B. Section includes embedded and nonembedded metal work, aluminum shapes, clip angles, rungs, tubing, rods guides, inserts, brackets, anchor bolts, beams, bracing, steel framing and supports for mechanical and electrical equipment, shelf angles, metal ladders/ship ladders, metal pipe and tube railings, and similar items.
- C. Products furnished, but not installed, under this Section:
  - 1. Loose steel lintels.
  - 2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
  - 3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

### 1.02 RELATED SECTIONS

- A. Coordinate related work specified in other parts of the Project Manual, including but not limited to the following:
  - 1. Section 03 30 00 – Cast-in-Place Concrete
  - 2. Section 05 12 00 – Structural Steel Framing
  - 3. Section 09 90 00 – Paints and Coatings

### 1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM):
  - 1. A 36 – *Specification for Structural Steel*
  - 2. A 153 – *Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware*
  - 3. A 307 – *Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile*
  - 4. A 325 – *Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength*
  - 5. A 490 – *Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints*
  - 6. B 6 – *Specification for Zinc (Slab Zinc)*
- B. American Welding Society (AWS).
  - 1. D1.1 – *Structural Welding Code*
- C. The Society for Protective Coatings (SSPC).
  - 1. *Painting Manual*

#### **1.04 SUBMITTALS**

- A. Submittals shall be in accordance with Section 01 33 00 – Submittal Procedure. In addition, the following specific information shall be provided:
  - 1. Shop Drawings showing fabrication and installation details for all fabricated items including all connections, field joints, and finishes.
    - a. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
  - 2. Product Data for the following:
    - a. Nonslip aggregates and nonslip-aggregate surface finishes.
    - b. Premanufactured metal assemblies.
    - c. Paint products.
    - d. Grout.
  - 3. Samples for Verification for each type and finish of extruded nosing and tread.
  - 4. Qualification Data for qualified professional engineer.
  - 5. Mill Certificates signed by manufacturers of stainless steel certifying that products furnished comply with requirements.
  - 6. Paint Compatibility Certificates from manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.
  - 7. Welder's certificates.

#### **1.05 QUALITY ASSURANCE**

- A. Regulatory Requirements:
  - 1. Metal Fabrications: Meet applicable requirements of IBC Chapter 27.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code – Steel"
  - 2. AWS D1.6, "Structural Welding Code – Stainless Steel"

#### **1.06 PROJECT CONDITIONS**

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

#### **1.07 COORDINATION**

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages and steel weld plates and angles for casting into concrete. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

## PART 2 - PRODUCTS

### 2.01 MATERIALS FOR BUILDINGS

#### A. Metals for Buildings, General

1. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes. Edges shall be free of burns.

#### B. Ferrous Metals for Buildings

1. Recycled Content of Steel Products: Provide products with average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
2. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
3. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304 and Type 316L.
4. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304 and Type 316L.
5. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
6. Rolled-Stainless-Steel Floor Plate: ASTM A 793.
7. Abrasive-Surface Floor Plate: Steel plate with abrasive granules rolled into surface or with abrasive material metallurgically bonded to steel.
  - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - (i) a. IKG Industries, a division of Harsco Corporation; Mebac.
    - (ii) b. SlipNOT Metal Safety Flooring, a W. S. Molnar company; SlipNOT.
8. Steel Tubing: ASTM A 500, cold-formed steel tubing.
9. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.
10. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
  - a. Size of Channels: 1-5/8 by 1-5/8 inches (41 by 41 mm) as indicated on plans.
  - b. Material: Galvanized steel, ASTM A 653/A 653M, commercial steel, Type B or structural steel, Grade 33 (Grade 230), with G90 (Z275) coating; 0.064-inch (1.6-mm) nominal thickness.
  - c. Material: Cold-rolled steel, ASTM A 1008/A 1008M, commercial steel, Type B, or structural steel, Grade 33 (Grade 230); minimum thickness; coated with rust-inhibitive, baked-on, acrylic enamel or hot-dip galvanized after fabrication.
11. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

C. Nonferrous Metals for Buildings

1. Aluminum Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.
2. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.
3. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
4. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.
5. Bronze Plate, Sheet, Strip, and Bars: ASTM B 36/B 36M, Alloy UNS No. C28000 (muntz metal, 60 percent copper).

D. Fasteners for Buildings

1. General: Unless otherwise indicated, provide Type 304 or Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
  - a. Provide stainless-steel fasteners for fastening aluminum.
  - b. Provide stainless-steel fasteners for fastening stainless steel.
  - c. Provide stainless-steel fasteners for fastening nickel silver.
  - d. Provide bronze fasteners for fastening bronze.
2. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 325, Type 3 (ASTM A 325M, Type 3); with hex nuts, ASTM A 563, Grade C3 (ASTM A 563M, Class 8S3); and, where indicated, flat washers.
3. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593 (ASTM F 738M); with hex nuts, ASTM F 594 (ASTM F 836M); and, where indicated, flat washers; Alloy Group 1 (A1).
4. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
  - a. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
5. Eyebolts: ASTM A 489.
6. Machine Screws: ASME B18.6.3 (ASME B18.6.7M).
7. Lag Screws: ASME B18.2.1 (ASME B18.2.3.8M).
8. Wood Screws: Flat head, ASME B18.6.1.
9. Plain Washers: Round, ASME B18.22.1 (ASME B18.22M).
10. Lock Washers: Helical, spring type, ASME B18.21.1 (ASME B18.21.2M).
11. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

12. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
  13. Post-Installed Anchors: Torque-controlled expansion anchors and chemical anchors.
    - a. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
    - b. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).
  14. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches (41 by 22 mm) by length indicated with anchor straps or studs not less than 3 inches (75 mm) long at not more than 8 inches (200 mm) o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.
- E. Miscellaneous Materials for Buildings
1. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
  2. Shop Primers: Provide primers that comply with Division 09 painting Sections.
  3. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
    - a. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
  4. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
    - a. Products: Subject to compliance with requirements, provide the following available products that may be incorporated into the Work include, but are not limited to, the following:
  5. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
  6. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
  7. Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.
  8. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
  9. Concrete: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

## **2.02 MATERIALS FOR OTHER APPLICATIONS**

### **A. Steel and Iron**

1. Wide Flange Shapes: ASTM A 992.
2. Carbon Steel Shapes (excl. wide flange shapes), Plates, and Bars: ASTM A 36.
3. Steel Pipe: ASTM A 53 Grade B, Schedule 40 unless indicated otherwise on drawings.
4. Steel Tubing, square or rectangular: ASTM A 500 Grade B, welded and seamless.
5. Steel Sheet: ASTM A 366 if not galvanized, ASTM A 526 if galvanized.
6. "Diamond Plate": ASTM A 786 with A 36 mechanical properties.

### **B. Aluminum**

1. Pipe Railings, Sleeves and Balusters: ASTM B 221, Schedule 40 and 80 Pipe, Alloy 6066-T6, finish AAM32.
2. Pipe Railing Sleeve Flange: ASTM B 209, Alloy 6061-T6 finish AAM32.
3. Extruded Structural Shapes and Tread Supports: ASTM B 221 Alloy 6066-T6, null finish.
4. Fabrication Weld balusters to railings.

### **C. Stainless Steel:**

1. Applications which may be exposed to damp or wet conditions must implement ASTM A 240 Type 316 unless approved by the engineer.
2. Other applications may implement ASTM A 240 Type 304 and Type 316 as noted within the plans or specifications.

### **D. Galvanizing**

1. Where items are called to be galvanized, galvanize by the hot-dip process in conformance with ASTM A 123, A 153, and A 525. Two ounces/square foot minimum.

## **2.03 FASTENERS FOR OTHER APPLICATIONS**

### **A. Metal to metal, unless noted otherwise on drawings:**

1. Steel to steel: ASTM A 307, Grade A, hex head, galvanized unless neither steel item is galvanized.
2. Aluminum to aluminum: ASTM F 593, Type 304 stainless steel for dry applications and Type 316 for wet or damp applications.
3. Other: Stainless steel; ASTM F 593, Type 304 stainless steel for dry applications and Type 316 for wet or damp applications.

### **B. Metal to concrete:**

1. Mechanical Anchors (For use on non-water bearing concrete structures only, such as building slab and concrete walkway locations. Locations to be approved by Engineer):
  - a. Anchor bolts, for ungalvanized steel: ASTM A 307.

- b. Anchor bolts, all other applications: Stainless steel, ASTM A 193, Grade B8M, Class 2
    - c. Expansion bolts: Federal Specification FF-S-325, stainless steel, group and type as appropriate, loading not to exceed 25% of specified "Proof test" load; Phillips Redhead "parabolt concrete anchors" or equal.
  - 2. Chemical Anchors (For use on all water bearing concrete structures. In addition, to be used at all locations where existing rebar cannot be avoided during concrete coring work and/or available spacing and edge offset is less than 3.5"):
    - a. Adhesive anchors: See Structural Notes.
    - b. For example, typical installation procedures (for a M10 x 90 anchor, as an example) include the following steps: Drill 12mm hole, 95mm deep in concrete; apply adhesive; install HVU M10x90 Foil Capsule; install M10x90/21 HAS-ER (stainless steel) Anchor Rod. Adhere strictly to MFR's recommended instructions and procedures.
- C. Metal to wood:
  - 1. Bolts: ASTM A 307, Grade A, hex head, hot-dip galvanized, except stainless steel where noted on Drawings.
  - 2. Lag screws: Square head type, Federal specification FFB-561, zinc coated for steel, stainless steel for all other.
  - 3. Metal to hollow construction: Toggle bolts, Federal Specification FF-B-588, zinc-coated (galvanized).
- D. Powder-actuated fasteners: May be used for all types of fastenings where pullout and shear values will not exceed 40% of manufacturer's specified values; galvanized for steel; stainless steel for all other.
- E. Washers:
  - 1. Provide washers of the same material and finish as the bolt or lag bolt in the following locations:
    - a. Under all nuts.
    - b. Under bolt heads where bolt material has a yield stress more than 110% of the yield stress of the material being fastened.
  - 2. Under all high-strength bolts, A325 or A490 or stainless steel, use ASTM F844 washers under head of the bolt and the nut.
- F. Lock washers: Provide spring steel helical lock washers of the same finish as the bolt under nuts and bolt heads of connections subject to vibration.
- G. Nuts: Nuts shall conform to the recommendation of the applicable bolt specification and shall be of the same material as the bolt.

## 2.04 WELDING

- A. Perform welding in accordance with pertinent recommendations of the American Welding Society. Use low hydrogen electrodes and methods recommended by manufacturer of material being welded. Type, size and spacing of welds in accordance with reviewed Shop Drawings.
  - 1. Welding shall be done by operators who are State-licensed. The quality of welding shall conform to AWS "Code for Arc Welding in Building Construction", Section 4 Workmanship.



- B. Welds behind finished surfaces: Use methods to minimize distortion and discoloration of finished surface.
- C. Remove flux and slag from both sides of welds.
- D. Grind accessible welds smooth.
- E. Buff or polish welded surfaces which will be exposed to view in the finished work to match and blend with adjacent parent material.
- F. Complete welding before galvanizing, anodizing or painting.

## **2.05 GALVANIZING REPAIR PAINT**

- A. High zinc dust content paint, Military Specification MIL-P-21035.

## **2.06 SHOP PRIMED SURFACES AND ASSEMBLIES**

- A. Steel Surfaces
  - 1. Shop prime steel with primer for paint system as specified in Section 09 90 00, painting schedule.
  - 2. If metal surfaces are shop primed with a coating other than the one specified in Section 09 90 00, the Contractor shall submit in writing to the Engineer a statement that the primer is compatible with the required top coatings specified in Section 09 90 00. Should the entire coating system fail down to bare metal as a result of the shop primer, the Contractor shall be responsible for removal of existing coatings, and re-priming and re-painting at no additional cost to the Owner.

## **2.07 SURFACE TREATMENT - FIELD APPLIED**

- A. Galvanized surfaces: Items that must be drilled or cut in the field as approved by Engineer shall be coated with galvanizing repair paint before installation.
- B. Painted surfaces: Touch-up damaged shop primed surfaces. Provide and apply field priming and finish painting as specified in Section 09 90 00, painting schedule.
- C. Field preparation and painting provided under Section 09 90 00.

## **2.08 PIPE HANGER RODS**

- A. Rods shall be cut and threaded to fit and galvanized after fabrication. The use of "all thread-rod" will not be accepted unless it is stainless steel in accordance with ASTM A 193 and used throughout the whole project.

## **2.09 STAIR NOSINGS**

- A. Concrete stairs shall have 4-inch wide aluminum abrasive nosings 8 inches less than the width of the tread.
- B. Stair nosings shall be Amcolun, Type DSA4 as manufactured by the American Abrasive Metals Company; Super Grit, Type 242 as manufactured by Wooster Products, Inc., or equal. Color as selected by Engineer.

## **2.010 CORROSION PROTECTION**

- A. Ferrous metals that are not entirely embedded in concrete shall be hot-dip galvanized after fabrication. Other miscellaneous steel Items not specifically described elsewhere shall be hot-dip galvanized. Galvanizing shall be in conformance with ASTM A 123 for shapes and weldments, and A 153 for high strength bolts and associated hardware.

## **2.011 FABRICATION, GENERAL**

- A. Verify dimensions on site prior to shop fabrication.
- B. Fabricate Items with joints neatly fitted and properly secured.
- C. Fit and shop assemble in largest practical sections, for delivery to site. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- D. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- E. Exposed mechanical fastenings: Flush countersunk screws or bolts shall be unobtrusively located consistent with design of structure, except where specifically noted otherwise.
- F. Bring connected pieces into contact before bolting or otherwise mechanically fastened.
- G. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- H. Form exposed work with accurate angles and surfaces and straight edges.
- I. Weld corners and seams continuously to comply with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and not impair corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
- J. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- K. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- L. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- M. Supply components required for proper anchorage of metal fabrications. Fabricate anchorage and related components of same material and finish as metal fabrication. Coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
  - 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

- N. Clean surfaces of rust, scale, grease and foreign matter prior to prime painting, galvanizing, anodizing or buffing.
- O. Galvanize or prime paint steel Items as scheduled. Do not shop prime surfaces to be embedded in concrete. Primer is part of paint system specified in Section 09 90 00. Conform with ASTM A 123 and A 153 as applicable. Provide minimum 2.00 ounce/square foot galvanized coating except as otherwise specified therein.
- P. Shop primers that do not contain rust-inhibitive agents are not acceptable.

## **2.012 MISCELLANEOUS FRAMING AND SUPPORTS**

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
  - 1. Fabricate units from slotted channel framing where indicated.
  - 2. Furnish inserts for units installed after concrete is placed.
- C. Fabricate supports for operable partitions from continuous steel beams of sizes recommended by partition manufacturer with attached bearing plates, anchors, and braces as recommended by partition manufacturer. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.
- D. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.
  - 1. Provide bearing plates welded to beams where indicated.
  - 2. Drill or punch girders and plates for field-bolted connections where indicated.
  - 3. Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at 24 inches (600 mm) o.c.
- E. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.
  - 1. Unless otherwise indicated, fabricate from Schedule 40 steel pipe.
  - 2. Unless otherwise indicated, provide 1/2-inch (12.7-mm) baseplates with four 5/8-inch (16-mm) anchor bolts and 1/4-inch (6.4-mm) top plates.
- F. Galvanize miscellaneous framing and supports where indicated.
- G. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

## **2.013 MISCELLANEOUS STEEL TRIM**

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

- C. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- D. Galvanize exterior miscellaneous steel trim.
- E. Prime interior miscellaneous steel trim with zine-rich primer.

## **2.014 LOOSE STEEL LINTELS**

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

## **2.015 PIPE RAILING AND TUBING**

- A. Handrails and Guardrails: 1-1/4" diameter steel pipe to meet ADA standards, ASTM A53, Grade B, standard weight including wall flanges, bends and elbows.

## **2.016 FINISHES, GENERAL**

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.
- C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

## **2.017 STEEL AND IRON FINISHES**

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
- B. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
- D. Preparation for Shop Priming: Prepare surfaces to comply SSPC-SP 3, "Power Tool Cleaning." Requirements indicated below:
  - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 3. Items Indicated to Receive Primers Specified in Division 09 Section "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 4. Other Items: SSPC-SP 3, "Power Tool Cleaning."
- E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
  - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

## **2.018 ALUMINUM FINISHES**

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. As-Fabricated Finish: Prefinished as scheduled.

## **PART 3 - EXECUTION**

### **3.01 INSPECTION**

- A. Installer must examine the areas and conditions under which miscellaneous metal items are to be installed and notify the Contractor in writing of conditions detrimental to the timely and proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner satisfactory to the installer.

### **3.02 PREPARATION**

- A. Furnish setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, anchor bolts and miscellaneous items having integral anchors which are to be embedded in concrete or masonry. Coordinate delivery of such items to project site.

### **3.03 ERECTION**

- A. Obtain Engineer's written permission prior to site cutting, welding, or making adjustments which are not part of scheduled work.
- B. Install items square and level, accurately fitted and free from distortion or defects.
- C. Make provision for erection stresses by temporary bracing. Keep work in alignment.
- D. Replace items damaged in course of installation.
- E. Grouting (see Section 04 60 00):
  - 1. Use non-shrink grout under bearing plates, per Structural Notes.
- F. After installation, touch up scratched and damaged prime painted and galvanized surfaces.
  - 1. Use same primer as used for shop priming of painted surfaces.
  - 2. Use galvanizing repair paint for galvanized surfaces.

### **3.04 PROTECTION OF ALUMINUM**

- A. Aluminum in contact with masonry materials:
  - 1. Paint aluminum surfaces in contact with lime mortar, concrete or other masonry material with a heavy coat of bituminous paint.
- B. Aluminum in contact with dissimilar metals:
  - 1. Where aluminum surfaces are in contact with metals other than stainless steel, zinc, or small areas of white bronze, keep aluminum surfaces from direct contact with incompatible metals by any of the following methods:
    - a. Paint the dissimilar metal with bituminous paint
    - b. Apply a good quality caulking material between the aluminum and the dissimilar metal, only where accepted by the Engineer.
    - c. Use a non-absorptive tape or gasket only where accepted by the Engineer.
  - 2. Dissimilar metals shall be coated when used in locations where drainage from them passes over aluminum.

3. Aluminum modifications/fabrication shall not be performed on-site unless Contractor obtains prior approval from Engineer.

### **3.05 PROTECTION OF STAINLESS STEEL**

- A. Stainless steel modifications/fabrication shall not be performed on-site unless Contractor obtains prior approval from Engineer.

### **3.06 STAIR NOSING INSTALLATION**

- A. Install stair nosing with 1/8-inch wide gap located between concrete tread material and nosing end, to provide for thermal expansion, fill gap with sealant.

### **3.07 INSTALLATION, GENERAL**

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
  1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  2. Obtain fusion without undercut or overlap.
  3. Remove welding flux immediately.
  4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
  1. Cast Aluminum: Heavy coat of bituminous paint.
  2. Extruded Aluminum: Two coats of clear lacquer.

### **3.08 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS**

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

- B. Anchor supports for operable partitions securely to and rigidly brace from building structure.
- C. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.
  - 1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, provide installation details for review by Architect.
- D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates, provide installation details for review by Architect.
  - 1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

### **3.09 INSTALLING BEARING AND LEVELING PLATES**

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
  - 1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations unless otherwise indicated.
  - 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

### **3.010 ADJUSTING AND CLEANING**

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 painting Sections.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

**\*\*\*END OF SECTION\*\*\***



# **SECTION 05 51 10 – STEEL STAIRS AND GRATING PLATFORMS**

## **PART 1 - GENERAL**

### **1.01 SECTION INCLUDES**

- A. Work covered by this section includes:
  - 1. Design, detail, fabricate, and install galvanized steel stair and platform structural framing where shown on the plans. Stair treads shall be non-skid grating, and the platform shall be aluminum grating supported on the framing. The stairs and platforms will, when taken together, form the access and platforms needed for a complete and proper installation shown on the drawings.

### **1.02 RELATED SECTIONS**

- A. Coordinate this work with related work shown on the drawings and specifications in the Project Manual, including but not limited to:
  - 1. Section 05 52 00 – Aluminum Handrails and Guardrails
  - 2. Section 05 53 00 – Grating

### **1.03 SUBMITTALS**

- A. Submit calculations and shop drawings, including consideration of the following
  - 1. Drawings sealed by a Registered Professional Engineer in the State of Washington showing overall views (“E drawings”) as well as parts and pieces for the framing of stairs and platforms, including member sizes, dimensions and cuts, welds, end plates, bolts, etc. These drawings should describe the size, placement, and orientation of all the stairs and platforms covered by this section. Sets of typical details without reference to specific location on the site are not acceptable, and will be rejected without review.
  - 2. The shop drawings referenced in the preceding paragraph shall be coordinated with the metal grating drawings, or the grating drawings shall be included as part of this shop drawing package. Grating type and span direction shall be clearly indicated. Manufacturer’s data on span rating is acceptable in lieu of calculations regarding grating.
  - 3. Handrails shall be aluminum, as shown in the structural details. The stair and platform drawings shall be coordinated with the handrail drawings, or the handrail shall be included as part of this shop drawing package. Grating type and span direction shall be clearly indicated. See Specifications Section 05 52 00 and 05 53 00 for further requirements, including calculations and Professional Engineering Seals.

### **1.04 CODES AND STANDARDS**

- A. Comply with the Drawing Structural Notes, they are part of the contract documents and take precedence over less specific requirements in these specifications.
- B. American Institute for Steel Construction (AISC), “Specifications for Steel Buildings, “ANSI/AISC 360.

- C. American Welding Society (AWS) “Structural Welding Code - Steel,” AWS D1.1 2015.
- D. International Code Council, “International Building Code 2018.”

#### **1.05 PROJECT SITE CONDITIONS**

- A. Coordination: Notify the Engineer upon completion of preparatory work and of intended schedule for placement.
- B. Establish and maintain required lines and elevations.

#### **1.06 DELIVERY, STORAGE AND HANDLING**

- A. Deliver all materials to job site properly marked to identify the structure for which they are intended and at such intervals to insure uninterrupted progress of the work. Marking shall correspond to markings indicated on the shop drawings.
- B. Store all members off the ground using pallets, platforms, or other supports.
- C. Do not store materials on the structure in a manner that might cause distortion or damage to the members of the supporting structure.

### **PART 2 - FABRICATION**

#### **2.01 GENERAL REQUIREMENTS**

- A. Fit and shop assemble stair in the largest practical sections for delivery to the job site.
- B. Miter the stringers at changes in direction with joints tightly fitted and secured by continuous welds.
- C. Close and fit the ends of stringers at landings or platforms. Coordinate with the grating requirements to maintain required elevations.
- D. Provide standard prefabricated grating treads with non-slip ribs.
  - 1. Mechanically fasten or weld treads to stringers.
  - 2. Treads with grating bearing bars shall be banded.

#### **2.02 MATERIALS**

- A. See the Structural Notes for steel materials, and the specifications for grating.

#### **2.03 GALVANIZING**

- A. Hot dip galvanize all steel framing after fabrication, in the largest sections practical given limitations of dipping tanks, with sections to be bolted together at the time of installation.

#### **2.04 DIMENSIONS**

- A. Aside from mobile platforms subject to Section 05 51 19 and unless shown otherwise on drawings, all stairs and platforms shall have the following dimensions:
  - 1. 7” Riser, 11” Tread, 1” Nosing
  - 2. Clear width for all stairways and walkways shall be 4’-0” Min.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Install steel fabricated stairs and platforms in accordance with the shop drawings and in conformance with the project documents.
- B. Install components plumb and level, accurately fitted, free from distortion or defects.
- C. Securely bolt or anchors, plates, angles, hangers, and struts required for connecting stairs to structure. See the Structural Notes and Structural Drawings for further information.
- D. Field weld only where specifically approved (in writing) at time of shop drawing review.
- E. Obtain approval prior to site cutting or creating adjustments.

**\*\*END OF SECTION\*\***

## **SECTION 05 51 19 – MOBILE PLATFORM WITH METAL STAIRS**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Work includes: Fabrication and installation of all metal step and platform assemblies as shown on drawings.
- B. Coordination: Verify that the ladder assembly is equipped with functional lockable wheels that allow the entire unit to be manually relocated. Ensure the assembly is tall and wide enough to reach the intended location(s) without requiring users to bend, climb, extend beyond the guardrail, or maneuver around obstacles in an unsafe manner.

#### **1.02 CODES AND STANDARDS**

- A. OSHA 1910.25 - Stairways

#### **1.03 SUBMITTALS**

- A. Product data: Submit product data for each product included in this section. Submit all hardware and materials. For the metal ladder and platform assemblies to access proposed treatment trains catwalks, include dimensions verifying that the ladder will reach the treatment train platform.

### **PART 2 - MATERIAL**

#### **2.01 PRODUCTS**

- A. The mobile platform and stair assembly may be configured similarly to Global Industrial's Heavy Duty Steel Mobile Work Platform W/ Handrails - 36" x 36" Platform. However, the stairs proposed to access the treatment train catwalks must be able to provide open access to the walkway and provide structurally stable handrails on either side. The aforementioned model would require significant modifications to remove handrails without compromising the remaining railings' structural stability.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Install according to manufacturer's recommendations. Comply with applicable regulations of governing authorities.
- B. Install metal stairs where shown in the Drawings.
- C. Upon completion of the installation, and as a condition of its acceptance, the Contractor and Owner shall visually inspect all the work under this section, check all components for proper operation and damage. If the product is deemed unfit by the Owner, the Contractor is responsible for repairing or replacing the product.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 05 52 00 – ALUMINIUM HANDRAIL AND GUARDRAIL**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Scope
  - 1. Aluminum handrailing and guardrailing shall be provided and installed at the locations shown on the drawings, and configured to be in compliance with OSHA Railing Requirements (1910.29). Handrails (with two horizontal bars, min.) are to be used where shown on drawings. General arrangement details, including height, picket spacing, toe plates, and the like are shown on Civil and Structural Drawings.
- B. Reference Standards
  - 1. Handrailing and guardrailing shall conform to the standards of the Occupational Safety and Health Administration and to the 2021 International Building Code.

#### **1.02 SUBMITTALS**

- A. The Contractor shall submit shop drawings in accordance with Section 01 33 00, Submittals indicating compliance with material specifications and showing a dimensional layout of all handrailing and guardrailing. The Contractor shall submit for review the manufacturer's assembly and installation instructions. The submittal shall include shop drawings and calculations by a Washington State Registered Structural Engineer demonstrating that the rail system, including connections, meets OSHA and IBC requirements.
- B. The Contractor shall coordinate submittals of the railing systems with slabs, platforms, basins, or other structures shown on the drawings. Partial submittals that do not indicate specifically where parts and pieces are to be used shall be rejected without review. Likewise, submittals not sealed by a Washington State registered Structural Engineer shall be rejected.
- C. The Aluminum Handrail and Guardrail, Steel Stairs and Grating Platforms, and Grating specifications shall all be submitted together, as one submittal.

### **PART 2 - PRODUCTS**

- A. Handrails and guardrails shall be aluminum. Prefabricated components shall have a clear satin anodized architectural Class I finish of minimum 0.7 mil thickness. Rails, posts, and stanchions shall be fabricated from 1-1/2" IPS diameter, Schedule 40 cylindrical sections. Prefabricated sections or fittings shall be manufactured by
  - 1. Golden Railing Company, Golden, CO
  - 2. CRL Architectural Products and Services, Los Angeles, CA
  - 3. Ametco Railings, Willoughby, OH
  - 4. Or approved equal
- B. Toeboards shall be provided on all guardrails. Toeboards shall be aluminum, minimum thickness of 1/8". Toeboards shall be designed to allow for thermal contraction and expansion.

## **PART 3 - EXECUTION**

### **3.01 FABRICATION**

- A. Pipe cuts shall be clean, straight, square and accurate for minimum joint gap. Work shall be done in conformance with the railing manufacturer's instructions.
- B. Handrailing and guardrailing shall be connected by screws or bolts. Holes shall be 1/16" larger than the nominal size of the bolts. Handrail and guardrail components with mismatched holes shall be replaced.
- C. Where a bolted connection to the supporting structure is indicated, bolts, nuts and washers shall be Type 316 stainless steel. Weep holes shall be drilled at the lowest possible elevation in each post and rail.
- D. Where a removable section of railing is shown it shall be independently mounted and not connected to adjacent railing.

### **3.02 MEASUREMENT AND ASSEMBLY**

- A. Dissimilar metals shall be protected from galvanic corrosion by means of pressure tapes, coatings or isolators. Aluminum in contact with concrete or grout shall be protected with a heavy coat of bituminous paint.
- B. Metal to be embedded in concrete shall be placed accurately and held in correct position while the concrete is placed. Recesses or blockouts shall be formed in the concrete, and the metal work shall be grouted in place after the concrete has attained its design strength.
- C. Assemble and install in accordance with printed instructions of the manufacturer.

**\*\*\* END OF SECTION \*\*\***

## SECTION 05 53 00 – GRATING

### PART 1 - GENERAL

#### 1.01 SCOPE

- A. Aluminum grating set in pultruded vinyl ester fiberglass reinforced embedment angles with an integral anchor shall be provided and installed at the locations shown on the drawings.

#### 1.02 QUALITY ASSURANCE

- A. All grating shall conform to Metal Bar Grating Manual, latest edition, of the National Association of Architectural Metal Manufacturers.

#### 1.03 SUBMITTALS

- A. The Contractor shall submit shop drawings in accordance with Section 01 33 00, Submittals, indicating compliance with material specifications and showing a dimensional layout of all handrailing required. The Contractor shall submit for review the manufacturer's assembly and installation instructions.
- B. The Grating, Steel Stairs and Grating Platforms, and Aluminum Handrail and Guardrail specifications shall all be submitted together, as one submittal.

### PART 2 - PRODUCTS

#### 2.01 ALUMINUM BAR GRATING

- A. The grating shall support a uniform load of 100 lbs/ft<sup>2</sup> with a maximum deflection of 1/360 of the clear span of the grating. Minimum depth and weight shall be:

Grating Span	Grating depth (in)	Weight (lbs/ft <sup>2</sup> )
2'-6" to 6'-7"	2.0	4.0

- B. Grating shall be I-Bar, with the maximum spacing between bars 1-1/4" or less. Grating ends and cutouts shall be banded. Where changes in channel direction, openings for gates, ends of grating runs, prohibit adequate support for gratings, additional aluminum support angles shall be furnished to provide a full seating surface for the two primary supporting ends along the primary grating span.
- C. Concrete embedment angles for grating shall be 2.0" x 2.0" x 0.25" pultruded vinyl ester fiberglass reinforced embedment angles with an integral anchor, furnished gray in color as manufactured by IKG Industries (800) 835-8356 or equal. The top of embedment angles shall be flush with the top of grating.
- D. Where changes in channel direction, openings for gates, ends of grating runs, prohibit adequate support for gratings, additional aluminum supports shall be furnished to provide a full seating surface for the two ends of grating supporting the primary grating span.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Dissimilar metals shall be protected from galvanic corrosion by means of pressure tapes, coatings or isolators. Aluminum in contact with concrete or grout shall be protected with a heavy coat of bituminous paint.
- B. All grating shall be fastened to supports by suitable removable fasteners. Fastener clips shall be aluminum and necessary bolts, nut and washers shall be Type 316 stainless steel.
- C. Assemble and install in accordance with printed instructions of the manufacturer.

**\*\*END OF SECTION\*\***



## **SECTION 06 10 00 – ROUGH CARPENTRY**

### **PART 1 - GENERAL**

#### **1.01 REFERENCES**

- A. American Plywood Association (APA).
  - 1. "Guide to Plywood Grades."
- B. ASTM International (ASTM):
  - 1. A 307 - "Specification for Carbon Steel Bolts and Studs. 60,000 PSI Tensile Strength."
  - 2. D 3201 - "Test Method for Hygroscopic Properties of Fire-Retardant Wood and Wood-Based Products."
  - 3. E 497 - "Practice for Installing Sound-Isolating Lightweight Partitions."
- C. Federal Specifications (FS).
  - 1. TT-W-571 - "Wood Preservation: Treating Practices."
- D. International Building Code (IBC).
- E. United States Product Standard (PS).
  - 1. PS-1 - "Construction and Industrial Plywood."
- F. West Coast Lumber Inspection Bureau (WCLIB).
  - 1. "Standard Grading Rules for West Coast Lumber No. 16."
- G. Western Wood Products Association (WWPA).
  - 1. "Grading Rules for Lumber."

#### **1.02 QUALITY ASSURANCE**

- A. Regulatory Requirements: Conform with applicable requirements of IBC Chapter 23 and as noted on Structural Drawings.
- B. Certifications:
  - 1. Each piece of lumber shall bear the grade mark of WCLIB or WWPA, and each mill shipment to the site shall be accompanied by a certificate of inspection by WCLIB or WWPA.
  - 2. Each piece of plywood shall be grade stamped in accordance with APA "Guide to Plywood Grades," in conformance with requirements of PS-1.

#### **1.03 RELATED REQUIREMENTS**

- A. Section 06 20 00 – Finish Carpentry
- B. Section 07 25 00 – Weather Barriers.

## PART 2 – PRODUCTS

### 2.01 GENERAL

- A. Sills and all Wood in Contact with Concrete, Masonry, or Earth: Pressure-treated Hem-fir. Wolmanized, CCA Oxide formulation in conformance with Fed. Spec. TT-W-571 for preservative material and for pressure treating.
- B. Lumber: Species and Grades in accordance with WCLIB, Standard Grading Rules for West Coast Lumber No. 16, and WWP, Western Lumber Grading Rules, latest editions as noted on Structural Drawings.
- C. Plywood: U.S. Product Standard PS 1, and as noted on Structural Drawings.
  - 1. Roof Sheathing: APA RATED SHEATHING, Exposure 1, thickness per structural notes and drawings.
- D. OSB: U.S. Product Standard PS 2, and as noted on Structural Drawings.
  - 2. Interior Wall Sheathing (Interior & Exterior): APA RATED SHEATHING, Exposure 1, ½ inch thick (verify with structural drawings).
- E. Fiber-Cement Siding Panel (Interior).
  - 1. General: ASTM C1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.
    - a. Basis of Design: James Hardie Building Products, Inc.; HardiPanel, smooth finish Vertical siding or approved.
  - 2. Sizing: Not less than 5/16 inch, 4x10 panel size.
  - 3. Pattern: none; wide sheets with smooth texture.
  - 4. Factory Priming: Manufacturer's standard acrylic primer.
- F. Adhesive: APA Specification AFG-01.
- G. Rough Hardware: Hot-dipped galvanize or stainless steel exterior hardware.
  - 1. Nails: Common wire galvanized, at exposed locations, common or galvanized box at concealed locations.
  - 2. Screws: Self-drilling, self-tapping, corrosion resistant, Phillips wafer head.
  - 3. Powder actuated Devices: Tempered steel pins with special corrosion resistant finish. Provide guide washers to accurately control penetration. Accomplish fastening by low-velocity piston-driven powder-actuated tool. Pins and Tool: Hilti Fastening Systems, Impex Tool Corporation.
  - 4. Expansion Bolts: per Structural Notes.
  - 5. Bolts, Nuts, and Washers: ASTM A 307, galvanized, Hex head. Provide standard cut washers at all bolt heads and nuts bearing on wood or concrete.
  - 6. Metal Timber Framing Connectors: Simpson Company "Strong Tie"; Silver; or approved; types as shown. Fabricate from hot-dipped galvanized steel, 16 gage material minimum, 1/8 inch plate where welded, unless otherwise shown or specified, punched for nailing. Provide full nailing or bolting in accordance with manufacturer's recommendations. Provide a nail for each punched hole.
  - 7. Holdowns: Simpson Company "Strong-Tie" or approved.

8. Miscellaneous Hardware: Provide all common screws, bolts, fastenings, washers, and nuts required to complete rough carpentry Work.
- H. Preservative Treatment: Preservative solution shall conform with requirements of FS TT-W-570. Acceptable products include Willard Products Penta-Treat "300".
- I. Fire Retardant Treatment: Conform with requirements of AWPA C-20 and C-27, Type A, when tested in accordance with ASTM D 3201. Acceptable products include Hickson Corporation, DRICON, or approved.

## **2.01 FABRICATION**

- A. Lumber:
  1. 2X and 3X: Air- or kiln-dry to maximum 19 percent moisture content at time of surfacing.
  2. Furnish surfaced four sides, S4S, unless otherwise specified.
  3. Size in accordance with rules of governing standard. Sizes shown on drawing are nominal unless otherwise specified.
  4. Exterior Wood Trim
    - a. Fascia: 2x10 Cedar or 5/4 x 10 smooth finish, cement fiber board.
    - b. Rake: 2x12 Cedar or 5/4 x 12 smooth finish, cement fiber board.
    - c. Miscellaneous Trim: 2x6 Cedar or 5/4 x 6 smooth finish cement fiber board.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Coordination:
  1. Prior to bidding, contact local regulatory authorities having jurisdiction to identify, and comply with, any special framing, blocking or backing details, or caulking conditions as may be required for structural or fire stopping, or energy code requirements.
  2. Coordinate with Work of other Sections to ensure that all fixtures, devices, switches, outlets, ducts, pipes, and similar items can be installed as shown without modifications to framing. Provide all blockouts, raceways and similar framing as required.
- B. General: Fit accurately. Secure rigidly, to lines and levels shown, plumb and square to a tolerance of 1/8 inch in 10 feet. Provide any special framing, even if not specifically shown, as required to properly complete Work.
- C. Blocking:
  1. Provide all wood furring and blocking, backing, furring, grounds, nailers, stripping, and similar rough carpentry as detailed and as otherwise required to anchor fixtures and equipment to be installed by other trades. Perform all cutting, boring and similar Work.

2. Provide solid wood blocking for all wall mounted or wall supported items and accessories. Confirm locations with Owner or Architect prior to application of covering materials.
  3. Provide additional studs or blocking as required to assure solid end and edge nailing for all siding and facias.
  4. Provide additional blocking as required for edge nailing of all soffit materials at all soffits and overhangs.
  5. Provide blocking or bracing as required to make interior walls rigid.
- D. Framing: Provide as specified unless otherwise noted on Structural Drawings.
1. At bottom plate to concrete, provide 5/8 inch diameter anchor bolts, minimum embedment 7 inches, at 4 feet on center and within 12 inches of board ends. Provide E.P.S. sill sealer under bottom plate of all exterior walls.
  2. Remove all wood used in forming and placing concrete if within the ground or between foundation sills and ground. Remove all loose or casual wood in contact with the ground from under the building.
  3. Studs, Joists, Beams, and Posts: Install all members true to line. Shims shall be seasoned, dried, and same Grade (minimum) as members connected. Place joists with crown up; maximum 1/4 inch crown permitted.
  4. Support all columns and posts located on concrete or masonry floors, plinths exposed to weather or water splash, or in basements, by concrete piers or metal pedestals projecting above floors unless approved pressure preservative treated wood or foundation grade redwood is used. Pedestals shall project a minimum 6 inches above exposed earth and 1 inch above floors. Individual concrete or masonry piers shall project a minimum 8 inches above exposed earth unless the column or post they support are of approved wood specified.
  5. Maintain minimum 6 inch clearance between any wood and earth, or provide approved wood as specified.
  6. Provide positive connection between post support and post, and between post and beam sufficient to ensure against uplift and lateral displacement.
  7. Joists shall bear not less than 1-1/2 inch on wood or metal, and 3 inches on masonry.
  8. Support all joists laterally at ends and over supports with 2 inch wide by full joist depth solid blocking, rim joist, joist hanger, or other approved means.
  9. Notches at ends of joists shall not exceed 1/4 joist depth. Notches in top or bottom of joists shall not exceed 1/6 joist depth, and are not permitted in middle third of span.
  10. Support joists framing into sides of wood girders by framing anchors.
  11. Double all trimmers and headers framing openings or provide lumber of equivalent cross section. Support each end with proper sized framing anchors unless adequate bearing is provided through other means. Support tail joists with proper sized framing anchors.
  12. Provide double top plate, overlap at corners and intersections with all partitions. Offset end joints 4 feet minimum.

13. All studs shall have full bearing on a plate or sill not less than 2 inches in thickness, and having a width not less than that of stud.
  14. Effectively brace all exterior and main cross stud partitions, by an approved method, at each end or as near thereto as possible, and at a maximum 25 feet of length.
  15. Provide all openings in bearing walls with minimum 4 x 10 Douglas fir No. 2 header, with minimum bearing of 1-1/2 inches for full width unless noted otherwise on Structural Drawings.
  16. Provide fire stopping, of non-combustible material or 2 inch nominal wood members, to cut off concealed openings (both vertical and horizontal), to form an effective barrier between floors, between top story and roof or attic space, and as follows:
    - a. In concealed spaces between stair stringers at top and bottom of run.
    - b. Between studs along and in line with run of stairs.
    - c. Around vent pipes, ducts, and similar penetrations at ceiling and floor levels which afford a passage for fire.
  17. Provide metal nail plates in all locations where plumbing or wiring comes within 1-1/4 inch of the edge of any stud.
  18. Frame stud partitions containing plumbing, heating, or other pipes, and space joists underneath to provide proper clearance. Where a partition containing such piping runs parallel to joists double, space, and bridge joists to permit passage of piping. Where such piping is placed in or partly in a partition requiring cutting of soles or plates provide metal ties minimum 1/8 inch thick and 1-1/2 inch wide. Fasten across and to each side of opening with not less than 4 - 16d nails.
  19. Unless noted otherwise on Structural Drawings: Studs in exterior or interior partitions may be cut or notched for up to 25 percent of stud width. Studs may have a hole bored up to 40 percent of stud width, provided the hole is no closer than 5/8 inch from edge of stud. Bored holes shall not be located at same section of stud as a cut or notch.
  20. Lumber, Plywood, and Particleboard: Comply with applicable standards and grading rules of appropriate Association, and identified by Grade mark of approved inspection agency.
- E. Nailing: Conform to IBC Table 2304.9.1 for all nailing unless otherwise noted on Structural Drawings.
1. Staples or other power driven fasteners, with equivalent capacity of fasteners shown or specified, may be substituted only with prior written approval of Building Official and Architect.
- F. Plywood Roof Sheathing:
1. Lay up with face grain perpendicular to supports, with panel continuous over two or more spans, end joints over framing, and end laps staggered.
  2. Allow 1/8 inch spacing at panel ends and edges.
  3. Nail with 8d at 6 inches on center to panel edges and at 12 inches on center to intermediate supports unless noted otherwise on Structural Drawings.

G. Plywood Wall Sheathing:

1. Lay up with face grain perpendicular to supports, with panel continuous over two or more spans, end joints over framing, and end laps staggered.
2. Nail with 8d at 6 inches on center to panel edges and at 12 inches on center to intermediate supports unless noted otherwise on Structural Drawings.

H. Coat all wood members in contact with concrete with two flowing brush coats of preservative treatment. Extend coating on members a minimum of 2 feet from face of concrete. Coat members prior to installation. Perform all cutting prior to treating.

I. Framing for Sound-Retardant Partitions: Comply with applicable requirements of ASTM E 497.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 06 20 00 - FINISH CARPENTRY**

### **PART 1 - GENERAL**

#### **1.01 REFERENCES**

- A. American Plywood Association (APA).
- B. Architectural Woodwork Institute (AWI).
- C. United States Product Standard (PS).
  - 1. PS-1 - "Construction and Industrial Plywood."

#### **1.02 SUBMITTALS**

- A. Shop Drawings: Show materials, methods of fabrication, and details of installation.
- B. Samples: Furnish required samples with finishes specified.

#### **1.03 QUALITY ASSURANCE**

- A. Qualifications: Provide finish carpentry Work in accordance with AWI "Quality Standards," in the grades specified.

#### **1.04 RELATED REQUIREMENTS**

- A. Section 06 10 00 – Rough Carpentry
- B. Section 07 92 00 – Joint Sealant

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS**

- A. Trim:
  - 1. Exterior: Solid stock red cedar, S4S, for painted finish or 5/4" cement fiber trim.
  - 2. Exterior Plywood with P-Lam at exterior window sills.
- B. Fasteners:
  - 1. As shown, specified, and as required to securely install materials.
  - 2. Fasteners for Exterior Use: Aluminum or Stainless Steel.
  - 3. Size of fasteners for siding and paneling shall be as recommended by manufacturer.
- C. Joint Sealant: As specified in Section 07 92 00.

#### **2.02 FABRICATION**

- A. Conform with AWI "Quality Standards," Section 300, Custom Grade requirements as applicable. Standard wood moldings shall conform with Western Wood Product Association WP Series, where applicable.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Install all millwork in accordance with reviewed Shop Drawings and AWI "Quality Standards."
- B. Cope internal corners and miter external corners at all standing and running trim.
- C. Provide running trim in as long lengths as practical. Make splices with 45 degree butt joints.
- D. Install materials straight and true. Leave 1/8 inch space between ends of exterior trim, seal joint. Tightly butt ends of interior trim.
- E. In exterior Work drive nail heads flush with surface of siding and trim. Maintain nailing pattern in straight horizontal lines.
- F. In interior Work countersink nails and fill nail holes.
- G. Machine sand trim and finish with hand sanding. Leave free from machine or tool marks that will show through finishes specified. Ease all edges of trim.
- H. Install all finish hardware, accurately fit, securely apply, and carefully adjust to provide smooth and proper operation of all hardware.
- I. Miscellaneous Items: Install all items shown and specified, which are not called for to be installed under other Sections, to plumb, true, and level lines and positions. Install in accordance with details, manufacturer's printed instructions and additional requirements specified. Provide connections and miscellaneous items required to make Work of this Section complete. Securely fasten wall and ceiling mounted items to solid backing or blocking.

### **3.02 CLEANING**

- A. Remove dirt and other foreign matter from installed materials.
- B. Upon completion of installation, leave materials clean and ready for finishing.

**\*\*\*END OF SECTION\*\*\***



## **SECTION 07 20 00 – INSULATION**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Thermal insulation and vapor barrier in roof and wall construction, to be used for the new Dewatering Building.

#### **1.02 QUALITY ASSURANCE**

- A. Installation: company specializing in installing metal building insulation, with three years' experience and previous experience installing specified vapor barrier and suspension system.
- B. Provide the materials in original manufacturer's packages together with detailed instructions and shop drawings typical of the installation. Materials shall be inspected for damage or shortage upon delivery and stored in a dry, secure manner. Installation shall proceed with care to assure proper sealing of the liner fabric. Insulation shall be placed on or behind the liner fabric in the full specified thickness without voids or compression.

#### **1.03 WARRANTY**

- A. Roof liner insulation system shall include a 10-year limited materials warranty.

### **PART 2 - PRODUCTS**

#### **2.01 ROOF LINER INSULATION SYSTEM**

- A. Roof liner insulation system shall be the Simple Saver System™ interior finish and R30+R11 insulation system as manufactured by Thermal Design Inc., or approved equal.
- B. Roof liner insulation system shall be a single-layer system and shall include the following components as specified herein:
  - 1. Fiberglass blanket or batt insulation
  - 2. Thermal break
  - 3. Vapor barrier fabric liner
  - 4. Steel straps
  - 5. Fasteners
  - 6. Tape & sealant.

#### **2.02 INSULATION MATERIALS**

- A. Metal building cavity insulation for roof system and exterior walls: unfaced, batt or blanket type, fiberglass insulation which shall meet or exceed the following:
  - 1. Shall be formaldehyde-free fiberglass blanket or batt insulation meeting ASTM C991 Type 1, ASTM E136 and ASTM E84 or other insulation form as

may be recommended and submitted by the system manufacturer and approved by the Owner/Engineer during submittals.

2. Provide thermal resistance R-value and U-factor as noted on Drawings, as determined by ASTM C518 and ASRAE 90.1, respectively.
- B. Thermal break shall be 3/16" thick by 3" wide white Quik-Stop™, closed cell polyethylene foam with pre-applied adhesive film and peel-off backing, or 3/8" polystyrene Snap-R thermal block or 1" polystyrene Snap-R thermal block. The selection shall be provided as thermal break as shown on Drawings and where there is no existing thermal break, and/or if additional depth space is desired.
- C. Extruded Polystyrene Board
1. Extruded Polystyrene Board: ASTM C 578, Type-4, 25psi at below grade and exterior vertical wall conditions; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.
  2. Provide thermal resistance R-value as noted on Drawings, as determined by ASTM C518.
  3. Extruded Polystyrene Board shall be one of the following: Certainteed Corp., Dow Chemical Co., Owens Corning, or Pactive Building Products

## **2.03 VAPOR BARRIER FABRIC LINER**

- A. The vapor barrier fabric liner for the roof insulation system shall be woven reinforced high-density polyethylene yarns coated on both sides with a continuous polyethylene film. The fabric liner for the roof insulation system shall be Syseal FP (White) as manufactured by Thermal Design Inc., or approved equal.
- B. The fabric liner for the roof insulation system shall comply with UL/ULC 723 or ASTM E84, and be Class A compliant with a low flame spread index of 25 or less based on ASTM E84 test standards. This material shall be manufactured in large custom pieces by extrusion welding from roll goods. Pieces shall be fabricated to substantially fit the large defined building areas with minimum practical sealing to be done on job site. Fabric shall be folded to allow for rapid pull-out on the strap support system. The fabric shall be certified for free fall protection by the manufacturer.
- C. Roof insulation system fabric liner perm rating shall be < 0.02 grains per hour per square foot based on ASTM E96.
- D. The vapor barrier fabric liner for exterior wall construction shall be polyamide film vapor retarder sheeting intended for use with unfaced, vapor permeable insulation (fiberglass and mineral wool) complying with ASTM E86.
1. Water Vapor Permeance:
    - a. Dry cup method: 1.0 perms.
    - b. Wet cup method: 10 perms.
  2. Flame Spread Index: 20 or less, when tested with facing, if any, in accordance with ASTM E84.
  3. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.

## **2.04 STEEL STRAPS**

- A. 100 KSI minimum yield high tensile strength steel, galvanized, primed and then painted the specified color on the exposed side with a clear coat primer on the unexposed side. Minimum size shall be 0.02" x 1" x continuous length. The strap color shall be: UVMAX 8 White.
- B. Traverse strap pattern shall include one strap six (6) inches away from each rafter flange with the remaining space between rafters divided into equal spaces not to exceed five (5) feet. Longitudinal straps shall be nominally thirty (30) inches on-center, with two adjacent straps at the ridge line.

## **2.05 FASTENERS**

- A. Fasteners for the roof insulation system shall be #12 x 3/4", plated self-drilling screws with sealing washers painted to match the specified color for fastening to light gauge steel (up to 12 GA purlins) or #12 x 1 1/4" plated self-drilling screws with sealing washers, painted to match the specified color for heavier gauge steel (up to 3/8" purlins/bar joist). Special fasteners for wood, concrete and other structure types are available from Thermal Design and should be used when appropriate. Install two (2) fasteners in the end of each strap for safety and to withstand installation stress, and one (1) fastener at all other designated fastening points.

## **2.06 TAPE & SEALANT**

- A. Tape: Shall be per manufacturer's recommendations: Syseal™ Repair Tape, color to match roof insulation system fabric liner.
- B. Sealant: Shall be per roof insulation system manufacturer's recommendations: Simple Saver System G524 High Tack Sealant™ for sealing vapor retarder laps and/or Simple Saver System G220 Pressure Sensitive Sealant™.

# **PART 3 - EXECUTION**

## **3.01 INSULATION INSTALLATION**

- A. Install per manufacturer's recommendations and installation instructions.
- B. Face fiberglass batts suspended between structural frames, and metal covering sheets are to be fastened directly to frame.
- C. Fiberglass batt insulation shall fill cavity space; insulation shall be in contact with the metal roof sheet above to ensure no void space.
- D. All field seams in vapor barrier must be sealed with vapor barrier lap sealant. Edges of the vapor barrier fabric shall be trimmed and sealed to the adjoining steel fabric.
- E. Install insulation materials to provide continuity of thermal barrier at building enclosure elements, without gaps or voids. Place vapor barrier on interior side of insulation. Vapor barrier to be installed continuous without gaps or voids, fully seal all joints and penetrations.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 07 25 00 – WEATHER BARRIERS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Building Weather Resistive Barrier (WRB) at Exterior Stud Framing Conditions
  - 2. Roofing underlayment.
  - 3. Flexible flashing.
- B. Related Sections:
  - 1. Section 07 20 00 – Insulation
  - 2. Section 07 41 13 – Metal Siding and Roofing

#### **1.2 REFERENCE STANDARDS**

- A. American Association of Textile Chemists and Colorists (AATCC): ATCC 127 - Test Method for Water Resistance: Hydrostatic Pressure Test.
- B. ASTM International (ASTM):
  - 1. ASTM D 882 - Test Method for Tensile Properties of Thin Plastic Sheeting.
  - 2. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.
  - 3. ASTM E 96/E 96M - Test Methods for Water Vapor Transmission of Materials.
  - 4. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
  - 5. ASTM E 2178 - Standard Test Method for Air Permeance of Building Materials.
  - 6. ASTM D 1682 Standard Test Methods for Breaking Load and Elongation of Textile Fabrics.
  - 7. AC 48 Acceptance Criteria for Roof Underlayments for use in severe climate areas.
  - 8. AC 207 Acceptance Criteria for Polypropylene Roof Underlayments.
  - 9. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers Tension.
  - 10. ASTM D461 - Standard Test Methods for Felt.
  - 11. ASTM D 903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
  - 12. ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
  - 13. ASTM D3767 - Standard Practice for Rubber—Measurement of Dimensions.
  - 14. ASTM G90 – EMMAqua test.
- C. International Code Council Evaluation Service, Inc. (ICC-ES): ICC-ES AC38 - Acceptance Criteria for Water-Resistive Barriers.

### **1.3 SUBMITTALS**

- A. Submit manufacturers' current product data sheets, details and installation instructions for the water-resistive vapor permeable air barrier and drainage matrix membrane components and accessories.
- B. Submit manufacturer's current product data sheets, details and installation instructions for the water-resistive vapor permeable roof underlayment membrane components and accessories.
- C. Product Data: Submit perimeter roofing underlayment manufacturer's product data and installation instructions.
- D. Submit samples of the following:
  - 1. Manufacturer's sample warranty.
  - 2. Water-resistive vapor permeable air barrier and drainage matrix sheet, minimum 8 by 10 inches (203 by 254 mm).
  - 3. Self-adhered water-resistive vapor roof underlayment sheet, minimum 8 by 10 inches (203 by 254 mm).
  - 4. Manufacturer's recommended fasteners and flashing accessories.

### **1.4 QUALITY ASSURANCE**

- A. Single Source: Building wrap and roof underlayment components and accessories must be obtained as a single-source membrane system to ensure total system compatibility and integrity.
- B. Manufacturer Qualifications
  - 1. Manufacturer of specified products listed in this Section to have minimum 8 years of continued experience in the manufacture and supply of highly vapor permeable water resistive air barrier and drainage matrix products successfully installed in similar project applications.
  - 2. Manufacturer of specified products listed in this Section to have experienced in-house technical and field observation personnel qualified to provide expert technical support.
- C. Fire Performance Characteristics: Provide water-resistive barrier and drainage matrix meeting the following fire-test characteristics.
  - 1. Surface-Burning Characteristics: ASTM E 84
  - 2. Flame spread index: 25 or less, (class A)
  - 3. Smoke developed index: 450 or less, (class A)
- D. UV Performance - capable of 180 days exposure prior to cladding installation
- E. Installer: Minimum of 2 years experience with installation of similar products.

### **1.5 WARRANTY**

- A. Refer to Manufacturer's current Product Installation Documents for proper storage and handling.
- B. Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.

- C. Store roll materials on end in original packaging. Protect rolls from direct sunlight and inclement weather until ready for use. Store in dry condition with temperatures between 40 and 90 degrees.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Building Wrap:
1. Water-Resistive Air Barrier and Drainage Matrix Materials (Basis of Design) at “closed” conditions:
    - a. Primary water-resistive air barrier sheet and drainage matrix membrane shall be WrapShield RS® Water-Resistive Vapor Permeable Air Barrier and Drainage Matrix sheet by VaproShield or approved equal. Product is a zero VOC mechanically attached vapor permeable water-resistive sheet membrane consisting of multiple layers of UV stabilized spun-bonded polypropylene and preformed polypropylene mesh, 3mm depth
      - 1) Air Leakage: < 0.0019 cfm/sq.ft. (0.009 L/s/m) when tested in accordance with ASTM E 2178 and < 0.000034 cfm/sq.ft. (0.00017 L/s/sq.m.) when tested in accordance with ASTM E 283
      - 2) Water Vapor Permeance tested to ASTM E 96 Method B: 50 perms (2875ng/Pa.s.m<sup>2</sup>)
      - 3) Water Resistance tested to AATCC 127, 55 cm hydrostatic head for 5 hours: No leakage
      - 4) Tensile Strength tested to ASTM D 882: 44.8 lbf/inch (78 N/mm), machine direction; 25 lbf/inch (43.8 N/mm), cross-machine direction
      - 5) Surface Burning Characteristics tested to ASTM E 84: Class A, Flame-spread index of less than 25, Smoke-development index of less than 450
      - 6) Allowable UV Exposure Time: 180 days
    - b. Primary water-resistive vapor permeable air barrier and drainage matrix membrane components and accessories must be obtained as a single-source from the membrane manufacturer to ensure total system compatibility and integrity.
      - 1) Water-resistive vapor permeable air barrier and drainage matrix membrane by VaproShield LLC, Gig Harbor, WA, Ph (866) 731-7663, Email: [info@VaproShield.com](mailto:info@VaproShield.com), Website: [www.vaproshield.com](http://www.vaproshield.com).
  2. Water-Resistive Air Barrier Sheet Membrane Fasteners
    - a. As recommended by Manufacturer’s Installation Instructions.
  3. Water-Resistive Air Barrier Joint Sealant
    - a. Water-resistive air barrier sealant compatible with sheet membrane shall be Dow Corning® 758, a modified silicon-based Sealant tested for compatibility with VaproShield products.
  4. Water-Resistive Air Barrier Transition and Flashing Membranes
    - a. Per Manufacturer’s current Installation Instructions available at [www.vaproshield.com/](http://www.vaproshield.com/)
  5. Vaproliqui-Flash™ Vapor Permeable Water Resistive Flashing for Rough Openings
    - a. Flashings for Window and Door Rough Openings at both CMU and metal framed walls shall be VaproLiqui-Flash by VaproShield, a liquid-applied vapor permeable air barrier flashing material used with VaproFlashing or VaproFlashing SA 11 3/4”

minimum size, with vapor permeance and resistance to air leakage properties compatible with the primary air barrier membrane.

**B. Roofing Underlayment at Metal Roofing:**

**1. Self-Adhered Synthetic Roofing Underlayment**

- a. Primary membrane shall be interwrap roofing, Titanium PSU30 or approved equal. Product is a self adhering 0.45mil synthetic polymer with slip resistance texture. 36" wide rolls with the following properties:

TEST & PROPERTIES	STANDARD	TITANIUM PSU30 TYPICAL VALUE
Color		Gray
Surface		Synthetic Polymer-Patented Sure-Foot Slip resistant nodular
Release Liner		Silicone Treated, Crinkled Poly Split Release
Weight per Square		24 lbs/ (10.8kg)
Nail Sealability	ASTM D1970	Pass
Permeability	ASTM E96	0.0336
Nominal Thickness	ASTM D5147	45 Mil (1.1mm)
Tensile	ASTM D1970	MD 100lbs/in/ (17.5kN/m)/ CD 80lbs/in (14kN/m)
Thermal Stability	ASTM D1970	240° F (115° C) Pass
Low Temp Flexibility	ICC AC 48	Pass
Tear Resistance	ASTM D1970	MD 140/ DC 100lbf (622/445 N)
Adhesion to Plywood	ASTM D903	4 lb/in (700 Nm)
Temperature Range		-40°F to 240°F (-40°C to 115°C)

**2.2 MISCELLANEOUS MATERIALS**

**A. Flexible Flashing:** Self-adhesive butyl rubber bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

1. Products: Subject to compliance with requirements, provide the following provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. DuPont (E. I. du Pont de Nemours and Company); DuPont Flashing Tape.

**B. Penetration Sealant at Building Wrap and Roofing Underlayment**

1. Water-resistive roof underlayment sealant compatible with sheet membrane shall be Dow Corning® 758, a modified silicon-based Sealant tested for compatibility with roofing underlayment products.

**PART 3 - EXECUTION**

**3.1 GENERAL**

- A. Verify that surfaces and conditions are ready to accept the Work of this section. Notify Engineer in writing of any discrepancies. Commencement of the Work or any parts thereof shall mean acceptance of the prepared substrates.

- B. All surfaces must be sound, clean and free of oil, grease, dirt, excess mortar or other contaminants detrimental to the installation of the water resistive air barrier materials
- C. Minimum application temperature (for VaproShield) self-adhered membrane flashings to be above 20 degrees F (minus 6.0 degrees C).
- D. Mechanical fasteners used to secure sheathing boards and roof deck or penetrate sheathing boards and roof deck shall be set flush with sheathing and fastened into solid backing.
- E. Install self-adhered roof underlayment membrane in overlapping shingle format. Provide minimum lap seams and tape subject to roof slope and penetrations as follows:
  - 1. For roof slopes of >3:12 up to 4:12; provide minimum 12 inch horizontal and vertical lap seams, provide tape or sealants under clips and at other similar penetrations

### **3.2 INSTALLATION OF BUILDING WRAP**

- A. Follow current Manufacturer's Installation Instructions as published on Manufacturer's Website: [www.vaproshield.com/installation](http://www.vaproshield.com/installation).

### **3.3 INSTALLATION OF ROOFING UNDERLAYMENT**

- A. Coordination of Roof Underlayment Membrane Installation
  - 1. Complete installation of flashing membrane and seals around roof connections, up-turn details, stack and vent pipes and other junctures or penetrations of the roof system prior to the installations of the field applications.
  - 2. Install primary self-adhered roof underlayment membrane over the surface of roof sheathing board, insulation or roof deck as detailed.
- B. Membrane Applications at Penetrations, Up-Turn Flashings and Valley Flashings
  - 1. Install flashing membrane and seal roof connections, up-turn details, stack and vent pipes and other junctures or penetrations of the roof system with specified self-adhered flashing membranes.
  - 2. Install pre-manufactured penetration sleeves around mechanical and electrical penetrations as per Mechanical/Electrical Division and manufacturer's written instructions.
  - 3. Install double-sided flashing tape across the top and sides of pre-manufactured penetration sleeves, pre-measure and fit roof underlayment membrane over and around sleeves and press into double sided tapes against the sleeves as appropriate to form a weather tight connection.
  - 4. Provide sealant around all exposed terminations.
  - 5. Install pre-manufactured curbs as per approved shop drawings for curb and roof system installations.
  - 6. Extend the roof underlayment membrane over curbs and seal to corners with sealants as appropriate to form a weather tight connection.
  - 7. Prepare valley substrates so as to provide continuous uniform surface, install full width sheets of roof underlayment membrane centered in valley.
  - 8. Measure and pre-cut into manageable sized sheets to suit the application conditions. Start at lowest point of roof; install roof underlayment membrane in the direction of the roof



slope in overlapping shingle format. Roll installed applications of self-adhered roof underlayment to ensure positive contact with substrates.

9. Install second-ply of water-resistive roof underlayment membrane on each side of valley, place membrane in the direction of the roof slope.
10. Roll installed applications of self-adhered roof underlayment to ensure positive contact with substrates.

C. Storage

1. PSU30 should be stored at room temperature, upright in the original cardboard packaging in a dry properly ventilated area. Keep clear from open flames, sparks, harmful substances and shelter from the elements.
2. Only rolls destined for same-day use should be removed from its storage area.
3. For best results store in temperatures between 40°F (4.4°C) and 90°F (32°C) If room temperature storage is not available, it is recommended to heat material to a minimum temperature of 40°F (4.4°C) prior to application.

D. Use

1. PSU30 must be covered by primary roofing within 180 days of application. PSU30 is designed for use under; Asphalt Shingles, Synthetic Shingles, Metal Roofing, Tiles, Slate, and Cedar Shakes.

E. Deck Preparation

1. Protrusions from the deck area must be removed and decks shall have no voids, damaged or unsupported areas. Deck surface should be free of debris, dry and moisture free.
2. PSU30 may be applied directly to a plywood, OSB, concrete or masonry roof surface and should be fully covered as soon as possible or within 180 days. Priming is not required for attaching to wood surfaces when the temperature is above 40°F. Concrete and masonry decks should be primed with a solvent or a water based primer that meets ASTM D41 for asphalt based self-adhesive membranes.
3. For re-roofing projects replace any water damaged sheathing and sweep roof deck thoroughly removing dust, dirt and loose nails. Do not install over old roof covering.
4. Use of calcium or salt for ice and snow removal is not recommended.

F. Application

1. For best results PSU30 should be installed on a dry deck when the air, membrane, and substrate temperature is over 40°F (4.4°C).
2. For cold weather applications below 40°F (4.4°C) a primer should be used and the laps blind nailed. Blind nail with 3/8" head roofing nails of 1" or longer in the 3" over lap area marked with a "+" symbol.
3. For steep slope applications (6:12 or greater) or when installing at temperatures greater than 100°F (38°C) it is recommended to blind nail the overlap area as instructed above for cold weather applications.
4. PSU30 is to be laid out horizontally (parallel) to the eave with the printed side up, using 3" horizontal laps and 6" vertical laps.
5. PSU30 may also be installed vertically. For vertical installation anchor with 3/8" head roofing nails along the upper most edge 3 inches down with 6 equally spaced nails across the 36" width. Ensure roofing nails are perpendicular to the roof deck so that the head lays flat and seals well to the top surface of the PSU30. Vertical overlaps to be 6" and 3" for horizontal laps if required.
6. Always work from the low point to the high point of the roof. Apply the membrane in valleys before the membrane is applied to the eaves.

7. Cut the membrane into manageable lengths. Peel back 1-2 feet of release liner, align the membrane, and continue to peel the release liner from the membrane. Hand press or walk on, then follow with a 40 lb or heavier pressure roller to smooth and secure the membrane, especially at the overlap layers. If a roller is not available or considered safe, walk on all laps, and as much of the field area as possible to push the adhesive into the pours of the roof deck and overlap.
8. For eave installation PSU30 should be applied over the metal drip edge at the eave. Do not fold PSU30 over the roof edge unless the edge is subsequently covered over by a drip edge or other flashing material. It is recommended that PSU30 extend from the eave up the roof to a point 24" inside the exterior wall. This should be above the maximum ice dam buildup line in most areas. Consult your local building code for specific requirements.
9. For valleys and ridge applications, peel the release liner; center the sheet over the valley or ridge, drape, and hand press in place. Note: It is very important PSU30 stay in contact with the roof deck into and out of the valley area. PSU30 should never be suspended or bridge a valley. It is recommended to follow up with a pressure roller or by walking on the surface. Give special attention to ALL perimeter edge areas.
10. Repair holes, fish mouths, tears, and any other penetration damage to the membrane with a round patch of membrane extending passed the damaged area by 6" in all directions. If fasteners are removed leaving holes in the membrane or other penetrations are accidentally produced, they must also be patched.
11. Do not install fasteners through membrane over any unsupported areas of the structural deck, such as over joints between adjacent.

### **3.4 FLEXIBLE FLASHING INSTALLATION**

- A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.
  1. Lap seams and junctures with other materials at least 4 inches except that at flashing flanges of other construction, laps need not exceed flange width.
  2. Lap flashing over water-resistive barrier at bottom and sides of openings.
  3. Lap water-resistive barrier over flashing at heads of openings.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 07 26 10 – VAPOR RETARDER**

### **PART 1 - GENERAL**

#### **1.01 RELATED SECTIONS**

- A. Cast-in-Place Concrete: Section 03 30 00.

#### **1.02 REFERENCES**

- A. ASTM International (ASTM).
  - 1. E1745 – “Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.”

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS**

- A. Vapor Barrier: Stego Wrap Vapor Barrier (877-464-7834); ASTM E 1745; 15 mil sheeting, coated both sides and reinforced with fiberglass fibers.
- B. Tape and Mastic: Stego Wrap Tape and Mastic; seal all penetrations per manufacturer instructions.
- C. Slab Casting Base: Clean, dry, naturally occurring, pea gravel, free from wood waste and organic material.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Install underslab or behind retaining walls vapor barrier over compacted sub-bases. Lap 6 inches and continuously seal all edges. Turn up at edges and secure to foundations or footings for a continuous sealed installation per manufacturer recommended details. Fix and seal around pipes and conduits. Provide Manufacturer recommended Boots around pipes, conduits, and other penetrations of any size as required to maintain vapor retarder integrity. Protect during construction when re-bar and concrete slabs/footings are being placed with minimum 2” sand layers or geotextile fabrics.
- B. Installer: Materials shall be installed by a manufacturer approved and certified installer.
- C. Installer to provide an electronic video of installed conditions (pre-protection and pre-cover) as a submittal before covering.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 07 41 13 - METAL SIDING & ROOFING**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section includes metal siding, roof panels, flashing, trim, gutters, and downspouts.
- B. Related Sections:
  - 1. Section 06 10 00 – Rough Carpentry
  - 2. Section 07 20 00 – Insulation
  - 3. Section 07 25 00 – Weather Barriers

#### **1.02 SUBMITTALS**

- A. Product Data: For each type of product.
- B. Shop Drawings: Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
- C. Samples: 8" x 8" or 12" x 12" For each type of metal panel indicated.
- D. Warranties: Sample of special warranties.

#### **1.03 QUALITY ASSURANCE**

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

#### **1.04 WARRANTY**

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Finish Warranty Period: 20 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.01 ROOF PANELS**

- A. Roof Panels on Dewatering Building: watertight, standing seam concealed fastener metal roof system, to match roof panels on existing Blower Building.
  - 1. Material: minimum 24-gauge Galvalume/Zincalume conforming to ASTM A792 for coating AZ50. Minimum yield strength is 50 ksi.
  - 2. Panel coverage: 16 inches.
  - 3. Finish coating: factory-applied Kynar-based or Hylar-based fluoropolymer coating over Zincalume.
    - a. Color: Contractor to furnish Owner with color selection chart. Owner will select colors.
    - b. AEP Span Dura Tech 5000 or approved equal.
  - 4. Attachment: floating clips with 1/4-inch self-drilling, self-tapping screws.
  - 5. Uplift Rating: UL 90, (ASTM E1592).
  - 6. Roof panels shall be AEP Span Design Span hp or approved equal.
- B. Roofing on the 2W Bladder Tank Enclosure and Alkalinity Station Enclosure shall be fiberglass shingles as specified in the Drawings.

### **2.02 WALL PANELS**

- A. Wall Panels on Dewatering Building, 2W Bladder Tank Enclosure, and Alkalinity Station Enclosure: through-fastened panel with 1-1/4-inch-high trapezoidal ribs spaced 12 inches on center and two intermediate stiffener ribs.
  - 1. Material: minimum 26-gauge, Galvalume/Zincalume conforming to ASTM A792 for coating AZ50 or AZ55.
  - 2. Panel coverage: 36 inches.
  - 3. Finish coating: factory-applied thermoset modified polyester finish painted over Galvalume/Zincalume or factory-applied Kynar based finish over Galvalume/Zincalume (Owner's Choice).
    - a. Colors: Contractor to furnish Owner with color selection chart. Owner will select colors.
  - 4. Attachment: self-drilling, self-tapping, HWH screws with UV resistant sealing washers through flat of panel if "R" type panel or through rib if "A" type panel.
  - 5. Wall panels shall be AEP Span PBR Panel or approved equal.

## **2.03 UNDERLAYMENT MATERIALS (See Section 07 25 00)**

## **2.04 MISCELLANEOUS MATERIALS**

- A. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
  - 1. Colors: Contractor to furnish Owner with color selection chart. Owner will select colors.
  - 2. Lengths: Minimum 10 feet.
  - 3. Trim, overhang facias, track covers, and slide door jambs available in building panel covers.
  - 4. Overhead Sectional Door and Slide Door Jamb Trim: Fabricated from 1 piece up to 10 feet in length.
- B. Gutters and Downspouts: Formed from same material as roof panels according to SMACNA's "Architectural Sheet Metal Manual." Finish to match metal roof panels.
- C. Panel Fasteners: Self-tapping screws designed to withstand design loads.
- D. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
  - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch wide and 1/8 inch thick.
  - 2. Joint Sealant: ASTM C 920; as recommended in writing by metal panel manufacturer.
  - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

## **2.05 FABRICATION**

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

## **PART 3 - EXECUTION**

### **3.01 PREPARATION**

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

### **3.02 UNDERLAYMENT INSTALLATION (See Section 07 25 00)**

### **3.03 METAL PANEL INSTALLATION**

- A. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.
  - 1. Install clips to supports with self-tapping fasteners.
  - 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
- B. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
- C. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

### **3.04 CLEANING AND PROTECTION**

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 07 92 00 - JOINT SEALANTS**

### **PART 1 - GENERAL**

#### **1.01 REFERENCES**

- A. ASTM International (ASTM):
  - 1. C 920 - "Specification for Elastomeric Joint Sealants."

#### **1.02 SUBMITTALS**

- A. Manufacturer's data on materials, and application equipment and procedures.

#### **1.03 QUALITY ASSURANCE**

- A. Qualifications: Applicator shall have a minimum of 3 years' experience in the satisfactory installation of joint sealants of the types specified.

#### **1.04 WARRANTY**

- A. Furnish 2-year special warranty.

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS**

- A. Exterior Sealant: Dow Corning 795 silicone; no substitutions, single component, gun-grade, non-sag, silicone sealant, with movement capability of plus or minus 12-1/2 percent. Color: clear.
- B. Interior Sealant: Tremco, Pecora Corporation, Sonneborn Building Products, single component, gun-grade, paintable, acrylic-latex, water-base sealant. Color as selected. At exterior wall conditions: Prosc0, R-Guard Air Dam or approved equal.
- C. Sanitary Sealant: Dow-Corning, General Electric, single component, gun-grade, silicone rubber sealant, with movement capability plus or minus 25 percent.
- D. Acoustical Sealer: Tremco, Pecora Corporation, permanently plastic, non-skinning, non-bleeding, non-staining sealant, for use in concealed spaces.
- E. Joint Backing: Closed cell neoprene or polyethylene, compatible with sealant materials, of sizes and shapes as recommended by the joint sealant manufacturer.
- F. Primers, Solvents, and Cleaning Materials: Non-staining and non-injurious to exposed surfaces, of types as recommended by the joint sealant manufacturer.



## **PART 3 - EXECUTION**

### **3.01 PREPARATION**

- A. Surface Preparation:
  - 1. Thoroughly clean and dry surfaces prior to installation.
  - 2. Clean metals with manufacturer's recommended solvent, wipe clean.
  - 3. Remove any dust, dirt, oil, grease, and any other foreign substances from surface areas to receive sealant.
  - 4. Prime surfaces as recommended by sealant manufacturer. Prime all concrete substrates, regardless of manufacturer's requirements.
  - 5. Mask off any adjacent surfaces which are not to receive sealant.

### **3.02 APPLICATION**

- A. General: Comply with sealant manufacturer's installation instructions. Provide bond breaker tape as required to prevent sealant adhesion to backing. Joint depth 1/2 joint width, but not less than 1/4 inch nor more than 1/2 inch, unless otherwise specified by sealant manufacturer.
- B. Joint Backing: Install as recommended by sealant manufacturer to prevent sealant from adhering to rigid, inflexible materials or joint surfaces where such adhesion would result in sealant failure. Sealant shall bond two opposing joint surfaces.
- C. Sealant Application:
  - 1. Do not install sealants during rainfall or very windy conditions when windborne contaminants can become embedded in uncured sealant.
  - 2. Apply materials with hand gun, powered gun, or trowel to completely fill voids and joints, free of wrinkles and skips.
  - 3. Observe temperature control in accordance with sealant manufacturer's written recommendations.
  - 4. Do not allow any air entrapment in sealant.
  - 5. Extrude sealant fully into joint to be sealed, tool sealant to press into joint, assuring full adhesion to sides of joint surfaces, resulting in a uniformly smooth concave profile.
  - 6. Tool sealant using only materials recommended by sealant manufacturer.
  - 7. Remove masking tape immediately after sealant application to produce clean, sharp line.
  - 8. Do not seal weeps or drainage provisions in sill channels.
  - 9. Allow sealants to cure adequately prior to covering with other Work.
  - 10. Coordinate sealant installation with concrete, masonry, and flashing applications.
  - 11. Apply sand to wet sealant surfaces to match finish of adjacent concrete and masonry conditions.

### **3.03    CLEANING**

- A.     Remove all empty containers, materials, and debris from the site. Dispose off site in accordance with applicable regulations.
- B.     Remove any sealant spills, masking materials, and similar items from all surfaces not intended for their application.
- C.     Clean and repair surfaces soiled or damaged by sealant Work.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 08 11 00 - METAL DOORS AND FRAMES**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Products Installed but not Furnished Under this Section: Finish Hardware specified in Section 08 70 00 – Finish Hardware.

#### **1.02 REFERENCES**

- A. American Society for Testing and Materials (ASTM).
  - 1. A 366 - "Specification for Steel, Carbon, Cold- Rolled Sheet, Commercial Quality."
  - 2. A 526 - "Specification for Steel Sheet, Zinc- Coated (Galvanized) by the Hot-Dip Process, Commercial Quality."
- B. Steel Door Institute (SDI).
  - 1. 100 - "Recommended Specifications, Standard Steel Doors and Frames."
  - 2. 105 - "Recommended Erection instructions for Steel Frames."
  - 3. 107 - "Hardware on Steel Doors (Reinforcement- Application)."

#### **1.03 QUALITY ASSURANCE**

- A. Qualifications: Comply with SDI Publication, 100.

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS**

- A. Doors: Commercial quality cold-rolled sheet steel in conformance with ASTM A 366. Stretcher level steel for door faces. Hot-dip galvanize steel for exterior doors in conformance with ASTM A 526, G90 coating designation, factory baked on primer.
- B. Hardware: Comply with SDI 107. Furnished as specified in Section 08 70 00.

#### **2.02 FABRICATION**

- A. Exterior Insulated Hollow Metal (INS HM) Doors:
  - 1. Type: Standard-duty, full flush panel, in accordance with SDI 100 for Grade II, Model 1 doors, polyurethane or polyisocyanurate core.
  - 2. Steel Grades: 18-gauge face sheets minimum
  - 3. Door assembly U-factor: 0.37

- B. Frames: One-piece, welded, 16 gage minimum, galvanized, with integral stops, jambs, and trim in accordance with SDI 100 for Grade II, Model 2 doors.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with SDI 105, manufacturer's recommendations, and requirements of labeling authority.
- B. Install hardware, adjust, and lubricate for proper operation.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 08 33 60 – OVERHEAD DOORS**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section Includes:
  - 1. Insulated Sectional Overhead Doors.
  - 2. Operating Hardware, tracks, and support.

#### **1.02 REFERENCES**

- A. ANSI/DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors.

#### **1.03 DESIGN / PERFORMANCE REQUIREMENTS**

- A. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
  - 1. Design for maximum 90 mile-per-hour winds.
- B. Install the Dewatering Building sectional overhead door so that the exterior of the door is flush or nearly flush with the exterior wall of the building. The door should not be mounted on the interior wall. No components of the door, including, but not limited to, the door tracks, rollers, or handles, may extend more than 8-inches into the interior of the building, measured from the exterior wall of the building, within 11.0 vertical feet of the finished floor. A pull rope or chain is acceptable to dangle in this area when the door is open. See Detail 2 on sheet A1.3 for an illustration of how the overhead door should be installed.
- C. Single-Source Responsibility: Provide doors, tracks, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

#### **1.04 SUBMITTALS**

- A. Submit under provisions of Division 1.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Details of construction and fabrication.
  - 4. Installation methods.

- C. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- E. Operation and Maintenance Data, submit lubrication requirements and frequency.

## **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Protect materials from exposure to moisture until ready for installation.
- C. Store materials in a dry, ventilated weathertight location.

## **1.06 WARRANTY**

- A. Manufacturer's limited door and operators System warranty for 10 years against delamination of polyurethane foam from steel face and all other components for 3 years or 20,000 cycles, whichever comes first.

# **PART 2 - PRODUCTS**

## **2.01 MANUFACTURERS**

- A. Basis of Design Manufacturer: Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100.  
Fax: (972) 906-1499. Web Site: [www.overheaddoor.com](http://www.overheaddoor.com).  
E-mail: [sales@overheaddoor.com](mailto:sales@overheaddoor.com).
- B. Substitutions: Per Division 01 provisions.

## **2.02 INSULATED SECTIONAL OVERHEAD DOORS**

- A. Insulated Steel Sectional Overhead Doors: Model 850 Advanced Performance Thermacore Doors by Overhead Door Corporation. Units shall have the following characteristics:
  - 1. Door Assembly: Metal/foam/metal sandwich panel construction, with 1-3/4 inch wide PVC thermal break and weather-tight tongue-in-groove meeting joints.
    - a. Panel Thickness: 3 inches (76.2 mm).
    - b. Exterior Surface: Microgroove, textured.
    - c. Exterior Steel Gauge: 0.015 inch (0.38 mm), hot-dipped galvanized.
    - d. End Stiles: 18 gauge single end stiles. Provide with thermal break to prevent heat/cold transfer.

- e. Spring Counterbalance: Sized to weight of the door, with a helically wound, oil tempered torsion spring mounted on a steel shaft; cable drum of diecast aluminum with high strength galvanized aircraft cable. Sized with a minimum 7 to 1 safety factor.
  - (i) High cycle spring: 100,000 cycles.
- f. Insulation: CFC-free and HCFC-free polyurethane, fully encapsulated.
- g. U-factor of 0.07 as independently tested and verified per ANSI/DASMA 105 using solid doors and specific product sizes.
- h. Air Infiltration: 0.09 cfm at 15 mph.
- i. Provide with high-usage package.
- j. Sound Transmission Rating: STC 22
- 2. Finish and Color:
  - a. Two coat baked-on polyester:
    - (i) Interior color: White.
    - (ii) Exterior color: Confirm with Owner.
- 3. Windload Design: Provide to meet the Design/Performance requirements specified.
- 4. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.
- 5. Lock:
  - a. Interior mounted slide lock.
- 6. Weatherstripping:
  - a. PVC retainer with dual-durometer PVC bulb seal.
  - b. Factory-installed flexible header seal.
- 7. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.
  - a. Size:
    - (i) 3 inch (76 mm).
  - b. Type:
    - (i) Standard lift
- 8. Manual Operation: Chain hoist.
- 9. Overhead door shall be capable of being mounted flush with the exterior wall as shown in the Plans.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Do not begin installation until openings have been properly prepared.
- B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- C. If preparation is the responsibility of another installer, notify Engineer of unsatisfactory preparation before proceeding.

### **3.02 PREPARATION**

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### **3.03 INSTALLATION**

- A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer's printed instructions.
- B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance. Overhead door shall be mounted so the exterior of the door is flush with the exterior of the building wall, as shown in the Plans, to maximize clearance between the inside of the overhead door and the equipment inside the building.
- C. Anchor assembly to wall construction and building framing without distortion or stress.
- D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- E. Fit and align door assembly including hardware.

### **3.04 CLEANING AND ADJUSTING**

- A. Adjust door assembly to smooth operation and in full contact with weatherstripping.
- B. Clean doors, frames and glass.
- C. Remove temporary labels and visible markings.

### **3.05 PROTECTION**

- A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.
- B. Protect installed products until completion of project.
- C. Touch-up, damaged coatings and finishes and repair minor damage before Substantial Completion.

**\*\*\*END OF SECTION\*\*\***



## **SECTION 08 70 00 – FINISH HARDWARE**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Description: Work under this section includes the complete finish hardware requirements for the new Dewatering Building.
- B. Quantities listed are for the Contractor's convenience only and are not guaranteed. Items not specifically mentioned but necessary to complete the work shall be furnished, matching the items specified in quality and finish.
- C. The Contractor shall be responsible for proper operation and fitting of hardware in locations specified. Exposed surfaces of hardware shall be covered and well protected during installation to avoid damage to finishes.

#### **1.02 RELATED SECTIONS**

- A. Coordinate this work with related work shown on the drawings and specifications in the Project Manual, including but not limited to:
  - 1. Section 08 11 00 – Metal Doors and Frames
  - 2. Section 08 33 60 – Overhead Doors

#### **1.03 QUALITY CONTROL**

- A. Supplier: Finish hardware shall be supplied by recognized builders' hardware supplier who has been furnishing hardware in the same area as the project for a period of not less than two years.
- B. Codes:
  - 1. All finish hardware shall comply with applicable local and state current building codes.
  - 2. Provide hardware which meets or exceeds handicapped accessibility per local and state building code requirements.

#### **1.04 SUBMITTALS**

- A. Manufacturer's Data: Submit copies of manufacturer's data for each item of finish hardware with each hardware schedule submitted per Section 01 33 00 – SUBMITTAL PROCEDURES.
- B. Hardware Schedule: Submit final hardware schedule in manner indicated below. Coordinate hardware with doors, frames and related work to ensure proper size, thickness, hand, function and finish of hardware. Based on finish hardware indicated, organize hardware schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:
  - 1. Type, style, function, size and finish of each hardware item.
  - 2. Product name, model number, description, and name of manufacturer of each item.

3. Fastenings and other pertinent information.
  4. Location of hardware set cross referenced to indications on drawings both on floor plans and in door and frame schedules.
  5. Explanation of all abbreviations, symbols, codes, etc. contained in schedule.
  6. Recommended mounting locations for hardware.
- C. Submittal Sequence: Submit copies of schedule at earliest possible date in accordance with requirements in Division 01, particularly where acceptance of hardware schedule must precede fabrication of other work (e.g., hollow metal frames) which is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by finish hardware, and other information essential to the coordinated review of hardware schedule.
- D. Keying Schedule: Submit separate detailed schedule indicating how the owner's final instructions on keying of locks has been fulfilled.
- E. Templates: Furnish hardware templates to each fabricator of doors, frames and other work to be factory or shop prepared for the installation of hardware. Upon request, check shop drawings of other work, to confirm that adequate provisions are made for proper location and installation of hardware.

## **1.05 PRODUCT HANDLING**

- A. Tag each item or package separately, with identification related to final hardware schedule, and include basic installation instructions with each item or package.
- B. Packaging of hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set number of approved hardware schedule. Two or more identical sets may be packed in the same container.
- C. Inventory hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.
- D. Deliver individually packaged hardware items at the proper times to the proper locations (shop or project site) for installation.

## **1.06 GUARANTEE**

- A. Finish hardware shall be guaranteed against defects in workmanship and operation for a period of one year, backed by a factory guarantee of the hardware manufacturer, except that door closers shall be so guaranteed for five years. No liability shall be assumed by the hardware supplier where faulty operation is due to improper installation or failure to exercise normal maintenance.

## **PART 2 - MATERIALS**

Manufacturers: See Part Four Hardware Schedule.

### **2.01 MATERIALS AND FABRICATION - GENERAL:**

- A. Finish hardware to match existing.

- B. Hand of door: Drawings show direction of slide, swing or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.
- C. Manufacturer's Name Plate: Do not use manufacturer's products which have manufacturer's name or trade name displayed in a visible location (omit removable name plates), except in conjunction with required UL or FM labels and as otherwise acceptable to the Architect. Manufacturer's identification will be permitted on rim of lock cylinders and latch faceplates only.
- D. Base Metals: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable ANSI A156 series standard for each type hardware item and with ANSI A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.
- E. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware which has been prepared for self tapping sheet metal screws, except as specifically indicated.
- F. Furnish screws for installation, with each hardware item. Provide Phillips flat head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finishes of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.
- G. Provide concealed fasteners for hardware units which are exposed when door is closed, except to extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or not on opposite face is exposed in other work, except where it is not feasible to adequately reinforce the work. In such cases, provides leaves for each thru-bolt or use hex screw fasteners.
- H. Tools and Maintenance Instructions for Maintenance: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of finish hardware.

## **2.02 LOCKSETS AND LATCHSETS**

- A. Key-in-lever type, steel cylindrical case with interior parts plated to resist corrosion, with access to cylinder without removal from the door, 2-3/4" backset. Design as specified.
  - 1. Strikes: Standard strikes sized to extend no more than 3/16" beyond door frame or adjacent trim.
  - 2. Keying: Keyed and registered at the factory, 6 pin cylinders, master keyed, keyed alike conforming to ESWD standard. All keys shall be tagged with room or door identification and delivered by the manufacturer direct to the Owner.

## **2.03 CLOSERS**

- A. Full rack and pinion construction with tamperproof valves to control closing, latching, and backcheck. Furnish proper mounting hardware to suite installation conditions, including all required screws or bolts. Provide thru bolts at wood doors with carriage heads exposed. Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit, depending on the size of

the door, exposure to weather and anticipated frequency of use. Where parallel arms are indicated for closers, adjust closer unit one size larger than recommended for use with standard arms. Provide arms for closers which allow the closer to be mounted on the room side, unless otherwise noted. Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units complying with ANSI A117.1 provisions for door opening force. Fire protection has precedence over handicapped compatibility, check with local jurisdiction.

#### **2.04 WEATHER STRIPPING**

- A. General: Except as otherwise indicated, provide continuous weather stripping at each edge of every exterior door leaf. Provide type, sizes and profiles as indicated as drawn or scheduled. Provide non-corrosive fasteners as recommended by the manufacturer for applications indicated.
- B. Perimeter weather strip: Flexible, hollow neoprene bulb or loop insert, conforming to MIL R 6055, Class II, Grade 40.

#### **2.05 KICK, MOP AND ARMOR PLATES**

- A. Plastic, 1/8" thick, laminated double face balance construction, color as selected. Metal: Minimum 0.050 inch thick, finish as specified. Furnish and widths as required to provide 1/4" clearance at sides of doors and stops, heights as specified. Furnish oval head mounting screws and mounting adhesive as recommended by manufacturer.

#### **2.06 STOPS AND HOLDERS**

- A. Exterior Doors: All exterior doors are to be equipped with heavy-duty stainless-steel latching door stops, which include door stop, holder, hook, ring, and door plate.
  - 1. Ives Model FS446, Contact Sargent Manufacturing Company, Doug Holderman 425-392-2358

#### **2.07 DOOR SILENCERS**

- A. Furnish three for each single door frame, and four for each double door frame.

#### **2.08 FINISHES**

- A. All items, unless otherwise specified, US32D Stainless Steel. Exposed closers, factory finished, US32D or spray-painted aluminum to match adjacent hardware. Items not available in stainless steel shall be furnished in dull chrome, US27D.

#### **2.09 THRESHOLDS**

- A. Furnish for each door opening.

## **PART 3 - EXECUTION**

### **3.01 PREPARATION**

- A. Provide solid blocking for all wall stops. Check all conditions and use fastening devices as needed to securely anchor all hardware as per manufacturer's published templates. Self-tapping sheet metal screws are not acceptable. All closers and exit devices on wood doors shall be thru-bolted.

### **3.02 INSTALLATION**

- A. Mounting heights: Mount units at heights recommended in "Recommended Locations for Builders' Hardware" by NBHA, except as otherwise indicated or as required by State Barrier Free regulations.
- B. Install each hardware item in compliance with the manufacturer's instructions. Wherever cutting and fitting are required to install hardware on surfaces which will be painted or finished at a later time, install each item completely and then remove and store in a secure place. After completion of the finishes, re-install each item. Do not install surface-mounted items until finishes have been completed on the substrate.
- C. Adjust and check each operating item of hardware and each door to insure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly.
- D. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units which are not factory prepared for fasteners. Space fasteners and anchors in accordance with industry standards.
- F. Set thresholds for exterior doors in a full bed of butyl-rubber or polyisobutylene mastic sealant.

### **3.03 HARDWARE LOCATIONS**

- A. The following shall be used in absence of other specifications from door manufacturers:
  - 1. Center of knob at Rail & Stile: Center on Mid Rail
  - 2. Center of knob to finished floor: 36"
  - 3. Bottom butt: bottom of door to bottom of butt: 10"
  - 4. Top butt - top of door to top of butt: 5"
- B. Center butt: equals distance between top and bottom butts.

### **3.04 ADJUSTMENT**

- A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.
- B. Wherever hardware installation is made more than one month prior to acceptance or occupancy, make a final check and adjustment of all hardware items during the week prior to acceptance of occupancy. Clean and lubricate operating items as necessary to

restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

- C. Clean adjacent surfaces soiled by hardware installation.
- D. Instruct Owner's personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.
- E. Continued Maintenance Service: Approximately six months after the acceptance of hardware in each area, the installer, accompanied by the representative of the lock and latch manufacturer, shall return to the project and re-adjust every item of hardware to restore proper function of doors and hardware. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

### **3.05 SPECIAL TOOLS**

- A. Contractor shall provide 2 sets of any special tools required for installation and maintenance of hardware.

## **PART 4 - HARDWARE SCHEDULE**

### **4.01 MANUFACTURERS**

- A. Each hardware symbol is followed by the model number of the first manufacturer listed for the item, unless otherwise identified. Such designation is intended to establish a standard of quality, function, and appearance for the various finish hardware items.
- B. 

Manufacturer Specified	Approved Substitutions
1. Stanley	Hager, McKinney, Lawrence
2. Simplex	None
3. Corbin Russwin	None
4. Ives	Quality, Rockwood
5. Tice	Quality, Rockwood
6. Pemko	National Guard, Reese

### **4.02 HARDWARE GROUPS**

(Note: Confirm active door size before ordering doors/hardware)

Hardware Group #1 - (insulated hollow metal doors - exterior single doors)

2 pr Hinges	Stanley FBB179 4-1/2x4-1/2 NRP
1 ea Lockset	Latchbolt by key outside or by grip either side, unless outside grip is locked by toggle-action stop. Auxiliary latch deadlocks latchbolt. Inside grip always free. Corbin Russwin ML2000 Series Grade Mortise Locksets with Lustra Lever Trim and Escutcheon Plate (satin chrome), include Russwin Mortise Cylinders. Keyway to match District Standard.
1 set Flushbolts	Ives 458-26D manual flush bolts
1 ea Dust Proof Strike	Ives DP2 (US26D)
1 ea Closers	Sargent 421 Series
1 ea Kickplate	PLKP 10x2" LD CAS
1 ea Astragal	Pemko 357SP
1 ea Gasketing	Pemko S88D
1 ea Door Bottom Sweeps	Pemko 315SN
1 ea Threshold	National Guard 713
1 ea Exterior Stops & Holders	Ives Model FS446

Hardware Group #2 - (insulated hollow metal doors - exterior double doors)

4 pr Hinges	Stanley FBB179 4-1/2x4-1/2 NRP
1 ea Lockset	Latchbolt by key outside or by grip either side, unless outside grip is locked by toggle-action stop. Auxiliary latch deadlocks latchbolt. Inside grip always free. Corbin Russwin ML2000 Series Grade Mortise Locksets with Lustra Lever Trim and Escutcheon Plate (satin chrome), include Russwin Mortise Cylinders. Keyway to match District Standard.
1 set Flushbolts	Ives 458-26D manual flush bolts
1 ea Dust Proof Strike	Ives DP2 (US26D)
2 ea Closers	Sargent 421 Series
2 ea Kickplate (Protection Plate)	PLKP 10x2" LD CAS
1 ea Astragal	Pemko 357SP
2 ea Gasketing	Pemko S88D
2 ea Door Bottom Sweeps	Pemko 315SN
2 ea Threshold	National Guard 713
2 ea Exterior Stops & Holders	Ives Model FS446

**\*\*\*END OF SECTION\*\*\***

## **SECTION 09 22 16 – NON-STRUCTURAL METAL STUD FRAMING**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Provide metal framing components as part of shown assemblies.
- B. Related Sections.
  - 1. Section 07 20 00 – Insulation.
  - 2. Section 09 26 00 – Cement Fiber Siding Panels.

#### **1.02 REFERENCES**

- A. ASTM International (ASTM).
  - 1. A 653 - "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process."
  - 2. A 1011 - "Specification for High Strength Steel Castings in Heavy Sections."
  - 3. C 645 - "Specification for Non-Load (Axial) Bearing Steel Studs, Runners (Tracks), and Rigid Furring Channels for Screw Application of Gypsum Board."
  - 4. C 754 - "Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products."
- B. American Welding Society (AWS).
  - 1. D1.3 - "Specification for Welding Sheet Steel in Structures."
- C. Steel Stud Manufacturers Association (SSMA).
  - 1. "Specification for Metal Lath and Furring."

#### **1.03 SYSTEM DESCRIPTION**

- A. Steel Stud Materials
  - 1. Provide all non-structural framing members, unless otherwise indicated, of gage thickness as determined by supplier/installer based on design performance calculations for each applicable wall condition, except no lighter than 20 gage. All furring, backing and/or blocking shall be 16 gage unless otherwise noted.
  - 2. Form all framing members 16 gage and heavier from steel corresponding to ASTM A1011, Grade 50, with minimum yield of 50,000 psi.
  - 3. Form all 18 gage and lighter framing members, including track, bridging, end closures and accessories from steel corresponding to ASTM A 653, Grade A, minimum yield of 33,000 psi.
  - 4. Form all framing members including accessories from steel having G-60 galvanized or A-60 galvannealed coating.



## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. All supplied by one manufacturer, U.S. Gypsum Co., Western Metal Lath, Angeles Metal System unless otherwise specified.
- B. Materials shall comply with ASTM C 645.
- C. Metal Studs: 25 gage minimum galvanized steel, non- bearing, with punched webs and perforated flanges to receive screws.
- D. Wide Flange Studs: 16 gage steel, with punched webs and perforated flanges to receive screws; paint with rust inhibitive primer.
- E. C-Studs: 16 gage galvanized steel, with punched webs and perforated flanges to receive screws.
- F. Resilient Channels: USG, RC-1; or approved; 25 gage corrosion resistant steel.
- G. Runner Tracks: 16 gage galvanized steel, un-punched.
- H. Backing Plates: Steel sheet or plate of gages or thickness required or scheduled, galvanized or painted with rust inhibitive primer.
- I. Channels: 16 gage steel, 3/4 inch furring channels and 1-1/2 inch runner channels, painted.
- J. Metal Furring: Roll formed 25 gage galvanized steel, hat shaped channels.
- K. Fasteners: To suit stud, track, or channel gage.
  - 1. Sheet Metal Screws:
    - a. 3/8 inch Type S pan head for fastening 25 gage material.
    - b. 1/2 inch Type S-16 pan head cadmium plated for fastening wide flange studs to door frame clips, and similar 16 gage material.
  - 2. Powder-Actuated Devices: 1/4 inch diameter with 1-1/2 inch concrete penetration as specified in Section 05 50 00.
  - 3. Concrete Nails: Case hardened stub nails 3/4 inch long.
- L. Wire:
  - 1. 18 gage soft annealed galvanized steel tie wire.
  - 2. 10 gage soft annealed galvanized steel hanger wire.
  - 3. 8 gage soft annealed galvanized steel hanger wire.
- M. Welding Electrodes: AWS low hydrogen type, as required.
- N. Miscellaneous Accessories: Manufacturer's standard, suitable for the intended use.
- O. Shaft Wall: Manufacturer's standard to suit rated shaft wall construction.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install Work in accordance with applicable requirements of SSMA, AWS, and ASTM C 754.
- B. Limit tolerance for bow and alignment to 1/8 inch in 10 feet.
- C. Use C Studs for exterior walls supporting lath and plaster.
- D. Use wide flange studs at partitions supporting ceramic tile, plywood, at electric panels, backing plates, fire extinguisher cabinets, and free ends of partitions.
- E. Use metal studs at interior partition framing supporting gypsum board not requiring wide flange studs.
- F. Use wide flange studs at heads and jambs of door frames and at borrowed light openings. Stiffen as shown.
- G. Furred Spaces: Provide metal furring or furring channels at 16 inch centers vertically or as shown. Fasten at top and bottom, and tie to horizontal furring channels at 4 foot centers. Fasten furring brackets to concrete with powder actuated devices, [concrete nails].
- H. Partition Stiffeners: Provide horizontal furring channel stiffeners at 5 foot centers maximum vertically at all metal studs in interior partitions.
- I. Provide backing plates as scheduled and detailed, of sufficient length to fasten each end to metal framing. Provide backing plate support for each point of fastening of any unit to be anchored.
- J. Fasten runner tracks at 2 foot intervals and 6 inches from ends.
  - 1. To Concrete Slab: With powder actuated devices [concrete nails].
  - 2. To Steel Framing: By welding, or by approved mechanical fastener.
  - 3. To Wood Framing: With concrete nails.
- K. Secure studs to runner tracks with sheet metal screws to suit stud gage.
- L. Provide welded, bolted, or screwed connections as shown or required.
- M. Partition Bracing: For partitions exceeding 10 feet in length provide two 10 gage wires, one each way perpendicular to plane of partition, at 10 foot centers maximum. Splay at 45 degrees vertically.
- N. Install accessories and miscellaneous specialties to plumb, true, and level lines, including other materials furnished and located as part of the Work of other Sections.
- O. Ceiling Furring for GWB Ceilings:
  - 1. Space hanger wires at 4 feet maximum centers connected to structural framing with 3/8 inch by 3 inch long tie wire screw eyes. Space runner channels at 4 foot centers and saddle tie hanger wire top and bottom with 2 loops secured with no less than 3 turns around itself.
  - 2. Provide hangers within 6 inches of ends of runner channels. Provide runner channels within 6 inches of walls and partitions to support ends of metal furring.
  - 3. Lay out runner channels transverse to direction of joists where spacings permit.

4. Space metal furring for gypsum board at 16 inch centers. Saddle tie to runner channels with 2 loops of tie wire secured with no less than 3 turns around itself.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 09 26 00 – CEMENT FIBER SIDING PANELS**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Work includes furnishing and installing all cement fiber siding and caulking all joints. Cement fiber siding to be used as the interior walls in the Dewatering Building (per finish schedule).

#### **1.02 QUALITY CONTROL**

- A. Cement fiber siding and caulk application and finishing standard: Install and finish cement fiber siding, and caulk to comply with manufacturers recommendations.
- B. Single source responsibility: Obtain each type of cement fiber siding from a single manufacturer.
- C. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.
- D. Handle cement fiber siding to prevent damage to edges, ends, and surfaces. Protect edges and corners from breakage. Neatly stack cement fiber siding flat to prevent sagging. Store materials inside under cover and store flat and keep dry and covered prior to installation. Protect against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic and other causes.

#### **1.03 SUBMITTALS**

- A. Samples: Submit samples of texture finish of cement fiber siding for approval before application.
- B. Product Data: Submit catalog cut sheets of cement fiber siding and caulk.

#### **1.04 PROJECT CONDITIONS**

- A. Environmental conditions, general: Establish and maintain environmental conditions for application and finishing cement fiber siding and caulk to comply with each manufacturer's recommendations.

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS**

- A. Cement Fiber Siding for Interior Applications: James Hardie Commercial. HardiePanel siding. Dimensions: 4' x 8'. Thickness: 5/16". Weight: 2.3 lbs/sq.ft. Texture: smooth. Finish/Color: primed.

- B. Fasteners:
  - 1. Cement Fiber Siding: Stainless steel nails, sized per manufacturer's recommendations
- C. Caulking: Elastomeric Joint Sealant complying with ASTM C920 Grade NS, Class 25 or higher or a Latex Joint Sealant complying with ASTM C834.

## **PART 3 - EXECUTION**

### **3.01 PREPARATION**

- A. Examine substrates to which cement fiber siding attaches or abuts, preset hollow metal frames, cast-in-anchors, and structural framing, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of cement fiber siding and weather barrier construction. Do not proceed with installation until unsatisfactory conditions have been corrected.

### **3.02 INSTALLATION**

- A. If cutting of cement fiber siding is required, use an NIOSH-approved respirator and adhere to the following manufacturer guidelines:
  - 1. Indoors:
    - a. Cut only using score and snap, or shears (manual, electric or pneumatic)
    - b. Position cutting station in well-ventilated area
    - c. NEVER use a power saw indoors
    - d. NEVER use a circular saw blade that does not carry the HardieBlade saw blade trademark
    - e. NEVER dry sweep – Use wet suppression or HEPA Vacuum
  - 2. Outdoors:
    - a. Position cutting station so that wind will blow dust away from user and others in working area
    - b. Use one of the following methods:
      - (i) Best: score and snap, shears (manual, electric or pneumatic)
      - (ii) Better: Dust reducing circular saw equipped with a HardieBlade saw blade and HEPA vacuum extraction
      - (iii) Good: Dust reducing circular saw with a HardieBlade saw blade (only use for low to moderate cutting)
- B. General Requirements for cement fiber siding installation: Maintain a 1" – 2" clearance between cement fiber siding and roofs, decks, paths, steps and driveways. Maintain a 1/4" clearance between cement fiber siding and horizontal flashing. Do not install cement fiber siding such that they remain in contact with standing water. Install cement fiber siding on vertical wall applications only. DO NOT use stain on cement fiber siding.

- C. Fastener Requirements for cement fiber siding: Position fasteners 3/8" from panel edges and no closer than 2" away from corners. Do not nail into corners. Drive fasteners perpendicular to siding and framing. Fastener heads should fit snug against siding (no air space). Do not over-drive nail heads or drive nails at an angle. If nail is countersunk, caulk nail hole and add a nail. For wood framing, under driven nails should be hit flush to the plank with a hammer (For steel framing, remove and replace nail).
- D. Cement fiber siding can be hand nailed or fastened with a pneumatic tool. Pneumatic fastening is highly recommended. Set air pressure so that the fastener is driven snug with the surface of the siding. A flush mount attachment on the pneumatic tool is recommended. This will help control the depth the nail is driven. If setting the nail depth proves difficult, choose a setting that under drives the nail. (Drive under driven nails snug with a smooth faced hammer - does not apply for installation to steel framing.)
- E. Other Requirements: Framing must be provided at horizontal and vertical edges for nailing. Cement fiber siding must be joined on stud. Double stud may be required to maintain minimum edge nailing distances.

### **3.03 FINISHING**

- A. Caulking Requirements: Caulking/Sealant must be applied in accordance with the caulking/sealant manufacturer's written instructions or ASTM C1193.

### **3.04 APPLICATION OF PAINT FINISH**

- A. DO NOT use stain on cement fiber siding. Cement fiber siding must be painted within 180 days for primed product. Paint shall be 100% acrylic topcoat per Section 09 90 00. Do not paint when wet. For application rates refer to paint manufacturers specifications. Back-rolling is recommended if the siding is sprayed.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 09 65 13 – RESILIENT BASE**

### **PART 1 - GENERAL**

#### **1.01 REFERENCES**

- A. ASTM International (ASTM).
  - 1. F 1861 – “Specification for Resilient Wall Base.”

#### **1.02 SUBMITTALS**

- A. 6” x 6” minimum samples of resilient base and edge trim; with color chart, manufacturer data and installation/maintenance instructions.

#### **1.03 PROJECT CONDITIONS**

- A. Concrete slabs shall have cured and be sufficiently dry to bond with adhesive.
- B. Moisture Vapor Rate: Acceptable allowable amount of moisture vapor emission from concrete slab substrate per manufacturer’s recommendations.
- C. Alkali (pH) Factor: Maximum allowable pH reading shall be as required by flooring adhesive manufacturer.
- D. Readings which exceed either Moisture Vapor Rate or Alkali (pH) Factor test values shall be Contractor’s responsibility. Provide additional heat, dehumidification, acid wash, and similar methods to bring slab into acceptable levels at no additional cost to Owner.
- E. Maintain minimum temperature of 70 degrees F in spaces to receive resilient base for a minimum of 48 hours prior to installation, during installation and for not less than 48 hours after installation. After this period maintain a temperature of not less than 55 degrees F.

#### **1.04 MAINTENANCE**

- A. Extra Materials: Furnish extra stock at rate of 3% of total lineal footage installed for base.

### **PART 2 - PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Specific brand names are listed as standards of quality, appearance, and utility.

#### **2.02 MATERIALS**

- A. Resilient Base: Johnsonite Inc.; thermoset vulcanized extruded rubber, in conformance with ASTM F 1861, Type TS, 1/8 inch thick, 6 inches high typical. 4” at casework conditions. Colors to be selected by Owner. Provide cove base unless scheduled otherwise. Provide premolded internal and external corners in colors to match base material. Use roll goods to avoid seams.
- B. Application materials: Provide crack filler, leveling compound, primer, and adhesives as required and as recommended by floor covering manufacturer.

## **2.03 WARRANTY**

- A. Provide 12-year warranty for resilient base product.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Prior to start of Work inspect all surfaces, verify that surfaces are clean, dry, sound, level, and free from oil, grease, wax or other foreign matter that would impair installation or telegraph through installed flooring.

### **3.02 PREPARATION**

- A. Fill cracks more than 1/16 inch wide, and depressions, with crack filler. Fill and thoroughly sand edge and end joints. Lightly sand any surface roughness around fasteners.

### **3.03 INSTALLATION**

- A. Apply application materials in accordance with manufacturer's instructions. Ensure that adhesives and patch compounds are kept at a minimum 70 degrees for 48 hours prior to installation.
- B. Install around perimeters of rooms and spaces shown in Drawings and in toe spaces of casework. Use longest lengths practical to minimize number of joints. Firmly adhere resilient base materials to walls and permanent fixtures. Scribe and fit bases accurately to abutting surfaces.

### **3.04 CLEANING**

- A. Perform operations immediately following installation of resilient base as follows:
  - 1. Remove visible adhesive and other surface blemishes using cleaner recommended by resilient base manufacturer.

**\*\*\*END OF SECTION\*\*\***



## **SECTION 09 90 00 – MISC. PLANT PAINTING**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION**

- A. Description of System: The work covered by this section consists of furnishing all plant, labor, equipment and materials necessary for the preparation and application of the paint coatings as specified herein.

#### **1.02 QUALITY ASSURANCE**

- A. Requirements of Regulatory Agencies: Comply with the requirements of agencies having jurisdiction over this section of work, including, but not limited to:
  - 1. WISHA, Washington Industrial Safety and Health Act.
- B. Reference Standards: All surface preparation, coating and painting shall conform to the applicable requirements of the:
  - 1. National Association of Corrosion Engineers
  - 2. Steel and Structures Painting Manual, Volume 2, Systems and Specifications (latest revision) published by the Steel Structures Painting Council (SSPC).
  - 3. American Water Works Association (AWWA) Standard D102 "Painting Steel Water Storage Tanks."
- C. Manufacturer: Manufacturer shall be of established good reputation and shall have regularly engaged in the manufacture of such coatings for a minimum of 5 years. This experience shall include a minimum of 20 similar applications in which such coatings have proven satisfactory service for a minimum of 3 years.
- D. Contractor: Contractor shall have 5 years of practical experience and successful history in the application of paint coatings to surfaces of municipal or industrial type equipment.
- E. Paint Film Thickness: All painted surfaces will be inspected by the Contractor with approved wet-film thickness gages. Inspection will include the thickness measurement of each prime and finish coat.
- F. Manufacturer's Representative: The manufacturer shall provide a qualified representative to visit the site from time to time during the paint operations as requested by the Engineer. The manufacturer's representative shall assist the Engineer in monitoring surface preparation and paint application.

#### **1.03 SUBMITTALS**

- A. Submittals detailing product data and application procedures shall be submitted in accordance with Section 01 33 00 for each paint service condition.
- B. Color charts for each of the finish coats listed in Part II of this section shall be submitted at least thirty (30) days prior to the starting of painting.
- C. A Schedule of the Painting Work shall be submitted to the Engineer at least fourteen (14) days prior to commencing of any work under this section. A revised schedule shall be submitted as requested by the Engineer to reflect changes or delays in the work.

## **1.04 JOB CONDITIONS**

- A. Environmental:
  - 1. Protective coatings shall not be applied in areas where dust is being generated or in any other areas where disturbances will affect the quality of the work.
  - 2. The Contractor shall comply with the manufacturer's recommendations as to environmental conditions (i.e. temperature, moisture, exposure to sunlight etc.) under which coatings and coating systems must be applied and cured.
- B. Protection: The Contractor shall be responsible for protecting coatings or coating systems from any disturbances during or after application which will affect the quality of the work.

## **1.05 DELIVERY AND STORAGE**

- A. Delivery: All products shall be delivered in sealed containers with labels legible and intact. Labels shall include the following information: Manufacturer's name and stock number, type of paint or protective coating, color, instructions for reducing, label analysis, and federal specification number.
- B. Storage: Products shall be stored in a single location and in a manner complying with all applicable safety, health and fire regulations.

## **PART 2 - PRODUCTS**

### **2.01 GENERAL**

- A. Surfaces to receive insulation or other protective materials shall be coated or painted in conformance with the applicable Service Conditions as specified herein.
- B. The intent has not been to identify each and every item to be coated, but only to list the major items. In no case shall any wood, ferrous metal or other surface, requiring protection, be left uncoated or unpainted.
- C. The products specified are those which have been evaluated for the specific service and are given to establish a quality standard for that service. Products of other manufacturers comparable in quality and type to those specified will be acceptable if said paints are offered by the Contractor with satisfactory data on past performance in similar applications. Requests for substitutions shall be in accordance with Section 01 66 00.
- D. The Contractor shall use products of the same manufacturer for all prime and finish coats listed in each separate Service Condition.
- E. Colors to be used shall be as designated by the Owner based upon the color charts provided by the Contractor.
- F. For the paint thickness listed under each Service Condition:
  - 1. WT = wet-film thickness in mils
  - 2. DF = dry-film thickness in mils
  - 3. The number following equals the minimum film thickness required, per coat.
  - 4. Putty: Conform to FS TT-P-791A(3), colored to match paint and stain finishes, as applicable.
- G. Cementitious Filler: Nonshrink formulation, white Portland cement with fine silicate aggregate, zinc-oxide pigment, and reinforcing chemical binder as approved.

- H. Spackling Compound: Standard gypsum board compound.
- I. Unspecified materials such as turpentine, linseed oil, or mineral spirits shall be products of reputable manufacturers and as recommended by paint manufacturers.
- J. Materials for Undercoats and Finish Coats: Ready mixed, and shall not be changed, except thinning of undercoats (when required), reinforcing, or coloring, all of which shall be performed in accordance with manufacturers' recommendations.

1. SERVICE CONDITION A

- a. Generic Type: Epoxy
- b. Applications:
- c. All exposed metal piping (including exposed ductile iron piping), joints, fittings, valves, supports, bollards, yard hydrant accessories, runway beams, runway supports, fasteners, and misc. ferrous metal items for this project shall be painted. Copper, galvanized, aluminum and stainless steel metal surfaces shall not be painted unless specifically specified. Exposed piping shall be defined as all piping that is not backfilled. Exposed piping shall also be defined as all piping that is permanently or intermittently submerged within structures. Exposed piping in vaults is considered to be exposed and shall be painted. All bollards are to be completely protected with shop coatings (primer and finish).
- d. Primer:  
One coat Tnemec Series 161- "High Solids Epoxy" or Sherwin Williams Macropoxy 646. DF = 4.0 to 6.0
- e. Finish:  
One coat Tnemec Series 161- "High Solids Epoxy" or Sherwin Williams Macropoxy 646. DF = 4.0 to 6.0

2. SERVICE CONDITION B

- a. Generic Type: Semi-gloss alkyd enamel.
- b. Application: Interior wood surfaces.
- c. Primer: One coat Sherwin-Williams PrepRite Wall and Wood Interior Oil Primer/Undercoater, alkyd, DF = 1.9.
- d. Finish: Two coats Sherwin-Williams ProMar 200 Interior Alkyd Semi-Gloss, DF = 3.4.

3. SERVICE CONDITION C

- a. Generic Type: Metal, gloss alkyd enamel.
- b. Application: Metal doors and frames.
- c. Primer: Factory baked on enamel.
- d. Finish: Two coats Sherwin-Williams Industrial Enamel, DF = 4.0.

4. SERVICE CONDITION D

- a. Generic Type: PVC, Vinyl Copolymer
- b. Application: PVC piping
- c. Finish: Two coats of Tnemec Series 73 Endurashield or Sherwin Williams High Solids Polyurethane, DF = 3.0

5. SERVICE CONDITION E

- a. Generic Type: Solid Color Acrylic Stain
- b. Application: All exterior wood surfaces
- c. Finish: Two coats Cabot O.V.T. Solid Color Acrylic Stain

➤ **NOTE: SERVICE CONDITION F & G NOT USED**

6. SERVICE CONDITION H

- a. Generic Type: Armorseal Rextthane I Floor Coating, or approved equal.
- b. Application: Interior concrete slab finish.
- c. SSPC-SP 1 (Solvent Cleaning) to remove grease oil or any other contaminants, if present, prior to blast cleaning. For surface preparation, refer to SSPC-SP13/NACE 6, or ICRI No. 310.2R, CSP 1-2. Surfaces should be thoroughly clean and dry. Concrete and mortar must be cured at least 28 days @ 75°F (24°C). Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement and hardeners. Fill bug holes, air pockets and other voids with Steel-Seam FT910. Primer required
- d. Application conditions
  - (i) Temperature: air and surface 20°F(7°C) minimum, 100°F (38°C) maximum; material 40°F (4.5°C) minimum; Do not apply over surface ice.
  - (ii) Relative humidity: 30% minimum, 99% maximum
- e. Spreading Rate per coat

	Minimum	Maximum
Wet mils (microns)	3.0 (75)	4.5 (112)
Dry mils (microns)	2.0 (50)	3.0 (75)
Coverage sq ft/gal (m2/L)	358 (8.8)	537 (13.1)
Theoretical coverage sq ft/gal (m2/L @ 1 mil/25 microns dft)	1072 (26.3)	

f. Drying Schedule @ 3.0 mils we (75 microns):

Temperature Condition	@ 40°F/4.5°C	@ 77°F/25°C	@ 100°F/38°C
To touch	4 hours	2 hours	30 minutes
To recoat			
Minimum:	48 hours	9 hours	3 hours
Maximum:	14 days	17 days	14 days
Foot Traffic:	48 hours	24 hours	12 hours
Heavy Traffic:	7 days	3 days	3 days
To cure:	7 days	3 days	3 days

7. SERVICE CONDITION I
  - a. Generic Type: High Build Epoxy (rated for immersion)
  - b. Application: Manufacturer Provided Steel in Trains 1 and 2
  - c. Weld Splatter to be removed per manufacturer SOP.
  - d. Blasting: SP6
  - e. Surface profile 2.0 mils (min.)
  - f. Caulk all non-welded seems with Epoxy Plus 25.
  - g. Primer: One Coat -Tnemec Series 66-1211 Red Oxide Primer, DFT = 2 to 6 mils
  - h. Finish: One Coat Tnemec Series 104 Epoxy Primer, DFT = 2 to 6 mils
  - i. Paint Color: Georgian Hemlock Green (Satin Finish)
8. SERVICE CONDITION J
  - a. Generic Type: Egg-shell alkyd enamel.
  - b. Application: Gypsum board
  - c. Primer: One coat Sherwin-Williams wall primer DF=2.0
  - d. Finish: Two coats Sherwin-Williams Pro-Mar alkyd egg-shell, DF=4.0
9. SERVICE CONDITION K
  - a. Generic Type: Aliphatic Acylic Polyurethane
  - b. Application: Exterior Metal Building Siding (rated for resistance to exterior weathering)
  - c. 1<sup>st</sup> Coat: Tnemec Series 73 Endura-Shield, DFT = MFR recommendations
  - d. 2<sup>nd</sup> Coat: Tnemec Series 73 Endura-Shield, DFT = MFR recommendations
  - e. Paint Color: Match Existing
10. SERVICE CONDITION L
  - a. Generic Type: 100% Acrylic Topcoat
  - b. Application: Interior Cement Fiber Siding Panels
  - c. Primer: Not applicable; produce comes primed from manufacturer.
  - d. Finish: Two coats Sherwin-Williams SuperPaint Machine Finish for Fiber Cement. DF = 3.6

## **PART 3 - EXECUTION**

### **3.01 GENERAL**

- A. All work shall be performed by skilled craftsmen qualified to perform the required work in a manner comparable with the best standards of practice. The intent of the coating systems is to obtain smooth, clean, dry and well protected surfaces.
- B. All coating and painting shall conform to applicable standards of the National Association of Corrosion Engineers and the Steel Structures Painting Council Manual. Material applied

prior to approval of surface by the Engineer shall be removed and reapplied at the expense of the Contractor to the satisfactions of the Engineer.

- C. Dust, dirt, oil, grease or any foreign matter that will affect the adhesion or durability of the finish must be removed by washing with clean rags dipped in a grease solvent and wiped with clean dry rags. Slag and weld metal accumulation and spatters shall be removed by chipping and grinding. All sharp edges shall be peened, ground or otherwise blunted as required by the Engineer.
- D. Painting systems include surface preparations, prime coatings and finish coatings. Unless otherwise specified, prime coat-coatings shall be field applied. Where prime coatings are shop applied, they shall be thoroughly cleaned and touched up in the field as specified. Any off-site work which does not conform to this specification is subject to rejection by the Engineer.
- E. The Contractor's coating and painting equipment shall be designed for the application of the materials specified and shall be maintained in first class working order. The Contractor's equipment shall be subject to approval of the Engineer.
- F. Application of the first coat shall follow immediately after surface preparation and cleaning and within an eight-hour working day. Any cleaned areas not receiving first coat within and right-hour period shall be recleaned prior to application of first coat.
- G. Prior to assemble, all surfaces that are inaccessible after assembly, shall be prepared as specified herein and shall receive the paint or coating system specified.
- H. Drop cloths shall be used to protect floor and adjoining work from splatter. Any paint surface damaged shall be repaired to the satisfaction of the Engineer before the work will be accepted. The lines formed by changes in color of coatings shall be neat and straight.

### **3.02 SURFACE PREPARATION**

- A. General:
  - 1. All surfaces to be painted shall be prepared in a workmanlike manner with the objective of obtaining a clean and dry surface. Surfaces shall be cleaned of all oil, rust, grease, dust, scale, and other foreign substances that may inhibit bonding.
  - 2. Field blast cleaning for all surfaces shall be dryblasted unless otherwise directed. Maximum particle size of abrasives shall be that which will produce a profile in accordance with recommendations of the coating manufacturer.
- B. All interior and exterior welded and abraded steel shall be sandblast cleaned in conformance with SSPC Section SP10 (Near White Blast Cleaning).
- C. Shop-Primed Ferrous Metal: Contractor shall be responsible for compatibility of the applied shop primer and the proposed field primer. If primers are compatible, all surfaces shall be cleaned in conformance with the manufacturers data sheet. If shop primer is not compatible, or damage to shop applied primer is too extensive for field touch-up, the surfaces shall be sandblasted in conformance to the surface preparation used in the shop.
- D. Shop Finished Ferrous Metal: Factory finished equipment or materials which have suffered damage to the shop applied coatings during shipment or installation shall be roughed-up in the field. All surfaces shall be cleaned in conformance with SSPC Section SP2 and touch-up shall be performed with paint supplied by the manufacturer.
- E. Immersion Service Ferrous Metal: Surfaces shall be sandblasted to a "Near White Clean" SP10 before application of the primer.

- F. Non-Ferrous Metal: Surfaces to be painted shall be cleaned in conformance with SSPC Section SP1 (Solvent Cleaned).
- G. Galvanized Metals: Galvanized surfaces to be painted shall be cleaned in conformance with SSPC Section SP1. Before application of the primer, surfaces shall be treated with one coat Koppers 40 Passivator (WF=4.0, DF=0.4).
- H. PVC Pipe: Surfaces shall be cleaned in conformance with SSPC Section SP1, except hand sanding shall be used to roughen the surface.
- I. Pipe with Factory Applied Bituminous Coatings: All exposed ductile iron pipe shall be painted. Bituminous coating shall be removed by sand blasting to near white before application of primer.
- J. Gypsum Wall Board: Cut out scratches, cracks, and abrasions in surfaces and openings adjoining trim and fill with approved filler. Bring filler flush with adjoining surfaces and when dry, sand smooth.
- K. Masonry: Surfaces shall be reasonably smooth and free of voids, cavities, dirt, dust, oils, grease or other contaminants.
- L. Concrete: Sweep sandblast to provide a surface profile. Allow concrete to cure for 28 days prior to painting.

### **3.03 COATING SYSTEMS APPLICATION**

- A. All coatings shall be applied in strict accordance with the manufacturer's printed instructions and recommendations.
- B. All coatings shall conform to the film thicknesses as specified in Part 2 of this section. Coatings failing to meet the minimum dry film thickness shall be given additional coats until the minimum film thickness is attained.
- C. Undercoats shall be tinted similar to the finish coats. Each coat shall be slightly darker than the preceding coat.
- D. Each coat applied shall be inspected and approved by the Engineer before application of the succeeding coat.
- E. Allow each coat to dry thoroughly before applying the next coat.
- F. Finish coats shall be uniform in color and sheen without streaks, laps, runs, sags or missed areas.

### **3.04 CONTRACT CLOSE-OUT**

- A. The Engineer shall make a detailed inspection of the paint work upon completion. All damage to surfaces resulting from the work of this section shall be cleaned, repaired or refinished as necessary, at no cost to the Owner.
- B. Upon completion of the work, all paint equipment and materials shall be removed from the site. Coating or paint spots, oil or stains upon adjacent surfaces shall be removed and the job site cleaned.

### **3.05 COLOR REQUIREMENTS**

- A. All exposed piping (except stainless steel and galvanized steel) is to be painted and labelled. Piping color charts are to be submitted for Owner review. Piping to be painted and labelled per the following table:

<b>EXPOSED PIPE COLOR &amp; LABEL REQUIREMENTS</b>		
<b>Pipe</b>	<b>Color</b>	<b>Label</b>
Influent Wastewater	Dark Green	-
Activated Sludge (WAS, RAS, SCUM)	Brown	-
Mixed Liquor	Light Brown	ML
Secondary Effluent & Final Effluent	Light Green	-
Air Gap Water (2W)	Light Blue	2W
Domestic Water	Dark Blue	Water
Air	White	AIR

- B. All exposed piping to be labeled with industrial grade water & UV resistant labels. Font color black with background matching piping color and 3" letter size. Labels to be applied by Contractor. In addition, all exposed piping to have direction of flow arrows with similar industrial grade stick-on labels. Coordinate all labels and arrows with the Engineer. Contractor to provide labeling walk-through with Owner and Engineer, and pipe labeling acceptance is required prior to Substantial Completion

### **3.06 INSPECTION HOLD POINTS**

- A. Inspection hold points include:
1. After surface reparation.
  2. After final coating.

**\*\*\*END OF SECTION\*\*\***



## **SECTION 10 44 16 – FIRE EXTINGUISHERS**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Work includes: Furnishing and installation of all fire extinguishers and cabinets as shown on drawings.
- B. Coordination: Verify that fire extinguisher cabinets are sized to accommodate fire extinguishers of type and capacity indicated.

#### **1.02 SUBMITTALS**

- A. Product data: Submit product data for each type of product included in this section. For fire extinguisher cabinets include roughing-in dimensions and details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type and materials, trim style and door construction, and panel style and materials.

### **PART 2 - MATERIAL**

#### **2.01 PRODUCTS**

- A. Manufacturer: J.L. Industries, Bloomington, Minn. Extinguisher: Model Cosmic 5E, UL rating 2A-10BC. Standard red finish.
- B. Mounting brackets: Provide manufacturer's standard brackets designed to prevent accidental dislodgment of extinguisher, of sizes required for type and capacity of extinguisher indicated, in manufacturer's standard plated finish.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Install according to manufacturer's recommendations, providing adequate anchorage into material encountered. Comply with applicable regulations of governing authorities.
- B. Install all fire extinguisher devices where shown in the Drawings and in the approved shop drawings, anchoring all components firmly in place.
- C. Upon completion of the installation, and as a condition of its acceptance, visually inspect all the work under this section, check all components for proper operation and touch up all scratches and abrasions to be completely invisible. Each extinguisher shall bear inspection tag.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 10 56 19 – PREFABRICATED HOUSING FOR CARBON FEED EQUIPMENT**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Work includes: Furnishing and installation of storage facilities for carbon storage drums as shown on drawings.
- B. Coordination: Verify that the storage facility/shelter is sized to accommodate two 55-gallon drums and a peristaltic pump.

#### **1.02 SUBMITTALS**

- A. Product data: Submit product data for each type of product included in this section. Ensure submitted information provides the product dimensions, construction material(s), product weight, and the manufacturer's warranty.

### **PART 2 - MATERIAL**

#### **2.01 PRODUCTS**

- A. Manufacturer: UltraTech International, Inc.: Model Ultra-Hard Top P2 Plus Spill Pallet with Drain, Part #9613, with (2) two ramps included per pallet, Part #0676.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Install according to manufacturer's recommendation. Comply with applicable regulations of governing authorities.
- B. Install all shelters where shown in the Drawings and in the approved shop drawings.
- C. Upon completion of the installation, and as a condition of its acceptance, visually inspect all the work under this section, check all components for proper operation and touch up all scratches and abrasions to be completely invisible.

**\*\*\*END OF SECTION\*\*\***

## SECTION 10 73 05 – FRP LAUNDER COVERS

### PART 1 - GENERAL

#### 1.01 DESCRIPTION

- A. The Contractor shall furnish and install the following fiberglass reinforced plastic launder cover for the new Train 1 & Train 2 Clarifiers weir launders.
- B. The Launder Cover Shall consist of a system of molded fiberglass panels that come together to form a continuous cover over the launder trough and weir within the treatment tank. The Cover shall be designed and manufactured to inhibit incident sunlight from striking the surfaces of the launder and weir. Each cover section shall be molded of UV-protected fiberglass and shall be opaque to sunlight. Individual sections shall be a minimum of four feet in length and curved to follow the curvature of the tank. The cover shall extend over the trough and weir as far as possible and may extend to a point immediately outside the scum baffle ring to avoid interference with the sweep arm. The Cover shall be designed such that adjacent panels fit together properly and the completed Cover, when installed, forms a rigid structure, and has a well-engineered and professional appearance.
- C. Launder cover panels shall have a cross-sectional ridge over the width of the launder trough in the direction of the flow to strengthen the panel and minimize possible deflections against snow loads. Additional reinforcement against snow loads may be incorporated into the design by means of stiffening flanges fastened radially to the cover panel's underside.
- D. The Cover shall be designed to open away from the operator and toward the center of the tank. Each Cover segment shall consist of a single Cover Section fastened to the top or side of the weir wall using two (2) pivoting support brackets. The pivoting support brackets shall provide a rigid mount for the Cover Sections and ensure the proper fixed spacing between them.
- E. The Launder Cover sections can be designed to open in one of three (3) configurations:
  - 1. Consecutively – in sequence
  - 2. Independently; or
  - 3. Alternatively – every other panel opens independently to allow the intermediate panels to open.
- F. Provision shall be made to secure the Cover in the closed position for safety and security. This is accomplished by means of an easily operated, spring-loaded latch mechanism that secures the Launder Cover panels in the closed position. Handles or lift rings may also be required for some panels. A means of limiting the travel of the Launder Cover sections, in the form of a restraint cable or tether, may also be provided to protect against damage. Covers with inspection hatches or cleanout doors are unacceptable.
- G. Where the circumference of the trough is interrupted by a bridge-support or another obstacle, a fixed panel(s) shall be installed over the trough beneath the support such that the surface of the Cover is continuous around the entire tank. Alternatively, vertical panels may be installed on both sides of the bridge supports to block out sunlight.
- H. The Cover system shall be designed to withstand common wind and snow loads but the entire Cover shall not be intended as a “walk-on” Cover designed to support the weight of plant personnel. Adequate stiffeners shall be integral to each panel, but panels reinforced with balsa or foam cores are not acceptable except where a single or double length reinforced walk-on section is used for safe entry to the launder.

## **1.02 WARRANTY**

- A. In addition to the standard warranty provided by the equipment manufacturer, the Contractor is to provide an extended warranty covering defects in material and workmanship for 1 year following the date of substantial completion of the equipment (per Supplementary Conditions). The warranty shall be in printed form, shall apply to all similar units, and shall include parts and labor.
- B. Supplied equipment to be free from defect in design, manufacture, workmanship and materials

## **1.03 SUBMITTAL DATA**

- A. The following shall be provided in accordance with Section 01 33 00 – Submittal Procedures:
  - 1. Manufacturer's catalog data showing construction materials, coatings, dimensions, wiring diagrams, controls, and misc. information.
  - 2. Operations and maintenance information as specified in Section 01 33 00 – Submittal Procedures.

## **PART 2 - PRODUCTS**

### **2.01 FIBERGLASS REINFORCED LAUNDER COVERS**

- A. Manufacture shall be Enduro Composites, Inc, NEFCO Inc, or approved equal.
- B. Each cover panel shall be molded of fiberglass, reinforced plastics. The resins and fiberglass reinforcing materials shall be consistent with environmental conditions and structural requirements of application.
- C. The resin shall be an industrial quality, isophthalic polyester resin with UV suppression additives, or equivalent. The resin shall be pigmented to ensure that the resulting part is opaque. The glass reinforcement shall be continuous fiberglass mats/roving combination, or equivalent. Multiple continuous panels of woven roving may be applicable for extra-large panels. Additional reinforcement in the form of stiffening ribs shall be added when necessary. The glass content of the finished laminate shall be not less than 35% by weight (ASTM D2584-18). The nominal thickness of each panel shall be ¼ inch. The laminate shall consist of resin rich glossy surface finish. The laminations shall be dense and free of voids, dry spots, cracks or crazes. All factory-trimmed edges shall be sanded and sealed. The finished laminate shall have a smooth, even appearance.
- D. FRP Launder Cover panels shall exhibit these minimum properties:

Tensile Strength (ASTM D-638)	18,900 psi
Flexural Strength (ASTM D-790)	24,200 psi
Flexural Modulus (ASTM D-790)	1.07 X 10 <sup>6</sup> psi
Barcol Hardness (ASTM D-2853)	45
Notched Izod (ASTM D-256)	10 ft-lbs/in
Water Absorption (ASTM D-570)	0.25% (MAX)
- E. Each cover panel's weight shall not supersede 55 lbs. max.
- F. Fasteners, handles, hinge, and latches shall be stainless steel. The weir wall mounting brackets shall be stainless steel, FRP or a combination of the two. The latch/handle shall be spring-loaded, where the mechanism shall have a positive detent positioned to indicate

the closed/locked position of the handle. The spring-loaded latch is activated by pressing down on the handle and turning it.

- G. The tether or restraint cable shall consist of a length of stainless-steel cable secured to the tank wall and the hinged Cover Section by means of stainless-steel eyebolts. The length of the cable is selected to limit the travel of the Cover.

## **2.02 SPARE PARTS**

- A. The FRP Launder Cover manufacturer is to include three complete sets of replacement wear parts for the Launder Covers.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. In accordance with contract drawings, manufacturers' shop drawings and instructions.

### **3.02 MANUFACTURER'S SERVICES**

- A. Installation assistance and certification: As required for proper installation prior to start up.
- B. Start-up and field testing: 2 full days on site, including all travel expenses.
- C. Operator Training: 1 full day on site.
- D. Warranty Service: As required during the warranty period.

**\*\*\* END OF SECTION \*\*\***

## **SECTION 11 30 00 –LAB EQUIPMENT**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Section includes lab oriented commercial equipment and devices.
- B. Owner will provide equipment for Contractor installation, as noted below.
- C. Model and manufacturer for each type of equipment shall be per the Lab Equipment Schedule as shown in the Plans.

#### **1.02 QUALITY ASSURANCE**

- A. NSF Standards: Provide equipment that bears NSF Certification Mark or UL Classification Mark certifying compliance with applicable NSF standards.
- B. Regulatory Requirements: Install equipment to comply with the following:
  - 1. ASHRAE 15, "Safety Code for Mechanical Refrigeration."
  - 2. NFPA 54, "National Fuel Gas Code."
  - 3. NFPA 70, "National Electrical Code."
- C. Seismic Restraints: Comply with SMACNA's "Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines," Appendix A, "Seismic Restraint Details," unless otherwise indicated.

#### **1.03 SUBMITTALS**

- A. Provide Manufacturer's Product Data, as available.

### **PART 2 - PRODUCTS**

#### **2.01 LAB EQUIPMENT**

- A. Refer to Drawing Sheet A2.3 for the Lab Equipment Schedule.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Install equipment level and plumb, according to manufacturer's written instructions.
  - 1. Connect equipment to utilities.
  - 2. Provide cutouts in equipment, neatly formed, where required to run service lines through equipment to make final connections.
- B. Complete equipment assembly where field assembly is required.
  - 1. Provide closed butt and contact joints that do not require a filler.

2. Grind field welds on stainless-steel equipment until smooth and polish to match adjacent finish.
- C. Install equipment with access and maintenance clearances that comply with manufacturer's written installation instructions and with requirements of authorities having jurisdiction.
- D. Install cabinets and similar equipment on bases in a bed of non-friable sealant.
- E. Install closure-trim strips and similar items requiring fasteners in a bed of sealant.
- F. Install joint sealant in joints between equipment and abutting surfaces with continuous joint backing unless otherwise indicated. Produce airtight, watertight, vermin-proof, sanitary joints.

### **3.02 CLEANING AND PROTECTING**

- A. After completing installation of equipment, repair damaged finishes.
- B. Clean and adjust equipment as required to produce ready-for-use condition.
- C. Protect equipment from damage during remainder of the construction period.

### **3.03 DEMONSTRATION**

- A. Provide a scheduled site demonstration of equipment operation to Owner's representatives.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 12 35 53 – STEEL LABORATORY CASEWORK**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY AND SCOPE**

**A. Section includes:**

1. Using Kewaunee Scientific Corporation, Research Collection Laboratory Furniture as a steel casework specification standard, furnish all cabinets and casework, including tops, ledges, supporting structures, and miscellaneous items of equipment as listed in these specifications, equipment schedules, and drawings. Include delivery to the building, set in place, level, and scribe to walls and floors as required. Furnish and install all filler panels, knee space panels and scribes as shown on Drawings. Ensure dimensions shown on Drawings will be compatible with undercounter lab equipment specified in the Lab Equipment Schedule.
2. Furnish and deliver all utility service outlet accessory fittings, electrical receptacles and switches as listed in these specifications, equipment schedules, and drawings, as mounted on the laboratory furniture. All plumbing and electrical fittings, not preinstalled in equipment, shall be packaged separately and properly marked for delivery to the appropriate contractor.
3. Furnish and deliver, for installation by the Contractor, all laboratory sinks, overflows and sink outlets with integral tailpieces, which occur above the floor, and where these items are part of the equipment or listed in these specifications, equipment schedules, and drawings. All tailpieces shall be furnished less the couplings required to connect them to the existing drain piping system.
4. Furnish and deliver, for installation by the Contractor, all fume hood base cabinets and work surfaces, to be compatible with the existing fume hood.
5. Furnish service strip supports where specified, and set in place, service tunnels, service turrets, supporting structures and reagent racks of the type shown on the drawings.
6. Remove of all debris, dirt and rubbish accumulated as a result of the installation of the laboratory furniture to an onsite container provided by others, leaving the premises broom clean and orderly.

**B. Related Sections:**

1. Section 06 10 00 – Rough Carpentry
2. Section 09 65 13 – Resilient Base
3. Section 11 30 00 – Laboratory Equipment
4. Division 22: Plumbing
5. Division 26: Electrical Fittings and Connections
6. Division 27: Communications



C. Related Publications:

1. SEFA 3 - Scientific Equipment and Furniture Association
2. SEFA 8 - Scientific Equipment and Furniture Association
3. NFPA 30 - National Fire Protection Association
4. NFPA-45 - National Fire Protection Association
5. UL - Underwriters Laboratories
6. ASTM D522 - Bending Test

**1.02 BASIS OF WORK**

- A. Supply all equipment in accordance with this specification. The offering of a product differing in materials and construction from this specification requires written approval Owner/Engineer. This approval must be obtained seven (7) days before the quotation deadline. Procedures for substitutions are defined in Division 01.
- B. Participants in the quotation process have the option of clarifying deviations to the specified design, construction, or materials. Without such clarifications, sealed quotations to the Owner or Owner representative will be construed as being in total conformance to the requirements of the specification.
- C. The Owner/Owner's representative reserves the right to reject qualified or alternate proposals and to award based on product value where such action assures the Owner greater integrity of product.

**1.03 QUALITY ASSURANCE**

- A. The steel laboratory furniture contractor shall also provide integrated stainless steel worktops all manufactured or shipped from the same geographic location to assure proper staging, shipment and single source responsibility.
- B. General Performance: Provide certification that furniture shall meet the performance requirements described in SEFA 8.

**1.04 SUBMITTALS**

- A. Manufacturer's Data: Submit manufacturer's data and installation instructions for each type of casework.
- B. The Engineer and Owner will retain the above samples of the successful manufacture to ensure that material delivered to jobsite conforms in every respect to the submitted.
- C. Shop Drawings: Submit shop drawings for furniture assemblies showing plans, elevations, ends, cross-sections, service run spaces, hardware location, color choices and type of service fittings.
  1. Coordinate shop drawings with other work involved
  2. Provide roughing-in drawings for mechanical and electrical services when required.

## **PART 2 - PRODUCTS**

### **2.01 MANUFACTURER**

- A. The basis of design is steel casework manufactured according to the standards used by Kewaunee Scientific Corporation, 2700 Front Street, Statesville, North Carolina. The specified design is Research Collection. All laboratory equipment covered by the specification shall be the product of one manufacturer and be fabricated at one geographic location to assure shipping continuity and single-source responsibility. Substitutions are allowed per Division 01 and submittals from a manufacturer other than Kewaunee Scientific Corporation shall contain a review of the following capabilities:
  - 1. List of shop facilities
  - 2. List of engineering and manufacturing personnel
  - 3. List of a minimum of ten (10) installations over the last five (5) years of comparable scope
- B. The selected manufacturer shall warrant that all products be free of defects in material and workmanship for a period of one year. The period shall start at the date of acceptance or occupation, whichever comes first. Purchaser shall notify the manufacturer's representative immediately of any defective product. The manufacturer shall have a reasonable opportunity to inspect the goods. The purchaser shall return no product until receipt by purchaser of written shipping instructions from the manufacturer.

### **2.02 CABINET MATERIAL**

- A. Steel: Cabinet bodies, drawer bodies, shelves, drawer heads and door assemblies shall be fabricated from cold rolled steel.

### **2.03 DRAWER AND DOOR STYLE**

- A. Inset – Type – Contour  
Drawers and doors, when closed, shall be recessed to create an overall flush face with 1/8" reveals and shall have an overall flush face with square aluminum bar pull. The outer drawer and door head shall have a channel formation on all four sides to eliminate sharp raw edges of steel. The top front corners of the door shall be welded and ground smooth.

### **2.04 MATERIALS**

- A. General Requirements: It is the intent of this specification to provide a high quality steel cabinet specifically designed for the laboratory environment.
- B. Steel:
  - 1. Cold Rolled Steel: Cold rolled sheet steel shall be prime grade 12, 14, 16, 18 and 20 gauge U.S. Standard; roller leveled, and shall be treated at the mill to be free of scale, ragged edges, deep scratches or other injurious effects.

2. Stainless Steel: Stainless Steel shall be Type 316; 12, 14, 16, 18 and 20 gauge U.S. Standard. Stainless steel shall be supplied with a #4 finish free of burrs, weld marks, or other imperfections.
- C. Hardware and Trim:
1. Drawer and Door Pulls: Square aluminum bar pull
  2. Hinges:
    - a. Inset 5-Knuckle Hinges: Inset style cabinets shall use 5-Knuckle hinges made of Type 304 stainless steel .089 thick, 2-1/2" high, with brushed satin finish, and shall be the institutional type with a five-knuckle bullet-type barrel. Hinges shall be attached to both door and case with two screws through each leaf. Welding of hinges to door or case will not be accepted. Doors under 36" in height shall be hung on one pair of hinges, and doors over 36" in height shall be hung on three hinges. (Note: meets SEFA 8 specifications)
  3. Drawer Slide:
    - a. Heavy duty, full extension, soft-close, self-closing, zinc plated, ball bearing slides, rated for 100 pound loads.
  4. Locks:
    - a. Disk Tumbler: Locks when shown or called for shall be a 5-disc tumbler with heavy duty interchangeable cylinder. Exposed lock noses shall be dull nickel (satin) plated and stamped with identifying numbers. Locks shall have capacity for 2000 primary key changes and Master Keyed one level with the potential of 5 different, non-interchangeable Master Key groups.
  5. Catches – For steel casework with 5-knuckle hinges:
    - a. Positive Catch: A two-piece heavy-duty cam action positive catch Main body of the catch shall be confined within an integral cabinet top or divider rail, while latching post shall be mounted on the hinge side of door. Polyethylene roller type catches are not acceptable.
  6. Elbow Catches: Elbow catches and strike plates shall be used on left hand doors of double door cases where locks are used, and are to be burnished cast aluminum, with bright brass finish.
  7. Shelf Adjustment Clips: Shelf adjustment clips shall be die formed, nickel-plated steel.
  8. Leg Shoes: Leg shoes shall be a pliable, black vinyl material and shall be provided on all table legs, unless otherwise specified, to conceal leveling device. Use of a leg shoe, which does not conceal leveling device, will not be acceptable.
  9. Rubber Base Molding: Base molding shall be provided per Section 09 65 00.
  10. Label Holders: Label holders, where shown or called for, shall be self adhesive type aluminum with satin finish and designed for 2-1/2" x 1-1/8" cards, unless otherwise specified.
  11. Number Plates: Number plates, where shown or called for, shall be self-adhesive type aluminum with indented black lettering.

12. Sink Supports: Sink supports shall be the hanger type, suspended from end panels of sink cabinet by four 1/4" dia. rods, threaded at bottom end and offset at top to hang from two full-depth reinforcements, welded to the top of end panels. Two 3/4" x 1-1/2" x 12 gauge channels shall be hung on the threaded rods to provide an adjustable sink cradle for supporting sinks.
13. Support Struts: Support struts shall consist of two 16 gauge channel uprights fastened top and bottom by two adjustable 12 gauge "U" shaped spreaders, each, 1-1/2" x length required, formed from galvanized steel. Struts shall be furnished to support drain troughs, and to support worktop at plumbing space under fume hood superstructures or other heavy loads. Support struts can be furnished with hangers at extra cost when specified, to support mechanical service piping and drain lines.

## 2.05 CONSTRUCTION

### A. Steel Cabinet Construction:

1. General:
  - a. The steel furniture shall be of modern design and shall be constructed in accordance with the best practices of the Scientific Laboratory Equipment Industry. First class quality casework shall be insured by the use of proper machinery, tools, dies, fixtures and skilled workmanship to meet the intended quality and quantity for the project.
  - b. All cabinet bodies shall be flush front construction with intersection of vertical and horizontal case members, such as end panels, top rails, bottoms and vertical posts in same plane without overlap. Exterior corners shall be spot welded with heavy back up reinforcements.
  - c. Each cabinet shall be complete so that units can be relocated at any subsequent time without requiring field application of finished ends or other such parts.
  - d. Case openings of Inset style cabinets shall be rabbeted on all four sides for both hinged and sliding doors to provide a dust resistant case.
  - e. All cabinets shall have a cleanable smooth interior. Bottoms shall be formed down on sides and back to create easily cleanable corners with no burrs or sharp edges.
  - f. Cabinets shall be designed using a standardized grid pattern to allow reconfiguration of doors and drawers.
2. Steel Gauges: Gauges of steel used in construction of cases shall be 18 gauge, except as follows:
  - a. Leveling bolt reinforcements 12 gauge.
  - b. Top and intermediate front horizontal rails, apron rails, hinge reinforcements, and reinforcement gussets, 16 gauge.
  - c. Drawer assemblies, door assemblies, bottom, bottom back rail, toe space rail, and adjustable shelves, 20 gauge.

B. Base Cabinets:

1. End uprights shall be formed into not less than an L formation at top, bottom, back and a 3/4" wide front C formation. A pilaster shall be added to the inside front of the upright for cabinet and hinge reinforcement and shall be perforated for the support of drawer channels, intermediate rails, hinge screws, and shelf adjustment holes.
2. A 7/8" high top horizontal rail shall interlock with the flange at top of end panels for strength, but shall be flush at face of unit. Top rails not flush with face of end uprights are not acceptable.
3. Intermediate rails shall be provided between doors and drawers, but shall not be provided between drawers unless made necessary by locks in drawers. Intermediate rails shall be recessed behind doors and drawer fronts, and designed so that security panels may be added as required.
4. Intermediate vertical uprights shall be furnished to enclose cupboards when used in a unit in combination with a half width bank of drawers.
5. Cabinet bottom shall be formed of one piece of steel, except in corner units, and shall be formed down on sides and back to create a square edge transition welded to cabinet end panels. Front edge shall include a C formation to form a 7/8" high bottom front rail and shall be flush with face of end uprights. Cabinet bottom front rails not flush with face of end uprights are not acceptable.
6. Toe space rail shall extend up and forward to engage bottom panel to form a smooth surfaced fully enclosed toe space, 3" deep x 4" high.
7. Back construction shall be one piece with integral channel formed for maximum strength and welded to back of top and bottom flanges of end uprights.
8. Each bottom corner of base cabinets shall have a 3/8"-16 leveling bolt, 2-1/2" long capable of supporting 500 lbs. Access to the leveling bolts shall be through plug buttons in the cabinet bottom. Access to leveling bolts through toe space or leveling bolts requiring special tools to adjust are not acceptable.
9. Adjustable shelves shall be formed down 3/4", returned back 7/8" and up 1/4" into a channel formation front and rear and formed down 3/4" at each end. Shelves over 42" long shall be further reinforced with a channel formation welded to underside of shelf. Shelves shall be adjustable on not more than 1" increments. Each adjustable shelf shall include a lip that extends 1/2" above the front edge.
10. Steel Door assembly (two-piece) for solid panel swinging doors shall consist of an inner and outer door pan. Outer door pan shall be formed at all four sides. The corners on the pull side of the outer door pan shall be welded and ground smooth to prevent exposure of sharp edges of steel at these critical points. Inner door pan shall be flanged at all four sides with hinge reinforcements welded in place. The door assembly shall be 3/4" thick and contains sound deadening material. Door assemblies shall be painted prior to assembly, and shall be punched for attaching pulls. Inner pan formation of door shall be indented for in-field installation of locks when required.
11. Doors shall be readily removable and hinges easily replaceable. Hinges shall be applied to the cabinet and door with screws. Welding of hinges to either cabinet or door will not be acceptable.

12. Drawer Assemblies:

- a. Drawer bodies shall be made in one-piece construction including the bottom, two sides, back and front. They shall be fully coved at interior bottom on all four sides for easy cleaning. The top front of the inner drawer body shall be offset to interlock with the channel formation in drawer head providing a 3/4" thick drawer head.

13. Knee space panels, where shown or specified, shall be 20 gauge, finished same as casework cabinets, and easily removable for access to mechanical service areas.

C. Fume Hood Base Cabinets

1. Acid Storage Cabinet:

- a. Acid storage fume hood cabinet shall be compatible with the existing fume hood.
- b. Acid storage fume hood cabinet shall utilize the same gauges of steel and construction features as other base cabinets except they shall be completely lined with a one piece polyethylene corrosion-resistant liner. The liner shall be 1/4" thick, molded into a seamless tub, including top, sides and bottom, with a 1" lip at the bottom front to contain spills. Tubs shall include integral cleats at both ends and back to support an optional shelf.
- c. Acid storage fume hood cabinet door shall be equipped with an L-handle in the upper right corner with a three-point latching system, similar to the door of the solvent storage cabinet.
- d. Cabinet shall be vented into the fume hood with a 1-1/2" vent pipe allowing a positive airflow directly into the fume hood exhaust system.
- e. Acid storage cabinet shall be Labconco Protector Acid Storage Cabinet, Catalog #9901500 with vent kit, 24" cabinet width with single, left-hinge door, or approved equal.

2. Solvent Storage Cabinet:

- a. Solvent storage cabinet shall be compatible with the existing fume hood.
- b. Solvent storage cabinet shall be specifically designed for the storage of flammable and combustible liquids. Construction shall be based upon the requirements listed by UFC, OSHA and NFPA No. 30 - 1993, and cabinets shall be FM approved and labeled. The bottoms, top, sides and doors shall be fabricated of 18 gauge steel and shall be all double panel construction with a 1-1/2" air space between panels. All joints shall be welded, or screwed, to provide a rigid enclosure.
- c. The door shall swing on full-length stainless steel piano hinges and shall be fully insulated. The door shall be self-closing. The door shall be equipped with an L-handle with a three-point latching system that automatically engages when the door closes. Door shall be equipped with a fusible-link hold-open feature that will ensure the door closes should the temperature outside the cabinet exceed 165 degrees Fahrenheit.

- d. A 2" deep liquid tight pan that covers the entire bottom of the cabinet shall be furnished to contain liquid leaks and spills. A second pan shall be provided to serve as a full-depth adjustable shelf.
- e. Two, 2" diameter, diametrically opposed vents with spark screens shall be provided in the back of the cabinet as well as a grounding screw. Cabinet shall be vented into the fume hood with a 1-1/2" vent pipe allowing a positive airflow directly into the fume hood exhaust system.
- f. The cabinet shall be labeled: "FLAMMABLE - KEEP FIRE AWAY".
- g. Solvent storage cabinet shall be Labconco Protector Solvent Storage Cabinet with self-closing door, Catalog #9903300 with solvent vent kit, 24" cabinet width with single, right-hinge door, or approved equal.

D. Upper Cabinet Construction:

- 1. Upper cabinets shall have a completely finished interior same as exterior and shall be designed so that no mounting hardware is visible when installed.
- 2. End uprights shall be formed at front, bottom and back to provide maximum strength and rigidity. Front edge of end upright shall be 3/4" wide. A pilaster shall be added to the inside front of the upright for cabinet and hinge reinforcement and shall be perforated for hinge screws, and shelf adjustment holes.
- 3. Cabinet tops shall be formed with a 7/8" high C formation at the front edge and turned down at the back to engage a wall hanging rail.
- 4. Cabinet flush bottoms shall be formed with a 7/8" high C formation at the front edge.
- 5. Cabinet backs shall be welded to the top, bottom and ends. Backs shall be perforated for shelf adjustment holes. Holes shall be enclosed by end uprights.
- 6. Adjustable shelves shall be formed down 3/4", returned back 7/8" and up 1/4" into a channel formation front and rear, formed down 3/4" at each end. Shelves over 42" long shall be further reinforced with a channel formation welded to underside of shelf. Shelves shall be adjustable on not more than 1" increments. Each adjustable shelf shall include a lip that extends 1/2" above the front edge.
- 7. Solid panel doors shall consist of an inner and outer door pan. Outer door pan shall be formed into a channel or flanged shape at all four sides. The corners on the pull side of the outer door pan shall be welded and ground smooth to prevent exposure of sharp edges of steel at these critical points. Inner door pan shall be flanged at all four sides with hinge reinforcements welded in place. The door assembly shall be 3/4" thick and contains sound deadening material.
- 8. Swinging doors under 36" high shall be hung on one pair of hinges, doors over 36" high shall be hung on three hinges.

E. Apron and Leg Assembly Construction:

- 1. In general, freestanding tables and/or apron and leg assemblies consist of welded leg assemblies connected to aprons by mechanical fasteners.
- 2. Table apron rails shall be formed of 16-gauge steel. The rails shall be 4" high, formed top and bottom into a channel formation. Where drawers occur, the apron rails shall provide the required opening.

3. Table legs shall be 2" square welded tubing. Securely welded to bottom end shall be a 14-gauge die formed gusset with four flanges. A threaded clinch nut shall accommodate a 3/8" 16 x 2-1/2" long leveling bolt. Leg shoes shall be provided on all table legs, unless otherwise specified, to conceal leveling bolts. Use of leg shoe which does not conceal leveling device will not be acceptable.
4. Stretchers shall be constructed of 18-gauge steel and furnished where indicated on drawings. They shall be formed into a 2-7/64" x 1-1/2" channel formation, and secured to table legs by a die-formed clip of 16-gauge steel. Clips shall be welded at ends of channel.

## **2.06 PERFORMANCE REQUIREMENTS**

### **A. Steel Casework Construction Performance:**

1. Base cabinets shall be constructed to support at least a uniformly distributed load 200 pounds per square foot of cabinet top area, including working surface without objectionable distortion or interference with door and drawer operation.
2. Base cabinet leveling bolts shall support 500 pounds per corner, at 1-1/2" projection of the leveling bolt below the cabinet bottom.
3. Each adjustable and fixed shelf 4 feet or shorter in length shall support an evenly distributed load of 40 pounds per square foot up to a maximum of 200 pounds, with nominal temporary deflection, but without permanent set.
4. Full extension soft-close, self-closing ball bearing zinc plated drawer slide shall be rated for 100 pound loads.
5. Swinging doors on floor-mounted inset style casework shall support 200 pounds suspended at a point 12" from hinged side, with door swung through an arc of 160 degrees. Weight load test shall allow only a temporary deflection, without permanent distortion or twist. Door shall operate freely after test and assume a flat plane in a closed position.

### **B. Steel Paint System Finish and Performance Specification:**

1. Steel Paint System Finish: After Cold Rolled Steel and Textured Steel component parts have been completely welded together and before finishing, they shall be given a pre-paint treatment to provide excellent adhesion of the finish system to the steel and to aid in the prevention of corrosion. Physical and chemical cleaning of the steel shall be accomplished by washing with an alkaline cleaner, followed by a spray treatment with a complex metallic phosphate solution to provide a uniform fine grained crystalline phosphate surface that shall provide both an excellent bond for the finish and enhance the protection provided by the finish against humidity and corrosive chemicals. After the phosphate treatment, the steel shall be dried and all steel surfaces shall be coated with a chemical and corrosion-resistant, environmentally friendly, electrostatically applied powder coat finish. All components shall be individually painted, ensuring that no area be vulnerable to corrosion due to lack of paint coverage. The coating shall then be cured by baking at elevated temperatures to provide maximum properties of corrosion and wear resistance. The completed finish system in standard colors shall meet the performance test requirements specified under PERFORMANCE TEST RESULTS.



2. Performance Test Results (Chemical Spot Tests):

- a. Testing Procedure: Chemical spot tests for non-volatile chemicals shall be made by applying 5 drops of each reagent to the surface to be tested and covering with a 1-1/4" dia. watch glass, convex side down to confine the reagent. Spot tests of volatile chemicals shall be tested by placing a cotton ball saturated with reagent on the surface to be tested and covering with an inverted 2-ounce wide mouth bottle to retard evaporation. All spot tests shall be conducted in such a manner that the test surface is kept wet throughout the entire test period, and at a temperature of  $77^{\circ} \pm 3^{\circ}$  F. For both methods, leave the reagents on the panel for a period of one hour. At the end of the test period, the reagents shall be flushed from the surface with water, and the surface scrubbed with a soft bristle brush under running water, rinsed and dried. Volatile solvent test areas shall be cleaned with a cotton swab soaked in the solvent used on the test area. Immediately prior to evaluation, 16 to 24 hours after the reagents are removed, the test surface shall be scrubbed with a damp paper towel and dried with paper towels.
- b. Test Evaluation: Evaluation shall be based on the following rating system.
- (i) Level 0 – No detectable change.
  - (ii) Level 1 – Slight change in color or gloss.
  - (iii) Level 2 – Slight surface etching or severe staining.
  - (iv) Level 3 – Pitting, cratering, swelling, or erosion of coating. Obvious and significant deterioration.

**After testing, panel shall show no more than three (3) Level 3 conditions.**

c. Test Reagents

Test No.	Chemical Reagent	Test Method
1.	Acetate, Amyl	Cotton ball & bottle
2.	Acetate, Ethyl	Cotton ball & bottle
3.	Acetic Acid, 98%	Watch glass
4.	Acetone	Cotton ball & bottle
5.	Acid Dichromate, 5%	Watch glass
6.	Alcohol, Butyl	Cotton ball & bottle
7.	Alcohol, Ethyl	Cotton ball & bottle
8.	Alcohol, Methyl	Cotton ball & bottle
9.	Ammonium Hydroxide, 28%	Watch glass
10.	Benzene	Cotton ball & bottle
11.	Carbon Tetrachloride	Cotton ball & bottle
12.	Chloroform	Cotton ball & bottle
13.	Chromic Acid, 60%	Watch glass
14.	Cresol	Cotton ball & bottle
15.	Dichlor Acetic Acid	Cotton ball & bottle
16.	Dimethylformamide	Cotton ball & bottle
17.	Dioxane	Cotton ball & bottle
18.	Ethyl Ether	Cotton ball & bottle
19.	Formaldehyde, 37%	Cotton ball & bottle

20.	Formic Acid, 90%	Watch glass
21.	Furfural	Cotton ball & bottle
22.	Gasoline	Cotton ball & bottle
23.	Hydrochloric Acid, 37%	Watch glass
24.	Hydrofluoric Acid, 48%	Watch glass
25.	Hydrogen Peroxide, 3%	Watch glass
26.	Iodine, Tincture of	Watch glass
27.	Methyl Ethyl Ketone	Cotton ball & bottle
28.	Methylene Chloride	Cotton ball & bottle
29.	Mono Chlorobenzene	Cotton ball & bottle
30.	Naphthalene	Cotton ball & bottle
31.	Nitric Acid, 20%	Watch glass
32.	Nitric Acid, 30%	Watch glass
33.	Nitric Acid, 70%	Watch glass
34.	Phenol, 90%	Cotton ball & bottle
35.	Phosphoric Acid, 85%	Watch glass
36.	Silver Nitrate, Saturated	Watch glass
37.	Sodium Hydroxide, 10%	Watch glass
38.	Sodium Hydroxide, 20%	Watch glass
39.	Sodium Hydroxide, 40%	Watch glass
40.	Sodium Hydroxide, Flake	Watch glass
41.	Sodium Sulfide, Saturated	Watch glass
42.	Sulfuric Acid, 33%	Watch glass
43.	Sulfuric Acid, 77%	Watch glass
44.	Sulfuric Acid, 96%	Watch glass
45.	Sulfuric Acid, 77% and Nitric Acid, 70%, equal parts	Watch glass
46.	Toluene	Cotton ball & bottle
47.	Trichloroethylene	Cotton ball & bottle
48.	Xylene	Cotton ball & bottle
49.	Zinc Chloride, Saturated	Watch glass

\* Where concentrations are indicated, percentages are by weight.

3. Performance Test Results (Heat Resistance): Hot water (190° F - 205° F) shall be allowed to trickle (with a steady stream at a rate not less than 6 ounces per minute) on the finished surface, which shall be set at an angle of 45° from horizontal, for a period of five minutes. After cooling and wiping dry, the finish shall show no visible effect from the hot water treatment.
4. Performance Test Results (Impact Resistance): A one-pound ball (approximately 2" diameter) shall be dropped from a distance of 12 inches onto the finished surface of steel panel supported underneath by a solid surface. There shall be no evidence of cracks or checks in the finish due to impact upon close eye-ball examination.
5. Performance Test Results (Bending Test): An 18 gauge steel strip, finished as specified, when bent 180° over a 1/2" diameter mandrel, shall show no peeling or flaking off of the finish.
6. Performance Test Results (Adhesion): Ninety or more squares of the test sample shall remain coated after the scratch adhesion test. Two sets of eleven parallel lines 1/16" apart shall be cut with a razor blade to intersect at right angle thus forming a grid of 100 squares. The cuts shall be made just deep enough to go

through the coating, but not into the substrate. They shall then be brushed lightly with a soft brush. Examine under 100 foot-candles of illumination. Note: This test is based on ASTM D2197-68, "Standard Method of Test for Adhesion of Organic Coatings".

7. Performance Test Results (Hardness):

- a. The test sample shall have a hardness of 4-H using the pencil hardness test. Pencils, regardless of their brand are valued in this way: 8-H is the hardest, and next in order of diminishing hardness are 7-H, 6-H, 5-H, 4-H, 3-H, 2-H, F, HB, B (soft), 2-B, 3-B, 4-B, 5-B (which is the softest). The pencils shall be sharpened on emery paper to a wide sharp edge. Pencils of increasing hardness shall be pushed across the paint film in a chisel-like manner until one is found that will cut or scratch the film. The pencil used before that one, that is, the hardest pencil that will not rupture the film, is then used to express or designate the hardness.

## **2.07 WORK SURFACES & BACKSPLASH**

A. Materials:

1. All work surfaces and backsplashes, with the exception of the fume hood work surface, shall be 3/16" thick Stainless Steel (316 grade) with continuous integrated 6" backsplash. Provide 1/2 inch raised radiused lip at higher work counter outer edges to contain spills. Provide 1" radius at lower work counters without raised lip/edge. Overall thickness of work surface shall be as shown in the Drawings. Contractor to confirm that undercounter lab equipment will fit underneath the work surface without damaging the equipment, cabinetry, or counter, while maintaining dimensions as shown in the Drawings.
2. Fume hood work surface shall be made from corrosion-resistant solid epoxy, and shall be compatible with the existing fume hood. Fume hood work surface shall be Labconco Flat Work Surface, 4-ft wide, Catalog #4882803, or approved equal.

## **2.08 SINKS**

A. Sinks:

1. Molded epoxy resin dual basin sinks with removable integral stainless steel covers with recessed pull; coordinate with Plumbing Division under mounted type sink. Minimum size of 14" x 18" x 10 1/2" deep. Provide grooved 1/4" recessed 12" wide drainage pan to left handed side of new lab sinks.

## **2.09 FITTINGS**

A. Materials:

1. Chrome-plated red brass or bronze

B. Construction:

1. Water Fittings

2. Steam Fittings
  3. Laboratory Ball Valves
  4. Gooseneck Type Outlets
  5. Tank Nipples
  6. Sink Outlets
  7. Crumb Cup Strainers
  8. Vacuum Breakers
  9. Aerator Outlets
  10. Waste Lines
  11. Traps
  12. Electrical Fittings
- C. Performance:
1. Maximum line pressures
    - a. Laboratory ball valves
    - b. Water (H&C) valve
  2. Sepia bronze finish performance

## **PART 3 - EXECUTION**

### **3.01 SITE EXAMINATION**

- A. The owner and/or his representative shall assure all building conditions conducive to the installation of a finished goods product; all critical dimensions and conditions previously checked have been adhered to by other contractors (general, mechanical, electrical, etc.) to assure a quality installation.

### **3.02 INSTALLATION**

- A. Preparation: Prior to beginning installation of casework, check and verify that no irregularities exist that would affect quality of execution of work specified.
- B. Coordination: Coordinate the work of the Section with the schedule and other requirements of other work being prepared in the area at the same time both with regard to mechanical and electrical connections to and in the fume hoods and the general construction work.
- C. Performance:
1. Casework:
    - a. Set casework components plumb, square, and straight with no distortion and securely anchor to building structure. Shim as required using concealed shims.

- b. Bolt continuous cabinets together with joints flush, tight and uniform, and with alignment of adjacent units within 1/16" tolerance.
  - c. Secure wall cabinets to solid supporting material, not to plaster, lath or gypsum board.
  - d. Abut top edge surfaces in one true plane. Provide flush joints not to exceed 1/8".
- 2. Work Surfaces:
  - a. Where required due to field conditions, scribe to abutting surfaces.
  - b. Only factory prepared field joints, located per approved shop drawings, shall be permitted. Secure the joints in the field, where practical, in the same manner as in the factory.
  - c. Secure worksurfaces to casework and equipment components with materials and procedures recommended by the manufacturer.
  - d. Contractor to ensure undercounter lab equipment, such as the dishwasher and BOD incubator, can be removed without damaging the equipment or surrounding cabinetry and work surface.
- 3. Epoxy Resin:
  - a. Sinks shall be set in chemical-resistant sealing compound, secured and supported per manufacturers recommendations.
- 4. Fume Hood Base Cabinets and Work Surface
  - a. Install per manufacturer recommendation, taking care to avoid damaging existing fume hood.
- D. Adjust and Clean:
  - 1. Repair or remove and replace defective work, as directed by owner and/or his representative upon completion of installation.
  - 2. Adjust doors, drawers and other moving or operating parts to function smoothly.
  - 3. Clean shop finished casework; touch up as required.
  - 4. Clean worksurfaces and leave them free of all grease and streaks.
  - 5. Casework to be left broom clean and orderly.
- E. Protection:
  - 1. Provide reasonable protective measures to prevent casework and equipment from being exposed to other construction activity.
  - 2. Advise owner and/or his representative of procedures and precautions for protection of material, installed laboratory casework and fixtures from damage by work of other trades.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 14 55 30 - SLUDGE BOX & COVER SYSTEM**

### **PART 1 - GENERAL**

#### **1.01 SYSTEM DESCRIPTION**

- A. This section covers furnishing one (1) self-contained leveling cover and one (1) 20-cubic-yard waste container. The self-contained leveling cover shall evenly distribute and cover a nominal 20 cubic yard waste container.
- B. All metal components are to be corrosion resistant, and at a minimum hot dipped galvanized steel.

#### **1.02 QUALITY ASSURANCE**

- A. Equipment furnished in this specification shall be fabricated and assembled in full conformity with this specification and as shown in the contract drawings. Each unit shall be furnished complete with all supports; all mechanical equipment required for proper operation, including complete drive units; all steel, iron, and other metal construction specified herein; and all additional materials or fabrication as required by the supplier's design.
- B. All equipment included in this section shall be furnished by a single supplier who shall be responsible for the design, coordination, and the satisfactory operation of the system. The cover system shall be the shafted type Level Lodor system as manufactured by JDV Equipment, Dover, New Jersey, or approved equal, including all equipment, materials and appurtenances necessary and as specified herein.
- C. The cover system shall include, but not be limited to the following:
  - 1. Container Cover
  - 2. Spiral fighting
  - 3. Troughs and Liners
  - 4. Chutes
  - 5. Covers.
  - 6. End Shaft
  - 7. End Seals
  - 8. Motor Reducer
  - 9. Mounting and Support Structure with automated tilting
  - 10. Level Indication
  - 11. Guide rails and stops
  - 12. Electrical Controls
  - 13. Safety Accessories

### **1.03 SUBMITTALS**

#### **A. General**

1. Data Sheet with description of the proposed equipment, size, length, type, capacity, arrangement, materials of construction, motor size, motor type, motor power requirements and equipment weights.
2. List of components and accessories to be furnished with catalog information
3. Significant dimensional differences between the equipment and specified herein, indicated on the drawings and the proposed equipment.

#### **B. Design Calculations**

1. Submit capacity and power requirements of the screw conveyor
2. Submit bearing life calculations for the gear reducer bearing and or drive end bearings.
3. Design loadings to be transmitted to foundations, supports, and H-frame assembly.

#### **C. Shop Drawings**

1. Drawings and specifications for the waste container.
2. Drawings and specifications for components of the equipment, showing principal dimensions and parts, materials of construction, material thicknesses (where applicable).
3. Screw diameter, pitch, and rotational speed(s).
4. Equipment performance specifications.
5. Drive details, including service factor of gear reducer based on absorbed horsepower and installed motor horsepower.
6. Size and location of anchor bolts or attachments to the foundations or supports.

#### **D. Quality and Control Submittals**

1. Operation and Maintenance manuals
2. Special shipping, storage, protection and handling instructions where applicable
3. Manufacturer's installation instructions

### **1.04 MANUFACTURER**

- A. All equipment included in this section shall be furnished by a single supplier who shall be responsible for the design, coordination, and the satisfactory operation of the system. The cover system shall be the shafted type Level Lodor system as manufactured by JDV Equipment, Dover, New Jersey, or approved equal, including all equipment, materials and appurtenances necessary and as specified herein.
- B. Any re-design required to accommodate the OWNER approved alternate bid equipment shall be borne by the contractor and equipment manufacturer.

- C. The shafted screw conveyors shall be manufactured by a supplier with not less than ten (10) operating installations in North America.
- D. The 20-cubic-yard waste containers shall be manufactured by Western Cascade Container (Woodland, WA), Dormel Containers (Delta, BC), or approved equal.
- E. The Supplier shall acknowledge that he is familiar with all the requirement of the contract documents relevant to the equipment supplied herein and agrees to perform and observe all obligations under the contract documents which relates to the portion of the work covered by this section and related sections.
- F. The Supplier of the material and/or products included in this section undertakes and agrees to defend, at Supplier's own expense, all suits, action or proceeding brought against the municipality or it's Contractor(s) for actual or alleged infringement on any United States patent or foreign letters patent because or on account of the employment of sales of such material or products, and further agrees to pay and discharge any and all judgments or decrees which may be rendered in any such suit, action or proceeding against the defendants herein.

## **1.05 WARRANTY**

- A. In addition to the warranty required in the General Conditions, the equipment manufacturer shall provide an extended warranty covering defects in material and workmanship for 1 year following the date of substantial completion or initial startup of the equipment. The warranty shall be in printed form, shall apply to all similar units, and shall include parts and labor.

## **PART 2 - PRODUCTS**

### **2.01 GENERAL EQUIPMENT**

- A. All products supplied shall meet the following as a minimum intent of supply.
  - 1. Power supply - Power supply to the equipment will be 480 volts, 60 Hz, 3 phase. Power supply for controls shall be 120 volts, 60 Hz, single phase.
  - 2. Electrical Equipment - All electrical equipment shall conform to applicable standard of the National Electrical Manufacturers Association (NEMA) and the National Electrical Code (NEC). Both power and control equipment shall be insulated for not less than 600 volts even though operating voltages may be lower. All motors shall be totally enclosed, fan cooled (TEFC). Control panels shall be NEMA 4X, stainless steel.
  - 3. Fabrication - All welds shall be continuous unless otherwise specified. Facing surfaces of bolted joints shall be shop primed. Facing surfaces of field welded components shall be beveled and match marked.
  - 4. Edge Grinding - Sharp corners of all cut and sheared edges shall be made smooth by a power grinder.



5. Fasteners - All bolts, nuts, washers, and other fasteners shall be AISI 316 stainless steel.
6. Surface Preparation - All iron and mild steel surfaces to be painted shall be dry abrasive grit blasted to "near white metal" in accordance with SSPC-SP6 or SSPC-SP10, and in accordance with the painting section of these specifications. Grit blasted surfaces shall be painted within 24 hours to prevent rusting and surface discoloration.
7. Painting. - After surface preparation, metal surfaces except for the spiral flighting shall receive a minimum of one coat of Tnemec "66-1211 Epoxoline primer" or equal, and one coat of "46H-413 Hi-Build Tnemec-tar" coal tar epoxy or equal, to provide a total minimum dry film thickness of 15 mils prior to shipment to jobsite. Stainless steel components shall be furnished unpainted.

## 2.02 PERFORMANCE AND DESIGN REQUIREMENTS

- A. The cover system shall be designed to meet the following minimum performance and design requirements. The standards for conveyor selection shall be based on the operational experience of the manufacturer with shafted screw conveyors.

1. Schedule of Leveling System(s):

POSITION	Level LODOR NO. 1
	SSC - 1
Cubic ft per Hour	25
Material	Dewatered Sludge
Material Density	45-60
Max Solids	20%
Container Size, CY	20
Max Screw Speed RPM	25
Max Trough Fill	50%
Min Flight OD	12"
Min Spiral Weight per ft	27
Minimum Trough Width	12.5"
Power	3 HP, 480V/3ph
Drive Location	Inlet End
Motor Type	TEFC
Reversing Screw	None

## 2.03 MATERIALS

- A. Unless otherwise specified or permitted, the materials used in the fabrication of the equipment under this section shall conform to the following:

Inlet Chutes	AISI 304, ASTM A167, 18-8
End Plates, Covers	AISI 304, ASTM A167, 18-8
Container Supports	A36 Galvanized Carbon Steel
Spiral Flighting	High Strength Alloy Carbon Steel with scheduled 40 center support shaft
Bolts, Nuts, and Washers for Conveyor Supports	AISI 316, ASTM A167, 18-8
Conveyor Channel Stiffeners	AISI 304, ASTM A167, 18-8
Container Guide Rails	A36 Galvanized Carbon Steel

## 2.04 CONTAINER COVER

- A. Components of the cover shall include truss/support assemblies, cover plates, purlins and conveyor designed to allow water to drain off top. Cover plates to be a minimum of 3/16". Cover to be designed to allow pivoting without excessive deflection. The cover shall include at a minimum, the following;
  - 1. One (1) flanged odor control connection, 8"
  - 2. One (1) flanged connection for ultrasonic sensor, 8"
  - 3. One (1) Level sensor
  - 4. One (1) inspection hatch

## 2.05 SHAFTED TRANSPORT CONVEYOR

- A. Spiral flighting for the shafted screw conveyors shall be designed to convey material with use of a center shaft. The minimum overall spiral weight and surface pressure shall be as specified herein. The conveyor will include an inner flight to increase axial strength and capacity of the conveyor. The minimum spiral weight shall be specified herein.
- B. Spiral flights shall be Carbon Alloy steel 12" diameter, full pitch with 1/4 to 3/8" thick sectional flight continuously welded on the carry side to 3 to 3 1/2" scheduled 40 pipe. Both ends of the pipe shall be bushed for minimum 2-7/16" diameter C1045 CFS Shafting and drilled with 2 holes for min 1/2" bolts.
- C. One (1) hanger bearings shall be provided with Hard-Iron bearings with coupling shafts with hardened surface in the bearing area. Hanger bearing may not be required should the design of the shaft tube be sufficient to withstand deflection limits.
- D. The connection of the spiral to the drive system shall be through a bolted connection.
  - 1. The connection of the conveyor from the drive system shall utilize a drive shaft fitted into the end conveyor shaft. The conveyor shaft shall be a bushed and bored fit utilizing two 1/2" bolts for coupled fastening to the drive assembly shaft. Drive systems utilizing flanged or flexible coupling fits shall not be allowed.

## **2.06 HORIZONTAL CONVEYOR GUIDE CHANNEL**

- A. Stiffeners shall be placed across the top of the guide channel/cover and fastened to both sides of the cover to maintain shape and act as a face seal for the covers; apply a continuous gasket, one half inch width, to the entire top face of the conveyor channel top flange.
- B. Each conveyor channel section shall be equipped with filling inlet and open discharge as required by the contract drawings. If required, each filling opening shall be flanged suitable for interconnection to other devices. Any interconnecting devices such as chutes and hoppers shall be fabricated from the same material as the conveyor guide channel sections.
  - 1. The portion of each conveyor channel section that is not covered by the filling chute shall be covered by a bolted cover of a material identical to the conveyor stiffening inner supports. The covers shall be manufactured in maximum four foot length section to allow for access to the conveyors. To prevent unsafe access to the conveyors, quick opening covers will not be allowed.

## **2.07 INLET CHUTES**

- A. Inlet and discharge chutes shall be provided by the conveyor supplier as shown on the drawings. All chutes shall be fabricated from the same material as the conveyor trough.

## **2.08 SUPPORTS**

- A. The cover system shall be furnished complete with supports and a H-frame assembly suitable for mounting as shown on the contract drawings and as required to allow unit to tilt up so dumpster can be removed and replaced. The supports shall be shop fabricated from structural steel shapes and plates, and shall be assembled and fitted to the conveyor prior to its delivery to the jobsite. Supports and conveyor segments shall be match marked and shipped to the jobsite for assembly by the contraction others.
  - 1. Supports and H-frame assembly shall be fabricated of AR 36 steel, galvanized or equal.
  - 2. All shop welding shall conform to the latest standards of the American Welding Society (AWS). The supports shall be designed to avoid interference with other equipment or equipment supports.
  - 3. H-frame assembly shall be sufficiently narrow at the top to fit between the existing wood framing members. Contractor to verify. See drawings.

## **2.09 GUIDE RAILS**

- A. The container rollers shall be guided into position with floor guide rails, one on each side. The guide rails shall be constructed from 3/8" thick carbon steel angle with coped ends to aid with the container alignment.

1. A 1/2" carbon steel stop plate shall be supplied by the cover system manufacturer and anchored to the floor as per the manufacturer's recommendations.
2. The 2" high side guides rails shall be anchored to the concrete pad.
3. All carbon steel shall be factory galvanized.
4. Anchor bolts shall be spaced on 24" centers minimum.

## **2.010 ELECTRIC HOIST**

- A. A 2-ton electric hoist shall be mounted on front end support. Hoist shall be mounted to support and installed as part of the LEVEL LODOR™. General components of the hoist shall meet the following conditions:
  1. Arrange all working parts for convenient inspection, lubrication, adjustment, repair, or replacement. Assemble paint, test, and adjust the equipment, in the shop as far as practicable before shipment.
  2. House the operating machinery and other exposed parts suitably, fabricate the exterior of the unit to have smooth surfaces or pleasing appearance.
  3. Design the hoist with an overload limit device to prevent damage to the equipment or structure if loads in excess of the specified capacity of the hoist are applied.
  4. Place a label, easily readable from the operating floor on each monorail beam showing the rated capacity of the equipment. Provide all appurtenances, caution markers, and appliances necessary to comply with applicable safety laws and codes.
  5. Unless otherwise shown or specified, provide all hoisting equipment suitable for normal indoor and outdoor service as shown.
  6. Design all gearing to meet requirements of CMMA Specification No. 74 and AGMA Standards and of helical or spur type constructed of heat treated steel. Provide worm gears of bronze and with precision machined cut teeth. Provide all pinions of heat treated alloy steel. Enclose or guard gearing and provide either oil bath or splash lubrication.
  7. Design the gear reducer or gear motor specifically for crane service with minimum classification of moderate shock service and with minimum service factor 1.0.

## **2.011 WASTE CONTAINERS**

- A. Waste containers shall be designed for hauling dewatered sludge, and shall have nominal 20-cubic-yard capacity
- B. Waste containers shall be hooklift style with two (2) wheels on the side of the container opposite container's hook system.

- C. Height of waste containers shall be no more than 4'-6" as measured from ground to top of container, and width shall be no more than 8'-0".
- D. Waste containers shall be compatible with the sludge box cover system as specified herein. Sludge box cover system supplier to confirm compatibility.
- E. Each waste container shall include a side roll tarp system installed on the container to provide load containment during transportation.
  - 1. Tarp shall be securely closed using web straps and ratchets, and can be operated safely by one person from the ground using a hand crank.
  - 2. Tarping system shall be compatible with the sludge box cover system specified herein.
  - 3. Tarps shall be 18-oz heavy duty vinyl and shall be sized to fully cover the 20-cubic-yard waste container.

## **2.012 STRUCTURAL DESIGN**

- A. All structural supporting members shall be designed such that the ratio of the unbraced length to least radius of gyration (slenderness ratio) shall not exceed 120 for any compression member and shall not exceed 240 for any tension member (of angles about Z-Z axis). In addition, all structural members and connections shall be designed so that the unit stresses will not exceed the American Institute of Steel Construction allowable stresses by more than 1/3 when subject to loading of twice the maximum design operating torque of the spiral conveyor drive motors.

## **2.013 DRIVE UNITS**

- A. Each spiral conveyor shall be driven by a constant-speed integral gear reducer/motor drive unit mounted to an adapter flange mounted to the end plate of the conveyor. The adapter flange shall allow the leakage of any material from the conveyor trough to atmosphere rather than into the gear reducer/ motor drive unit. Direct coupling of the gear reducer/motor drive unit to the end flange of the conveyor will not be acceptable.
- B. The drive unit shall be rigidly supported so there is no visible "wobble" movement under any operating condition. In the event of a prolonged power failure or emergency system shutdown the drive system shall be designed, at a minimum, to start the conveyor from a dead stop with the trough filled throughout its entire cross sectional area and length with partially dried and hardened dewatered material.
- C. Each motor shall be 460 volt, 60 Hz, 3 phase conforming to the General Equipment specifications, except as modified herein. Each motor shall be high efficiency, 40C ambient rated, 1.15 service factor and shall have Class F insulation. Motor shall have a TEFC enclosure with Design B speed/torque characteristics.

## **2.014 GEAR REDUCERS**

- A. All gears shall be AGMA Class II, single or double reduction, helical gear units with high capacity roller bearings.

1. Bearings shall be designed for the thrust loads from the fully loaded startup condition and shall have an AFBMA B10 life of 30,000 hours.
2. The reducer will be the standard air cooled unit with no auxiliary cooling.
3. The gear reducer shall be sized with a torque service factor of 1.5 times the absorbed power or 1.1 times the motor nameplate, at the driven shaft speed, whichever is greater.

## **2.015 PACKING**

- A. An adjustable greased gland packing ring consisting of two Teflon coated packing rings shall seal the drive shaft at its penetration through the end plate.

## **2.016 CONTROL SAFETY DEVICES**

- A. Motion Failure Alarm Unit - Each conveyor drive unit shall be equipped with a motion failure alarm unit. The location and mounting details shall be as recommended by the conveyor manufacturer. Motion sensors shall be the non-contacting type using a probe with a pre-amplifier and main electronic assembly. The main electronic unit shall operate on 120 volt, single phase, 60 Hz power supply, and shall be housed in a NEMA 4X enclosure. A 0 to 60 second time delay shall be provided for startup of the conveyor.
- B. Emergency Shutdown - Each conveyor shall be furnished with an emergency trip cord and safety switch. The cord shall run the full length of each conveyor. The trip switch shall immediately stop all conveyors when the switch is actuated.

## **2.017 CONTROLS**

- A. The main control panel shall be NEMA 4X supplied by equipment manufacture for wall mounting by the contractor. Power supply shall be 480VAC, 3 phase, 60 Hertz. Panel shall have the following components as a minimum:
  1. Main Circuit Breaker
  2. Disconnect Switch
  3. Motor Starters
  4. Control Transformer
  5. H-O-A Switch
  6. Conveyor Run Light
  7. Alarm Light
  8. Dumpster Full Light
  9. Alarm Horn
  10. Silence Button
  11. On/Off Switch for Electric Hoist Controls
  12. E-Stop

- B. In addition, controls shall include relays and timers to form a complete operational system.

## **PART 3 - EXECUTION**

### **3.01 QUALITY ASSURANCE**

- A. Conveyors shall be inspected and operated in the shop with the actual drive unit for this project in its entire length. Conveyor longer than the required shipping lengths will have the screws tack welded together and tested in their entire length.
1. Conveyors should be operated for a minimum of 15 minutes and observed for alignment and abnormal operation. Conveyors shall be corrected as necessary.
  2. Prior to shipment the tack welds will be broken apart and conveyors suitably prepared for shipment.
  3. A video of the test should be supplied on disk to the contractor to be forwarded on to the engineer for record purposes. Video must be received to get paid.

### **3.02 FIELD SERVICES, START-UP AND TRAINING**

- A. The services of the field representative shall include a minimum of:
1. two (2) days, exclusive of travel time, and one (1) travel trip for pre-startup inspection.
  2. two (2) days, exclusive of travel time, and one (1) travel trip for startup support and training.
- B. Pre-Startup Inspection: Once installation of the equipment has been completed, a representative of the supplier shall perform an in-person pre-startup inspection of the installation. The manufacturer shall furnish a letter of certification that all equipment is installed in accordance with its instructions and that the equipment is ready for operation.
- C. Startup Support, Training, and Solids Processing: During start-up of the equipment, a representative of the supplier shall perform in-person startup inspection and assistance of the equipment, commission and test the dewatering skid and provide training of the Owner's personnel on maintenance and operation of the dewatering skid. This startup testing and training shall include a complete processing of digested sludge from start to finish.
- D. The field person shall do a functional check of each item furnished and start-up of the process.
- E. Sludge processing shall be scheduled to ensure all representatives for biosolids equipment are included. This includes Centrifuge and Level Loader.
- F. Complete testing of all components and obtain signed certificates as follows:
1. Certificate of Installation
  2. Certificate of Start up

3. Certificate of Training
4. Certificate of Performance Testing

**\*\*\*END OF SECTION\*\*\***



## **SECTION 14 60 00 – HOISTS & CRANES**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION**

- A. This work shall consist of supplying and installing the following:
  - 1. One portable davit crane with:
    - A. Two base mounts to be used to lift and lower influent pump equipment.
    - B. One base mount to lift and lower dewatering manhole sump pump.

#### **1.2 SUBMITTALS**

- A. Submittals shall be made in accordance with SECTION 01 33 00. In addition, the following specific information shall be provided:
  - 1. Descriptive literature and catalog cuts
  - 2. Manufacturer's operation and maintenance manuals and recommended spare part lists.
  - 3. Shop drawings.

#### **1.3 QUALITY ASSURANCE**

- A. Manufacturer shall be of established good reputation and regularly engaged in the fabrication of such equipment.

#### **1.4 REFERENCE**

Section 09 90 00 – Painting

### **PART 2 - PRODUCTS**

#### **2.1 PORTABLE DAVIT CRANE**

- 1. Provide one portable davit crane, all required accessories, and hardware for lifting pumps and equipment as needed. Davit crane shall be designed for corrosive environments, and completely protected with stainless steel components. The Davit crane shall be Thern Ensign 1000 Series with the following part numbers: 5PA10S316-M3-5BF10S316 -WS19-36NS

The crane shall have the following minimum features:

- A. 316 Stainless steel flush bases: two (2) (model 5BF10S316)
- B. Stainless steel spur gear hand winch (model M4312PBSS-K)
- C. Crane Finish: 316 stainless steel construction (model 5PA10S316)
- D. Base Covers: two (2) base covers provided by manufacturer, one for each base
- E. Cable Spool: Stainless steel cable spool
- F. Adjustable boom length and adjustable boom height.
- G. Crane rotates 360-degrees.
- H. Quick disconnect anchor for quickly attaching or removing the wire rope from the winch drum.
- I. Handle extension – for ratchet style screw-jack
- J. Hook reach to reach 15' below floor level.
- K. Stainless steel wire rope: 3/16" x 36' length stainless steel rope (model WS19-36NS)

- 2. Wire Rope Keeper: 316 stainless steel (model RK19-25S316)

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. All equipment described in the section shall be installed in accordance with the manufacturer's recommendations, drawings, and specifications. Alignment and adjustment shall be field verified.

\*\*\* END OF SECTION\*\*\*

## SECTION 15 08 13 – TEMPORARY CONSTRUCTION SIGN

### PART 1. GENERAL

- A. Contractor shall supply and erect a temporary construction sign per Department of Ecology and CDBG Department of Commerce requirements and standards.
- B. For construction projects funded in whole or in part by the Bipartisan Infrastructure Law (or Inflation Reduction Act) through the U.S. Environmental Protection Agency, recipients must place a sign at construction sites that display the Investing in America emblem and identify the project as a “project funded by President Biden’s Bipartisan Infrastructure Law”.

### 1.01 SUBMITTALS

- A. The following items shall be submitted:
  - a. Proof of graphics to be printed.

### 1.02 PRODUCTS

- A. Dimensions, Materials, and Details
  - 1. Sign shall be 4’ x 8’ x 3/4”
  - 2. Plywood Panel (APA Rated A-B Grade – Exterior)
  - 3. Sign shall consist of black lettering over a white background.
  - 4. Sign shall include the “Investing in America” emblem and the latest logo of the Department of Ecology, CDBG Department of Commerce, Engineer, and Contractor. Emblem and logos will be provided.
  - 5. Sign shall include the following information:
    - a. Project Name: **Eastsound Sewer and Water District Wastewater Treatment Plant Upgrade – Phase II (WQC-2023-EaSoWd-00130)**
    - b. Owner: **Eastsound Sewer and Water District**
    - c. County: **San Juan County, WA**
    - d. Engineer: **Wilson Engineering, LLC**
    - e. Contractor: **TBD**
    - f. **Project funded by President Biden’s Bipartisan Infrastructure Law**

\*\*\*END OF SECTION\*\*\*

## **SECTION 15 40 00 – MISC. PLUMBING**

### **PART 1 - GENERAL**

#### **1.01 SYSTEM DESCRIPTION**

- A. Providing and installing miscellaneous plumbing for exterior purposes only as described herein and shown on plans,

#### **1.02 SUBMITTALS**

- A. Submittals: Shop Drawings and Product Data.

#### **1.03 QUALITY ASSURANCE**

- A. Regulatory Requirements: Comply with Uniform Building Code (UBC) & Uniform Plumbing Code (UPC).

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS**

- A. Sanitary Drains:
  - 1. Soil and Waste Piping Above Ground: ABS Drain Waste Vent (DWV).
  - 2. Soil and Waste Piping Below Ground: ABS Drain Waste Vent (DWV).
- B. Unions: Provide at each pipe connection to equipment and fixtures, and where necessary to disconnect piping for repairs. Match pipe in which installed.
- C. Cleanouts: Provide at all locations required to clean piping, including end of main drain, base of all vertical stacks, at crosses, and elsewhere as required by codes and ordinances. Full size of piping served, accessible for use with conventional cleaning equipment. Provide brass lugs, with graphite lubricant on threads.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Slope drainage lines 1/4 inch per foot or as required to meet code.
- B. Provide accessible cleanouts as required by code.
- C. Install in accordance with Manufacturer's instructions and as per local codes and ordinances

**\*\*\*END OF SECTION\*\*\***

## **SECTION 22 13 30 – SUBMERSIBLE SUMP PUMP**

### **PART 1. GENERAL**

#### **1.01 DESCRIPTION**

- A. Furnish complete, tested and operating, submersible pump stations, as shown on the Drawings and as specified herein.
- B. This work shall consist of supplying and installing a new, submersible pump station at the project site (Dewater Sump Pump Station), complete with controls, and any other appurtenances as described in these specifications and as shown on the Plans.
- C. Contractor is responsible for taking all necessary field measurements and coordinating with the pump supplier to provide a complete working pump station within the confines of the site configuration. The plans do not purport to show all of the necessary measurements and details for installation of the new submersible pump station equipment. Contractor shall prepare his bid in close coordination with said manufacturers so that no required components are inadvertently excluded from the bid due to miscommunication of intermediate suppliers or manufacturer's representatives. Contractor is ultimately responsible for the complete working operation of the proprietary installations.
- D. This work requires the installation of new pump station equipment, installation of new discharge piping, vaults, flow meter, connection to existing piping, and all of the associated modifications and components necessary for a complete working pump station at the project sites as shown on the Plans.
- E. This is a performance specification which is reliant upon the pump and control system manufacturers to provide, to the Contractor, all necessary components and instructions essential to a complete, working installation of the proprietary package of said manufacturer. The plans and specifications do not provide complete details, yet Contractor is required to provide the Owner with a complete working installation.

#### **1.02 RELATED SECTIONS**

- A. Related Requirements Specified Elsewhere:
  - 1. Section 01 33 00 – Submittal Procedures
  - 2. Section 01 50 00 - Temporary Facilities
  - 3. Section 03 30 00 – Cast-in-Place & Precast Concrete
  - 4. Section 31 23 33 – Trenching and Backfilling
  - 5. Section 33 05 00 – Common Works Results for Utilities
  - 6. Section 33 31 00 – Wastewater Piping
  - 7. Division 26 - Electrical

### **1.03 SUBMITTALS**

- A. Submittals shall be made in accordance with SECTION 01 33 00. In addition, the following specific information shall be provided:
  - 1. Manufacturer's brochures and certified pump curves.
  - 2. Shop Drawing of complete pumping assembly, station, and lifting system.
  - 3. Catalog information and cuts.
  - 4. Manufacturer's specifications and equipment drawings.
  - 5. Manufacturer's parts lists, schematic and wiring diagrams.
  - 6. Complete lubrication, maintenance, and operation instructions.
  - 7. Control panel submittals including wiring diagram and panel layout.
  - 8. Interconnection wiring showing field wiring.
  - 9. Copy of manufacturer's warranty for pump.
  - 10. Factory test report.
- B. Affidavits: The Contractor shall furnish affidavits from the manufacturer stating that the pumps have been properly installed and tested, and each is ready for full time operation.
- C. Performance Testing: Certified non-witnessed factory performance tests in accordance with Hydraulics Institute Standards are required for each pump.

### **1.04 QUALITY ASSURANCE**

- A. All equipment furnished under this Section shall: (1) be of a manufacturer who has been regularly engaged in the design and manufacture of the equipment for at least 5 years; and (2) be demonstrated to the satisfaction of the Engineer that the quality is equal to equipment made by those manufacturers specifically named herein.
- B. Field Tests. The pumping units shall be field tested after installation to demonstrate satisfactory operation, without causing excessive noise, vibration, cavitation, or overheating. The field testing shall be performed in the presence of an experience field representative of the manufacturer who shall supervise the startup and checkout of the equipment and who shall certify in writing that the pumps and motors have been properly installed, lubricated, adjusted, and prepared for operation.
- C. The completed pump station shall be given an operational test of all equipment at the factory to check for excessive vibration, leaks in all piping and seals, correct operation of the automatic control system and all auxiliary equipment. All irregularities shall be corrected at the factory. Copies of this factory testing shall be submitted to the Engineer for review and approval PRIOR TO PUMP INSTALLATION.

### **1.05 WARRANTY**

- A. The submersible pumps shall be warranted for a period of five (5) years or 10,000 hours of operation to be of quality construction, free from defects in material and factory workmanship.

- B. Major components that fail to perform as specified by the engineers (or as represented by the manufacturer) or prove defective in service during the warranty period shall be replaced, repaired, or satisfactorily modified by the manufacturer without cost of parts or labor to the owner. After start-up service has been performed, labor to replace accessory items such as blowers, heaters, or other accessible and easily serviced parts, shall be the responsibility of the owner. Such components, parts, or repairs determined by the manufacturer to have failed because of defects in workmanship or materials will be replaced or repaired F.O.B. factory or other designated location.

## **1.06 WARNING SIGNS**

- A. Each piece of driven machinery which can be started manually by any control station not within 15 feet of the machine, or which can be controlled automatically by any means, shall be identified with a warning sign inscribed:

CAUTION  
THIS MACHINE IS REMOTELY CONTROLLED  
AND MAY START AT ANY TIME

The word "CAUTION" shall be in yellow block letters on black panel at the top of the sign which shall have yellow background and text in black block letters. Signs shall be fabricated from 30-gauge copper bearing steel and finish shall be high baked enamel; the finished signs shall be weather resistant. Signs shall be ten inches wide by seven inches high. Signs shall be located in prominent locations at machines and shall be fastened to surfaces previously specified for nameplates.

## **PART 2. PRODUCTS**

### **2.01 PUMP STATION - GENERAL**

- A. The pump station shall be designed to provide the pumping requirements and functions indicated and implied by the Drawings and these Specifications and to provide trouble-free operation with minimum maintenance. The system shall readily enable manual operation of any and all functions in the event of failure of any one component.
- B. The Pump Station Supplier shall be locally available for onsite response when called within a reasonable time, depending upon the nature of the emergency. The Supplier shall have personnel available 24 hours a day, every day of the year – NO EXCEPTIONS.
- C. All submersible pumps for this project shall be by the same manufacturer – NO EXCEPTIONS.

### **2.02 SUBMERSIBLE WASTEWATER PUMPS**

- A. General: Submersible wastewater pumps shall be heavy-duty, submersible, non-clog, centrifugal, quick disconnect pumps. The pumps shall be capable of operating in the range of capacity specified on a continuous basis with no detrimental effects to the pump or motor.

B. Pump Schedule: The pump operating characteristics shall be as follows.

1. Dewater Sump Pump Station – (one pump, characteristics below are for this pump)
  - a. Design Condition (gpm) 40 gpm @ 19.0 ft
  - b. Additional operation point 1: 20 gpm @ 23.0 ft
  - c. Additional operation point 2: 80 gpm @ 10.5 ft
  - d. Minimum Shutoff Head 28 ft
  - e. Rated Speed 3390 rpm
  - f. Pump Drive Type single speed (across the line starter)
  - g. Nominal Motor Horsepower Size 1.8 HP
  - h. Required minimum hydraulic efficiency at operating point flow rate (percent) 20%  
Manufacturer and Pump Type Flygt CS 3045 HT 3~ 254  
Impeller Polyamide 66 (size = 74 mm)
  - i. Discharge 2" diameter

C. Pump Construction:

1. General
  - a. The pumps shall be designed to permit removal of pumping units from the wetwell for inspection or service without disconnecting or disturbing the discharge piping. The pump connection shall be metal to metal or with secondary O ring seal. The design shall permit the pumps when lowered into place to be automatically connected to the discharge piping by positively locking the volute in position to prevent any axial or lateral movement. There shall be no need for personnel to enter the wetwell when pump inspection or service is required. Pump assembly, including motor, pump and cable accessories must be rated for Class 1, Division 1 hazardous environment, explosion proof, group C & D.
  - b. Lifting assemblies and discharge mating flanges shall be spark proofed, Factory Mutual Standards.
2. Piping, Fittings, and Appurtenances: Each pump shall be furnished with quick-disconnect discharge elbow, Type 316 stainless steel Schedule 40 pipe rails, upper guide rail bracket, intermediate guide rail bracket, rail-guided lifting assembly, and stainless steel chain of sufficient strength to raise and lower pump. All guide rail components and fasteners shall be type 316 stainless steel.
3. Pump Castings: Castings shall be of cast iron or semi-steel of uniform quality and free from blowholes, porosity, hard spots, shrinkage defects, cracks and other injurious defects. The casings shall be designed to permit replacement of wearing parts. Joints shall be properly sealed with O rings and shall not leak under a test pressure equal to 50 percent greater than the pump discharge pressure or the total dynamic head, whichever is greater. Passageways shall permit smooth flow and shall be free from sharp turns and projections.
4. Impellers: Impellers shall be polyamide 66 and suitable for the service required. The impellers shall be smooth and free flowing and shall have sufficient clearance



to permit objects in the water that enter the pump to pass into the discharge pipe. Each impeller shall be accurately fitted and keyed, splined, or threaded on the shaft, and locked in such a manner that lateral movement will be prevented and reverse rotation will not cause loosening.

5. Balance: All rotating parts of the equipment shall be in such balance, mechanically and hydraulically, as to operate throughout the required range without excessive end thrust, vibration or noise.
  6. Shafts: Shafts shall be steel, shall be of sufficient size and strength to perform the work required, and shall be adequately provided with alignment bearings.
  7. Bearings: Bearings subject to submersion shall be ball bearings manufactured from high-grade bearing alloy. Bearing shall have a minimum B 10 life of 18,000 hours.
  8. Mechanical Seals: Each pump shall be equipped with tungsten carbide seals.
  9. Electrical Motors: The pump motor shall be induction type with a squirrel cage rotor, housed in an air filled, watertight chamber, NEMA B type. The stator windings and stator leads shall be insulated with moisture resistant Class H insulation rated for 356 °F. The motor shall have a minimum service factor of 1.15. Power cords shall be non-potted and removable. Stator windings shall be trickle impregnated with resin and rated at 180°C (355°F). Stator windings shall be embedded with three (3) thermal switches for overheating protection. The motor shall have integral moisture sensors that shall be monitored by a motor saver relay. The stator shall be heat-shrink fitted into the housing and locked against rotation. Motor speed and power specifications shall be as follows:
    - a. Dewater Sump Pump Station – Submersible, 3390 rpm, 1.8 HP, 460 Volt, 3 phase, 60 Hertz.
  10. Motor Saver Relay: The pumps shall be pre-wired for connection to ITT Flygt MiniCAS – 120 motor saver relay. Contractor shall supply ITT Flygt MiniCAS – 120 to Control Systems Integrator.
  11. Miscellaneous Metals: Bolts, nuts, anchors, washers, and all other types of supports necessary for the installation of the pumps and drive units shall be furnished and shall be of Type 316 stainless steel.
  12. Shop Painting: Pump, motor, and accessories shall be factory applied and finish painted in accordance with the manufacturer's standard.
- D. Pumps must be capable of operating within pump manufacturer's recommended operating envelopes through the full range of design flows and speeds. Any restrictions shall be incorporated into the pump control logic to prevent undesirable operating conditions from occurring at no additional cost to the OWNER.
- E. Pump Removal Equipment: Provide and install Type 316 stainless steel guide bars and cable, brackets, and Type 316 Stainless steel lifting chain. There shall be a minimum of two guide bars or cables for each pump. Removal equipment shall be installed in a manner that prevents excessive deflection under normal operating conditions.

## **2.03 EQUIPMENT FOR WET WELL INSTALLATION**

- A. For each pump the contractor shall supply and install a discharge connection made of cast iron ASTM A-48, Class 35B.
- B. The pump(s) shall be automatically and firmly connected to the discharge connection,

guided by no less than two parallel guide bars extending from the top of the station to the wet well mounted discharge connection. The material of the guide bars shall Stainless steel AISI 316.

- C. The length of the guide bars shall be 15 feet (contractor to verify) and they shall be fastened at the top of the station with a guide bar holder made of Stainless steel AISI 316.
- D. The contractor shall supply and install **two** cable holders, each made with 4 hooks of Stainless steel AISI 316.
- E. There shall be no need for personnel to enter the wet-well.
- F. The sealing of the pumping unit to the discharge connection shall be accomplished by a machined metal to metal contact. Sealing of the discharge interface with a diaphragm, O-ring or profile gasket will not be accepted. The entire weight of the pump/motor unit shall be borne by the pump discharge elbow. No portion of the pump/motor unit shall bear on the sump floor directly or on a sump floor mounted stand.

## **2.04 LIFTING EQUIPMENT FOR PUMPS**

- A. Each pump shall be fitted with 20 feet of stainless steel lifting chain with spectra cord for use with the Grip-Eye lifting device. The working load of the lifting system shall be 50% greater than the pump unit weight.

## **2.05 SPARE PARTS**

- A. Each new pump station shall be furnished with the following spare parts, plus any additional spare parts listed as recommended by the manufacturer:
  - 1. Complete replacement mechanical (pump shaft) seal, including all gaskets, seals, sleeves, O-rings, and packings required to be replaced during replacement of the seal.
  - 2. Impeller clearance adjustment shims
  - 3. One plug-in seal unit.
  - 4. One quart seal lubricant
  - 5. One cover plate O-ring
  - 6. One rotating assembly O-ring.
  - 7. One filter element for the seal filter
  - 8. One volute gasket.

## **PART 3. EXECUTION**

### **3.01 PUMP AND MOTOR**

- A. Install pumps and sump floor anchoring in accordance with the manufacturer's recommendations. Pumps must be installed plumb & level.
- B. Each pump shall be installed in accordance with the manufacturer's recommendations by a qualified professional with experience installing similar pumping systems. Mount pumps with motors in concrete wetwells as shown on the drawings. Anchor bolt size and material shall be as per manufacturer's recommendations. Bolts shall be accurately placed with templates and bolt thread projections covered with 2 to 3 wraps of duct-tape.
- C. Control Systems Integrator shall incorporate ITT Flygt MiniCAS – 120 motor saver relay into pump station control panel. Control Systems Integrator shall be responsible for

connecting pumps to motor saver relay and confirming operation.

### **3.02 FLOAT SWITCHES**

- A. Float switches shall be suspended at levels as shown on the Plans. Suspension cables shall be secured on the cable holder forming a large loop such that conductors in the cable shall not be squeezed tight. In addition, please note that a submersible level transducer will also be used for pump control.

### **3.03 START-UP SERVICES**

- A. The pump equipment manufacturer shall furnish the services of a qualified factory trained field service engineer for a minimum of one (1) 8-hour day per each pump station (travel time excluded) to inspect the installations and instruct the Owner's personnel on the operation and maintenance of the pumps. The Contractor is responsible for coordinating start-up with the supplier/pump manufacturer. After the pumps have been completely installed and wired, the Contractor shall have the pump manufacturer's field engineer perform the following
  1. Inspect megger stator and power cables.
  2. Check seal lubrication.
  3. Check proper rotation.
  4. Check power supply voltage.
  5. Measure motor operating load and no load current.
  6. Check level control operation sequence.
  7. Demonstrate to the Owner each submersible pump being lifted out of the wetwell and then reinstalled using the lifting chain.
  8. Perform flow tests to confirm pump's ability to meet the specified design flow conditions.
- B. The Contractor is required to provide any additional information needed by the pump supplier to validate pump warranties (i.e. voltage and amp readings for each leg of line).

### **3.04 PAINTING**

- A. All painting shall be in accordance with manufacturer's standards appropriate for exterior wastewater applications.

### **3.05 ELECTRICAL**

- A. All electrical work shall be in accordance with State and Local code. Reference Electrical and Controls specifications for additional information regarding the electrical and control system design.

**\*\*\* END OF SECTION\*\*\***

## **SECTION 23 05 00 COMMON WORK RESULTS FOR HVAC**

### **PART 1 GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to work of this section.

#### **1.02 SCOPE OF WORK – GENERAL**

- A. This section specifies general requirements for HVAC installations and includes requirements common to more than one section of Division 23. It expands and supplements the requirements specified in sections of Division 01.
- B. Provide materials, labor, transportation, tools, permits, fees, inspections, utilities and incidentals necessary for the complete installation of HVAC work indicated and described in the Contract Documents.
- C. It is the intent of the Contract Documents to provide an installation complete in every respect. If additional details or special construction is required for work indicated or specified under this section of work or work specified in other sections, provide material and equipment which is usually furnished with such systems to complete the installation, whether mentioned or not.

#### **1.03 CODES AND STANDARDS**

- A. Code Compliance: Comply with most current edition adopted by the Authority Having Jurisdiction of the following:
- B. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>).
- C. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems.
- D. ICC (IBC) - International Building Code.
- E. ICC (IFC) - International Fire Code.
- F. ICC (IFGC) - International Fuel Gas Code.
- G. ICC (IMC) - International Mechanical Code.
- H. NFPA 70 - National Electrical Code.
- I. Washington State Energy Code, Commercial Provisions.
- J. Applicable State and local codes, laws, and ordinances.

#### **1.04 SEQUENCE OF WORK**

- A. Conduct work in sequence to provide least interference to the activities of the Owner, and to permit orderly transfer of activities and equipment to completed areas.

#### **1.05 ALTERNATES**

- A. Refer to Division 01 Section “Alternates” for description of alternates. Review Contract Documents for additional information.

#### **1.06 DEFINITIONS**

- A. Provide: Furnish and install complete and ready for intended use.
- B. Indicated: Indicated on drawings.
- C. Noted: Noted on Drawings or in Specifications.

- D. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspace, and tunnels.
- E. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- F. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- G. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- H. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

## **1.07 SAFETY OF PERSONS AND PROPERTY**

- A. Comply with applicable laws, ordinances, rules, and regulations of any public authority for the safety of persons and property, including requirements of the Washington Department of Safety and Health (DOSH) or the Occupational Safety and Health Act (OSHA) whichever is most stringent, and Division 01, General and Supplementary Conditions.

## **1.08 PERMITS AND FEES**

- A. Obtain and pay for required permits and fees necessary to fully complete work included in the Contract Documents.

## **1.09 INTENT AND INTERPRETATION**

- A. Drawings and Specifications supplement each other, and any details contained in one and not the other shall be included as if contained in both. Items not specifically mentioned in the specifications or noted on the drawings, but which are obviously necessary to make a complete working installation shall be included.
- B. Drawings are partly diagrammatic and do not necessarily show the exact location of new piping and existing utilities, unless specifically dimensioned.
- C. Riser and other diagrams are schematic only and do not necessarily show the physical arrangement of equipment. They shall not be used for obtaining quantities or linear runs of piping.
- D. Grilles, fixtures, or other pieces of equipment shall be centered on windows, wall spaces, or other items, unless specifically dimensioned otherwise.
- E. Location of piping and ductwork shall be checked to determine that it clears openings and structural members; that it may be properly concealed; and that it clears cabinets, lights and equipment having fixed locations.
- F. Mechanical drawings shall serve as working drawings for Division 23 work. Refer to Architectural, Structural, and Electrical drawings for additional detail affecting the installation of work. The Architectural drawings shall take precedence over the Mechanical drawings if any dimensional discrepancies exist.
- G. The approximate location of each item is indicated on the drawings. These drawings are not intended to give complete and exact details regarding location. Exact locations are to be determined by actual measurements at the building. Not all pipe and duct offsets are indicated on the drawings.

## **1.10 SUBMITTAL OF EQUIPMENT FOR APPROVAL**

- A. Refer to Division 01 requirements for submittal definitions, requirements and procedures. Additional requirements are listed below.
- B. Shop drawings, catalog information, and material schedules shall be submitted for approval on materials and equipment prior to ordering.
- C. Submit a single, complete submittal package for products in Division 23. Submittal package shall be organized by specification number. PDFs shall be bookmarked.

## **1.11 GUARANTEE**

- A. Guarantee satisfactory operation of material and equipment installed under Division 23. Repair or replace any defective materials, equipment, or workmanship which may show itself within one year from the date of Substantial Completion.

## **PART 2 PRODUCTS**

### **2.01 GENERAL MATERIALS AND EQUIPMENT REQUIREMENTS**

- A. Where more than one manufacturer is listed, provide products of only one manufacturer for each type of product.
- B. Materials used under this Contract, unless specifically noted otherwise, shall be new and of the latest and most current model line produced by the manufacturer. Outdated “new” equipment is not acceptable.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

### **2.02 EQUIPMENT AND MATERIAL SUBSTITUTIONS**

- A. Throughout these Contract Documents, various materials, equipment, apparatus, etc., are specified by manufacturer, brand name, type, or catalog number. Such designation is to establish standards of desired quality and construction and shall be the basis of the bid.
- B. Where more than one manufacturer is listed, and only one manufacturer’s catalog number is indicated, that standard of quality and construction shall be maintained by materials supplied by other manufacturer(s).
- C. Substitutions of equipment or materials shall be made only with written prior approval. Prior approval requests must be received at least ten (10) days prior to bid date unless otherwise instructed. Refer to Division 01 Section, “Substitution Procedures” for procedures in requesting substitutions. The Owner or Owner’s Representative shall review all substitution requests for final approval.
- D. Acceptance of substitution request signifies manufacturer recognition only. No attempt has been made to check each item as to special features, capacities, or physical dimensions required by this project. Verify requirements before submitting for approval. Acceptance of exact features, sizes, capacities, etc., all of which must meet or exceed design requirements will be determined when submitted during the construction phase.
- E. Substitution request must include manufacturer, specific model number, special features, physical dimensions, and capacities of proposed equipment. Verify requirements before submitting for approval.

- F. The Contractor shall bear full responsibility for substituted equipment and materials, including, but not limited to:
  - 1. Costs.
  - 2. Available space requirements
  - 3. Effect on other trades
  - 4. Changes in electrical requirements
  - 5. Changes in structural requirements.

## **PART 3 EXECUTION**

### **3.01 COMMISSIONING**

- A. At a minimum, comply with the requirements of the Washington State Energy Code.
- B. Refer to Division 01 Section “Commissioning” for additional requirements.

### **3.02 COORDINATION**

- A. Refer to Division 01 Section “Project Management and Coordination”.
- B. Coordinate available space for equipment and systems with other trades. Refer to Architectural, Structural and Electrical Drawings for additional building details necessary for coordination.
- C. Cutting, patching, wiring, finishing or any other work required for relocation of work installed due to interferences between the work of the various trades will be at no additional cost to the Owner.

### **3.03 MANUFACTURER’S INSTRUCTIONS**

- A. Furnish proper equipment and/or materials required for installation as intended by the manufacturer, for all work described under Division 23. If needed for proper installation or operation, request advice and supervisory assistance from the representative of the specific manufacturer. Manufacturer’s published instructions shall be followed for preparing, assembling, installing, erecting, and cleaning manufactured materials or equipment, unless otherwise indicated. Promptly notify the Architect in writing of any conflict between the requirements of the Contract Documents and the manufacturer’s directions and obtain the Architect’s instructions before proceeding with the work.

### **3.04 EXAMINATION OF SITE**

- A. Visit site of proposed work and become familiar with conditions affecting work. Verify measurements at the building before beginning work.

### **3.05 LAYING OUT WORK**

- A. Locations of equipment and devices, as shown on the drawings, are approximate unless dimensioned. Exact locations of such items shall be determined from the Construction Drawings. Verify physical dimensions of each item of mechanical equipment, ductwork system and piping system, to fit available space and promptly notify the Architect prior to roughing-in if conflicts appear. Coordinate equipment to available space and access routes through construction. Offsets or transitions in ductwork or piping systems required for proper system operation and/or installation, whether indicated on drawings or not, shall be provided at no additional cost to Owner.

### **3.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage, and handling.

- B. Store equipment and materials at the site, unless offsite storage is authorized in writing. Protect stored equipment and materials from damage.
- C. Coordinate deliveries of mechanical materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

### **3.07 ACCESSIBILITY**

- A. Install equipment and materials to provide required access for servicing and maintenance. Coordinate location of concealed equipment and devices requiring access with location of access panels and doors. Allow ample space for removal of parts that require replacement or servicing.

### **3.08 TEMPORARY USE OF NEW EQUIPMENT**

- A. New equipment shall not be used for temporary heating, cooling, or ventilation unless authorized in writing by the Owner.

### **3.09 CUTTING AND PATCHING**

- A. Comply with Division 01 Section, "Execution" for general requirements for cutting and patching.
- B. Cutting shall be performed with masonry saws, core drills or similar equipment to provide neat and uniform openings.
- C. Patching shall match adjacent surfaces in materials and finish. Do not endanger or damage installed work through procedures and processes of cutting and patching.
- D. Arrange for repairs required to restore other work, which was damaged caused damage as a result of because of mechanical installations. Upon receipt of written authorization from Architect, Contractor will be authorized for cutting and patching work that is necessitated by ill-timed, defective, or non-conforming installations.
- E. No additional compensation will be authorized for cutting and patching work that is necessitated by ill-timed, defective, or non-conforming installations.
- F. Perform cutting, fitting, and patching of mechanical equipment and materials required to:
  - 1. Uncover work to provide for installation of ill-timed work.
  - 2. Remove and replace defective work.
  - 3. Remove and replace work not conforming to requirements of the Contract Documents.
  - 4. Remove samples of installed work as specified for testing.
  - 5. Install equipment and materials in existing structures.
  - 6. Upon written instructions from the Architect, uncover and restore work to provide for observation of concealed work.
- G. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including, but not limited to removal of mechanical piping, heating units, and other mechanical items made obsolete by new work.
- H. Protect structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
- I. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

## **END OF SECTION 23 05 00**



## **SECTION 23 05 05**

### **PROJECT CLOSEOUT FOR HVAC**

#### **PART 1 - GENERAL**

##### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to work of this section.

##### **1.02 SCOPE OF WORK - GENERAL**

- A. This section specifies procedural requirements for HVAC installations project closeout, including but not limited to:
  - 1. Project Record Document submittal.
  - 2. Operation and Maintenance (O&M) Manual submittal.
  - 3. Operation and Maintenance Instruction and Training.
  - 4. HVAC Equipment and Systems Startup.
  - 5. Final Cleaning.
  - 6. Owner Training Session Agenda.
- B. Related Sections include the following:
  - 1. Division 01 Section, "Submittal Procedures".
  - 2. Division 01 Section "Closeout Procedures".

##### **1.03 PROJECT RECORD DOCUMENTS**

- A. Record the differences between the HVAC work as installed and as shown in the Contract Drawings on a set of prints of HVAC drawings furnished by Architect. Return these prints to the Architect at the completion of project. Notations made on drawings shall be neat and legible. Comply with Division 01 requirements.
- B. Mark drawings to indicate revisions to HVAC piping and ductwork, size and location both exterior and interior; including locations of coils, dampers, and other control devices, filters, motors and similar items requiring periodic maintenance; actual equipment locations; concealed equipment and control devices; mains and branches of piping systems, with valves and control devices located and numbered.
- C. Revise the equipment and fixture schedules on the Drawings to indicate actual installed manufacturer and model numbers.
- D. Mark specifications to indicate change orders; actual equipment and materials used.

##### **1.04 OPERATION AND MAINTENANCE MANUALS**

- A. Prepare and submit Operation and Maintenance (O&M) Manuals for HVAC systems provided. Comply with Division 01 Section requirements.
- B. Provide primary index at beginning of Manual showing sections and items included.
- C. Cover section: List name, address, and phone number of Project Architect, General Contractor, Mechanical Engineer, HVAC Contractor and all HVAC Subcontractors. Provide a list of equipment suppliers with address and phone number.
- D. Provide a separate section for each Section of the Specifications. Provide an index for each section listing equipment included. Include all items specified.

- E. Include descriptive literature (manufacturer's catalog data) of each manufactured item. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined. Data sheets shall be originals or clean copies of originals.
- F. One (1) draft copy of the manual shall be submitted for review, comment, and approval, as applicable, at least 15 days prior to substantial completion or training, whichever is first. After approval, submit three (3) copies of the manual to the Architect for approval unless otherwise directed by Division 01 Section requirements. Information to be included in manual:
  - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.
  - 2. Manufacturer's printed operating procedures to include startup, break-in, routine and normal operating instructions; regulation, control, stopping shutdown, and emergency instructions; and summer and winter operating instructions.
  - 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
  - 4. Servicing instructions and lubrication charts and schedules.
  - 5. Schematic control diagrams for each automatic control system. Mark the correct operating setting for each control instrument on these diagrams.
  - 6. Valve schedule indicating the valve symbol (tag number), valve location by room number and description, valve purpose and system served, and valve size. Provide one (1) corresponding set of full-size HVAC prints showing these valve locations for cross-reference. A second complete set of valve schedules (8.5 inches x 11 inches) encased in transparent plastic laminate and fitted in an aluminum holding frame shall be furnished to the Owner.
  - 7. Testing, Adjusting, and Balancing Report.
  - 8. Test records and certifications.
  - 9. Equipment startup reports.
  - 10. Warranty information and letters of guarantee.
  - 11. Instruction period checklist for each equipment item.
- G. Complete O&M Manual shall be available for use by Owner's representatives during instruction and training sessions.

### **1.05 OPERATION AND MAINTENANCE INSTRUCTION AND TRAINING**

- A. Instruct Owner's Representative(s) in the Operation and Maintenance procedures described in Operation and Maintenance Manual. Comply with Division 01 Section requirements.
- B. Enlist the services of qualified personnel, including each sub-trade and factory trained specialists for each major piece of equipment, to attend training sessions and provide operation and maintenance instructions.
- C. Submit training agenda, schedule and list of representatives for review 30 days prior to training sessions. Confirm attendance by written notification to all participants.
- D. Prepare a checklist of all equipment and systems requiring instruction and maintenance for verification and agreement by the Owner's Representative of satisfactory startup and instruction. The checklist shall include a statement of completion by the Contractor, date and topic(s) covered in each training session, and an attendance list of all participants at each training session. Submit a copy of checklist for review 30 days prior to training sessions. Include copy of the completed checklist in Operation and Maintenance Manual.
- E. Refer to individual Division 23 Sections for additional instruction/training requirements.

- F. All HVAC systems shall be properly functioning prior to instruction period.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

**3.01 HVAC EQUIPMENT AND SYSTEMS STARTUP**

- A. Provide the services of a factory-authorized service representative to test and inspect unit installation, provide startup service and demonstrate and train Owner's maintenance personnel.
- B. Include certification of factory-authorized representative status as part of equipment submittal from manufacturer. Include copies of any installation and startup instructions, manufacturer's checklists, and other forms used in startup as part of the equipment submittal.
- C. Include written startup reports with test data for equipment in Operation and Maintenance Manual.
- D. All construction debris, including electrical wiring debris shall be removed from units prior to equipment startup. Areas surrounding and served by equipment being started must be free of construction debris, sheetrock dust, and any materials that may adversely affect the equipment.

**3.02 FINAL CLEANING**

- A. Refer to Division 01 general requirements for final cleaning.
- B. At time of final cleanup, clean all fixtures and equipment, and leave in condition for use intended. Vacuum cabinet interiors of control panels, air handling units, etc. to remove all construction debris including electrical wiring debris.

**END OF SECTION 23 05 05**

**SECTION 23 05 29**  
**HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT**  
**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Support and attachment components.

**1.02 REFERENCE STANDARDS**

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General-Purpose Piping.
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
- E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings.
- F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
- G. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.
- H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- I. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
- J. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
- K. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation.

**1.03 SUBMITTALS**

- A. See Section 23 05 00 - Common Work Results for HVAC for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.

**1.04 QUALITY ASSURANCE**

- A. Comply with applicable building code.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

**PART 2 PRODUCTS**

**2.01 SUPPORT AND ATTACHMENT COMPONENTS**

- A. General Requirements:
  - 1. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.

2. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
  3. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
    - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
    - b. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
    - c. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Prefabricated Trapeze-Framed Metal Strut Systems:
1. Manufacturers:
    - a. ABB Installation Products.
    - b. Cooper B-Line, a division of Eaton Corporation.
    - c. Unistrut, a brand of Atkore International Inc.
    - d. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
  2. Strut Channel or Bracket Material:
    - a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
  3. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch.
  4. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.
  5. Accessories: Provide bracket covers, cable basket clips, cable tray clips, clamps, conduit clamps, fire-retarding brackets, j-hooks, protectors, and vibration dampeners.
- C. Hanger Rods:
1. Threaded zinc-plated steel unless otherwise indicated.
- D. Steel Cable:
1. Manufacturers:
    - a. Ductmate Industries, Inc, a DMI Company.
    - b. Elgen Manufacturing Company, Inc.
    - c. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
    - a. Concrete: Preset concrete inserts, expansion anchors, or screw anchors.
    - b. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
    - c. Hollow Masonry: Use toggle bolts.
    - d. Steel: use beam-ceiling clamps, beam clamps, machine bolts, or welded threaded studs.
    - e. Sheet Metal: use sheet metal screws.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.

- C. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- D. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- F. Equipment Support and Attachment:
  - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
  - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
  - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
- G. Secure fasteners according to manufacturer's recommended torque settings.
- H. Remove temporary supports.

**END OF SECTION 23 05 29**

## **SECTION 23 05 93**

### **TESTING, ADJUSTING, AND BALANCING FOR HVAC**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Testing, adjustment, and balancing of air systems.
- B. Measurement of final operating condition of HVAC systems.
- C. Commissioning activities.

##### **1.02 RELATED REQUIREMENTS**

- A. Section 01 91 13 - General Commissioning Requirements: Commissioning requirements that apply to all types of work.

##### **1.03 REFERENCE STANDARDS**

- A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition.
- B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems.
- C. NEBB (TAB) - Procedural Standard for Testing Adjusting and Balancing of Environmental Systems.
- D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing.
- E. Washington State Energy Code Commercial Provisions, latest adopted version.

##### **1.04 SUBMITTALS**

- A. See Section 23 05 00 - Common Work Results for HVAC for submittal procedures.
- B. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
- C. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
  - 1. Include at least the following in the plan:
    - a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
    - b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
    - c. Identification and types of measurement instruments to be used and their most recent calibration date.
    - d. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
    - e. Final test report forms to be used.
    - f. Procedures for formal deficiency reports, including scope, frequency and distribution.
- D. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
  - 1. Revise TAB plan to reflect actual procedures and submit as part of final report.
  - 2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.

3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
5. Units of Measure: Report data in I-P (inch-pound) units only.

## **PART 2 PRODUCTS - NOT USED**

## **PART 3 EXECUTION**

### **3.01 GENERAL REQUIREMENTS**

- A. Perform total system balance in accordance with one of the following:
  1. AABC (NSTSB), AABC National Standards for Total System Balance.
  2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
  3. SMACNA (TAB).
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. TAB Agency Qualifications:
  1. Company specializing in the testing, adjusting, and balancing of systems specified in this section independent of the installing contractors or equipment suppliers for this project.
  2. Having a minimum of five years documented experience of projects of similar scope and complexity.
  3. Certified by one of the following:
    - a. AABC, Associated Air Balance Council: [www.aabc.com/#sle](http://www.aabc.com/#sle); upon completion submit AABC National Performance Guaranty.
    - b. NEBB, National Environmental Balancing Bureau: [www.nebb.org/#sle](http://www.nebb.org/#sle).
    - c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: [www.tabbcertified.org/#sle](http://www.tabbcertified.org/#sle).
- D. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.
- E. Pre-Qualified TAB Agencies:
  1. Neudorfer Engineers
  2. AirTest Inc.
  3. United Test & Balance
  4. TAC Systems
  5. Hardin and Sons
  6. Or approved equal

### **3.02 EXAMINATION**

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
  1. Systems are started and operating in a safe and normal condition.
  2. Temperature control systems are installed completely and operable.
  3. Final filters are clean and in place. If required, install temporary media in addition to final filters.
  4. Duct systems are clean of debris.
  5. Fans are rotating correctly.
  6. Air coil fins are cleaned and combed.



7. Access doors are closed, and duct end caps are in place.
8. Air outlets are installed and connected.

### **3.03 ADJUSTMENT TOLERANCES**

- A. Air Handling Systems: Adjust to within + or – 5% of design for supply systems and + or – 10% of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within +10% and –5% of design to space. Adjust outlets and inlets in space to within + or –10% of design.

### **3.04 RECORDING AND ADJUSTING**

- A. Field Logs: Maintain written logs including:
  1. Running log of events and issues.
  2. Discrepancies, deficient or uncompleted work by others.
  3. Contract interpretation requests.
  4. Lists of completed tests.
- B. Ensure recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

### **3.05 AIR SYSTEM PROCEDURE**

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross-sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50% loading of filters.
- E. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- F. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- G. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.

### **3.06 SCOPE**

- A. Test, adjust, and balance the following:
  1. Fans.
  2. Exhaust inlets
  3. Unit Heaters

### **3.07 MINIMUM DATA TO BE REPORTED**

- A. Electric Motors:
  - 1. Manufacturer.
  - 2. Model/Frame.
  - 3. HP/BHP.
  - 4. Phase, voltage, amperage; nameplate, actual, no load.
  - 5. RPM.
  - 6. Service factor.
  - 7. Sheave Make/Size/Bore.
- B. Exhaust Fans
  - 1. Location.
  - 2. Manufacturer.
  - 3. Model number.
  - 4. Serial number.
  - 5. Air flow specified and actual.
  - 6. Total static pressure (total external), specified and actual.
  - 7. Inlet pressure.
  - 8. Discharge pressure.
  - 9. Fan RPM
  - 10. Air Pressure Sensing Switch Functionality
- C. Unit Heaters:
  - 1. Location.
  - 2. Manufacturer.
  - 3. Model number.
  - 4. Serial number.

**END OF SECTION 23 05 93**

## **SECTION 23 31 00**

### **HVAC DUCTS AND CASINGS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Metal ducts.
- B. Manufactured ductwork and fittings.

##### **1.02 REFERENCE STANDARDS**

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems.
- D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible.
- E. SMACNA (FGD) - Fibrous Glass Duct Construction Standards.

##### **1.03 SUBMITTALS**

- A. See Section 23 05 00 - Common Work Results for HVAC for submittal procedures.
- B. Product Data: Provide data for duct materials.

#### **PART 2 PRODUCTS**

##### **2.01 GENERAL REQUIREMENTS**

- A. Provide UL Class 1 ductwork, fittings, hangers, supports, and appurtenances in accordance with NFPA 90A and SMACNA (DCS) guidelines unless stated otherwise.
- B. Duct Shape and Material in accordance with Allowed Static Pressure Range:
  - 1. Round:  $\pm 2$  in-wc of galvanized steel.
  - 2. Rectangular:  $\pm 1/2$  in-wc of galvanized steel.
  - 3. Duct Sealing and Leakage in accordance with Static Pressure Class:
  - 4. Duct Pressure Class and Material for Common Mechanical Ventilation Applications:
    - a. Outside Air Intake:  $1/2$  in-wc pressure class, galvanized steel.
    - b. General Exhaust Air:  $1/2$  in-wc pressure class, galvanized steel.
    - c. Fittings: Elbows, End caps, Connecting couplings, Spin-in-collar, Soffit-discharge head, Support Brackets, and Wall discharge head.
  - 5. Low Pressure Service: Up to 2 in-wc:
    - a. Seal: Class C, apply to seal off transverse joints.
    - b. Leakage:
      - 1) Rectangular: Class 24 or 24 cfm/100 sq ft.
      - 2) Round: Class 12 or 12 cfm/100 sq ft.
  - 6. Duct Fabrication Requirements:
  - 7. Duct and Fitting Fabrication and Support: SMACNA (DCS) including specifics for continuously welded round and oval duct fittings.
  - 8. Use reinforced and sealed sheet-metal materials at recommended gauges for indicated operating pressures or pressure class.
  - 9. Construct tees, bends, and elbows with radius of not less than 1-  $1/2$  times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide airfoil turning vanes of perforated metal with glass fiber insulation.

10. Increase duct sizes gradually, not exceeding 15° divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45° convergence downstream.
11. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side, seal to louver frame and duct.

## **2.02 METAL DUCTS**

- A. Material Requirements:
  1. Galvanized Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
- B. Rectangular Metal Duct:
  1. Rectangular Double Wall Insulated: Rectangular spiral lock seam duct with galvanized steel outer wall, perforated galvanized steel inner wall; fitting with the solid inner wall.
    - a. Insulation:
      - 1) Thickness: 1 inch.
      - 2) Material: Air.
- C. Connectors, Fittings, Sealants, and Miscellaneous:
  1. Fittings: Manufacture with solid inner wall of perforated galvanized steel.
  2. Joint Sealers and Sealants: non-hardening, water resistant, mildew and mold resistant.
    - a. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
    - b. VOC Content: Not more than 250 g/L, excluding water.
    - c. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.

## **2.03 PART 3 EXECUTION**

### **2.04 INSTALLATION**

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. During construction, provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering the ductwork system.
- C. Duct sizes indicated are precise inside dimensions. For lined ducts, maintain sizes inside lining.
- D. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

**END OF SECTION 23 31 00**

## **SECTION 23 33 00 AIR DUCT ACCESSORIES**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Air turning devices/extractors.
- B. Duct access doors.
- C. Volume dampers
- D. Duct test holes.
- E. Flexible duct connectors.
- F. Miscellaneous Products:
  - 1. Air Pressure Sensing Switch.
  - 2. Louvers

#### **1.02 REFERENCE STANDARDS**

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems.
- B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible.

#### **1.03 SUBMITTALS**

- A. See Section 230500 - Common Work Results for HVAC, for submittal procedures.
- B. Product Data: Provide for shop-fabricated assemblies including volume control dampers, duct access doors, duct test holes, and hardware used. Include electrical characteristics and connection requirements.

### **PART 2 PRODUCTS**

#### **2.01 DUCT ACCESS DOORS**

- A. Manufacturers:
  - 1. Acudor Products Inc, a Division of Nelson Industrial Inc.
  - 2. Ductmate Industries, Inc, a DMI Company.
  - 3. Elgen Manufacturing, Inc.

#### **2.02 VOLUME DAMPERS**

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8-inches by 72-inches. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
- C. End Bearings: Except in round ducts 12-inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.

#### **2.03 DUCT TEST HOLES**

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

#### **2.04 FLEXIBLE DUCT CONNECTORS**

- A. Manufacturers:
  - 1. Carlisle HVAC Products.

2. Duro Dyne Corp.
  3. Elgen Manufacturing, Inc..
  4. Ventfabrics, Inc.
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.
- C. Flexible Duct Connections: Fabric crimped into metal edging strip.
1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz/sq yd.
    - a. Net Fabric Width: Approximately 2 inches wide.
  2. Metal: 3 inches wide, 24 gauge, 0.0239-inch-thick galvanized steel.

## **2.05 MISCELLANEOUS**

- A. Air Pressure Sensing Switch:
1. Sensing switch intended for positive, negative, or differential air pressure. Switch to be UL listed with an adjustable set point range.
  2. Manufacturer:
    - a. Cleveland Controls or approved equal.
- B. Louvers:
1. Combination Louver with gravity damper. Louver to have drainable stationary blades, integrated multi-blade gravity backdraft dampers, provisions for insect or bird screen, and a filter rack
  2. Frame:
    - a. Material: Extruded aluminum, alloy 6063-T6
    - b. Wall thickness: 0.081 inch nominal.
  3. Blades:
    - a. Style: drainable
    - b. Wall thickness: 0.081 inch nominal
    - c. Material: Extruded aluminum, alloy 6063-T6
  4. Backdraft Damper Blades:
    - a. Style: Gravity
    - b. Material: .025 formed aluminum 3003 alloy with blade edge seals.
  5. Free Area: 40% nominal
  6. Accessories:
    - a. Aluminum Filter Racks: Formed channel racks to accept standard thick filters. Unused bottom portion blanked off with 0.040 inch (1 mm) aluminum sheet.
    - b. Insect Screen: Aluminum 18-16 mesh, mill finish, .011 inch wire with aluminum frame.
  7. Finish: Prime Coat
    - a. Apply alkyd prime coat following chemical cleaning and pretreatment.
    - b. Primer preparation for field painting.
  8. Manufactures:
    - a. Ruskin or approved equal.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). See Section 23 31 00 for duct construction and pressure class.
- B. Provide duct test holes where indicated and required for testing and balancing purposes.

- C. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
- D. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- E. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly. Locate dampers as far upstream as possible and in accessible locations.

**END OF SECTION 23 33 00**

## **SECTION 23 34 16 CENTRIFUGAL HVAC FANS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. In-line centrifugal fans.
- B. Bearings and drives.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 23 05 13 - Common Motor Requirements for HVAC Equipment.
- B. Section 23 05 48 - Vibration and Seismic Controls for HVAC.
- C. Section 23 33 00 - Air Duct Accessories: Backdraft dampers.

#### **1.03 REFERENCE STANDARDS**

- A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings.
- B. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program.
- C. AMCA 99 - Standards Handbook.
- D. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating.

#### **1.04 SUBMITTALS**

- A. See Section 23 05 00 - Common Work Results for HVAC for submittal procedures.
- B. Product Data: Provide data on centrifugal fans and accessories including fan curves with specified operating point plotted, power, rpm, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate assembly of centrifugal fans and accessories including fan curves with specified operating point plotted, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.
- D. Manufacturer's Instructions: Include complete installation instructions.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

### **PART 2 PRODUCTS**

#### **2.01 IN-LINE CENTRIFUGAL FANS**

- A. Manufacturers
  - 1. Greenheck Fan Corporation.



2. Loren Cook Company
3. PennBarry, Division of Air System Components
4. Twin City Fan & Blower.

## **2.02 PERFORMANCE REQUIREMENTS**

- A. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.

## **2.03 WHEEL AND INLET**

- A. Backward Inclined: Steel or aluminum construction with smooth curved inlet flange, heavy back plate, backwardly curved blades welded or riveted to flange and backplate; cast iron hub riveted to back plate and keyed to shaft with set screws.

## **2.04 MOTOR TYPE**

- A. EC motor.

## **2.05 HOUSING**

- A. Galvanized steel, spot welded for AMCA 99 Class I and II fans, and continuously welded for Class III, adequately braced, designed to minimize turbulence with spun inlet bell and shaped cut.
- B. Factory finish before assembly to manufacturer's standard.

## **2.06 BEARINGS**

- A. Bearings: Ball bearing motor.

## **2.07 CONTROLS**

- A. Provide A H wall disconnect switch for fan.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install flexible connections between fan inlet and discharge ductwork; see Section 23 33 00. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.
- C. Install fan restraining snubbers. Adjust snubbers to prevent tension in flexible connectors when fan is operating.

**END OF SECTION 23 34 16**

## **SECTION 26 05 00**

### **GENERAL ELECTRICAL**

#### **PART 1 GENERAL**

##### **1.01 DESCRIPTION**

- A. The General Provisions, Supplementary Conditions, and related work in other Sections apply for all work in Section 26.

##### **1.02 SCOPE OF WORK**

- A. This section specifies general requirements for electrical work. Detailed requirements for specific electrical items are specified in other sections, but are subject to the general requirements of this section. The electrical drawings and schedules included in this project manual are functional in nature and do not specify exact locations of equipment or equipment terminations. It is the intent of this Section of the Specifications and the accompanying drawings to describe and provide for the furnishing, installing, testing and placing in satisfactory and fully operational condition all equipment, materials, devices and necessary appurtenances to provide a complete electrical system, together with such other miscellaneous installations and equipment hereinafter specified and/ or shown on the drawings. The work shall include all materials, appliances and apparatus not specifically mentioned herein or shown on the drawings, but which are necessary to make a complete, fully operational installation of all electrical systems shown on the drawings or described herein. Equipment and devices furnished and installed under other Sections of this specification shall be connected under this Section. The drawings and specifications are complementary and what is called for in either is binding as if called for in both.
- B. This project may include installation of packaged equipment system(s) or sub-system(s) that will require coordination between the Contractor and the manufacturer to determine the detailed installation requirements. The Engineer has shown general installation information for these systems based on the best information available at the time of design. Where indicated on the drawings to 'provide a complete and operational system' the Contractor shall provide all materials, installation, and coordination with the manufacturer so the equipment is installed and operates in a satisfactory manner. Minor changes in equipment locations, quantity of terminations or wires, junction boxes, conduit, etc shall be included in the Contract price.
- C. See all other Sections of these specifications for work in other areas and disciplines related to this project.

##### **1.03 GENERAL DESCRIPTION OF ELECTRICAL WORK**

- A. The Contractor shall provide all labor, material, tools, equipment and services required to complete the furnishing, installation, wiring, connection, calibration, adjustment, testing and operation of all electrical equipment, devices and components as indicated and implied by the drawings and specifications. General descriptions include:

1. Complete the procurement, installation, wiring, connection, calibration, adjustment, testing and operation of all electrical devices, components, accessories and equipment that is not shown or specified but which is nonetheless required to make the systems shown and specified function properly.
2. Install all equipment so it shall be readily accessible for maintenance. Installations shall have electrical clearances in accordance with NEC and shall be installed in locations that will provide adequate cooling.
3. Check electrical equipment prior to installation so that defective equipment is not installed.
4. Provide field services of qualified technicians to supervise and check out the installation of the equipment, to supervise and check out interconnecting wiring, to conduct start-up of operation of the equipment, and to correct any problems that occur during start-up.
5. Provide circuit breakers, conduit, wire and installation for all items that require electrical power.

#### 1.04 PROJECT DESCRIPTION

- A. This project shall consist of the Phase 2 of construction of process improvements and facility improvements at the Eastsound Waste Water Treatment Plant (WWTP) located on Orcas Island, WA.
- B. The major electrical work shall include, but not limited to:
  1. Area 100 - 2w system:
    - a. Construction of new enclosure for 2W bladder tanks and pressure sensor.
    - b. Provide new receptacle and heat tape for exposed water piping.
    - c. Relocate pressure sensor to new location as shown on civil plans.
  2. Area 200 - Influent:
    - a. Provide new digital display in influent control panel for Train no.1 flow display and panel modifications shown on the drawings.
    - b. Provide new AC cooling unit for influent control panel as shown on the drawings.
  3. Area 300 - Biotreatment systems:
    - a. Provide all electrical and controls for the complete replacement of Trains 1 and 2 including new clarifier drives, mixers, instrumentation, controls, lighting and power distribution.
    - b. Install local control panels from manufacturer, power feeders from MCC, and new PLC control panel located in new dewatering building.

4. Area 400 - Effluent/UV system:
  - a. No electrical work anticipated.
5. Area 500 - Biosolids Facility:
  - a. Construction of new dewatering building including packaged equipment systems, ventilation system, power distribution, lighting, PLC control panel, new 480V and 208Y/120V lighting panels, transformer, gas sensors.
  - b. New sludge conveyor, level indicator and hoist system.
  - c. New Dewatering sump pump with float switches and control panel.
6. Area 600 - Plant drain system:
  - d. No electrical work anticipated.
7. Area 700 - Blower building:
  - a. New MCC bucket with 100A circuit breaker and 480V feeder to new Dewatering building.
  - b. Two new 30A 480V feeders from existing MCC breakers to new Train control panels.
  - c. Extend power and control circuits to new equipment as required.
8. Area 800 - Control building:
  - d. Electrical upgrades for lab renovation including new cabinetry, lab equipment, data and power receptacles.
9. Programming and commissioning of all new PLC, operator interface and SCADA system hardware and software for Phase 2 project components.
10. Installation of packaged equipment and treatment systems.
11. All other electrical work as shown on the drawings.

#### 1.05 ELECTRICAL CONTRACTOR MINIMUM QUALIFICATIONS

- A. The Electrical Contractor shall have a minimum 5 years of experience with having performed similar construction installations.
- B. Provide a summary of qualifications with the bid form, including Owner, project description, and summary of electrical equipment manufacturer and ratings that shows similar project experience.

#### 1.06 CODES AND REGULATIONS

- A. The electrical systems shall be installed based on the following current Standards:

1. NFPA 70 - National Electrical Code - current version as adopted by Washington State Department of L&I.
  2. Washington Administrative Code (WAC) chapter 296-46B.
  3. Building Codes - International Conference of Building Officials as adopted and amended by the Local Jurisdiction.
- B. The Contractor is required to familiarize himself with the detailed requirements of these standards and any local codes and ordinances as they affect the installation of specific electrical systems.
- C. Identification of Listed Products
1. All materials and equipment specified herein shall be within the scope of Nationally Recognized Testing Laboratory (NRTL) examination services, be approved by the NRTL for the purpose for which they are used, and shall bear the appropriate listing label.
  2. Equipment listed/labeled by an NRTL shall be as dictated by the latest printing of the Electrical Testing Laboratories Accreditation Report available from the State of Washington Department of Labor and Industries, Electrical Inspection Division. Any NRTL listing/labeling shall be as accepted by the local authority having jurisdiction.
  3. When a product is not available with a testing laboratory listing for the purpose for which it is to serve, the product may be required by the inspection authority to undergo a special inspection at the manufacturer's place of assembly. All costs and expenses incurred for such inspections shall be included in the original contract price.
  4. All skid mounted and packaged equipment systems shall be labeled in accordance with the requirements of the State of Washington Department of Labor and Industries, Electrical Inspection Division.
  5. Where field modifications require field inspection for listing/labeling, the Contractor shall be responsible for all field inspection fees for listing/labeling of all final modified electrical assemblies.
- D. Thermal ratings of equipment terminations
1. All materials shall conform to the National Electrical Code Article 110-14C. Wiring and circuit breakers on this project are designed for 75 deg C operation above 100 amperes; 60 deg C for 100 amperes and below.
  2. All products furnished on this project shall have electrical terminations rated for 60 deg C for ampacities of 100 amperes and below, and rated for 75 deg C for ampacities above 100 amperes.

#### 1.07 PERMITS AND FEES

- A. The Contractor shall obtain and pay for all licenses, permits and inspections required by laws, ordinances and rules governing work specified herein.
- B. The Contractor shall arrange for inspection of work by the inspectors and shall give the inspectors all necessary assistance in their work of inspection.

#### 1.08 COORDINATION

- A. The Contractor responsible for accomplishing Section 26 work shall coordinate his work with that of the other Contractors and/or other trades doing work on the project and shall examine all drawings and specifications of other trades for construction details and necessary coordination.
- B. Obtain submittals and shop drawings of all equipment with electrical connections furnished under other Sections of the specifications. Provide all wiring in accordance with requirements indicated. Advise the Engineer of any changes which may affect the contract price.
- C. Special attention is called to the following items and all conflicts shall be coordinated prior to installation:
  - 1. Location of pipes and equipment so that all electrical equipment, lighting fixtures and other electrical outlets and equipment are clear from and in proper relation to these items.
  - 2. Recessing and concealing electrical materials in CMU walls, concrete construction and similar construction methods.
  - 3. Electrical characteristics (HP, KVA, voltage, phase) of actual equipment furnished under other Sections being different from that shown on the electrical drawings.
- D. The Contractor will not be paid for relocation of work, cuttings, patching and finishing required for work requiring reinstallation due to lack of coordination prior to installation.

#### 1.09 SITE FAMILIARIZATION

- A. The Contractor shall become familiar with all features of the site which may affect the execution of the work prior to submitting a bid.
- B. The Contractor shall take all field measurements necessary for the work and shall assume full responsibility for their accuracy.
- C. The Contractor shall take full responsibility for locating and avoiding all substructures and utilities. Any damage to existing equipment or utilities shall be repaired or replaced by the Contractor at the Contractors expense.

#### 1.010 AREA CLASSIFICATIONS

- A. The following classification of areas shall be used as a reference in determining application of material covered by this Section unless specifically shown otherwise on the drawings.
  - 1. Outdoor, Damp or Corrosive Areas:

- a. Raceways shall be PVC coated Galvanized Rigid Steel conduit (PGRS), stainless steel, or as shown on the drawings. Conduit entrances shall be threaded and fittings shall have gasketed covers.
  - b. Threaded fastening hardware and rods shall be stainless steel.
  - c. Raceway supports such as channel, clamps, and brackets shall be stainless steel.
  - d. Panels and boxes shall be NEMA 4X, 3R or as shown on the drawings. Enclosures shall be mounted 1 inch from walls to provide an air space unless specifically shown otherwise.
  - e. Install liquid tight flexible conduit and fittings for connections to motors and equipment subject to vibration. Use liquid tight flexible non-metallic conduit and fittings.
  - f. Device boxes shall be corrosion resistant malleable iron Type FS or FD case boxes with threaded hubs.
2. Below Grade Areas:
- a. Conduits shall be Schedule 40 PVC, or as indicated on the drawings.
  - b. Sweeps and transitions from below to above-grade areas in damp areas shall be PVC coated GRS (OCAL).
3. Hazardous areas: All areas indicated as Hazardous Areas on drawings, or as classified by NFPA 820.
- a. Raceways, junction boxes and sealing fittings shall be installed in accordance with NFPA 70, article 500.
4. General Purpose Areas: All other areas not described above
- a. Raceways shall be GRS.
  - b. Raceways concealed in walls or ceilings for general purpose lighting and receptacle circuits may be EMT.
  - c. Exposed boxes shall be NEMA 12.
  - d. Concealed boxes may be NEMA 1.

#### 1.011 CONTRACT DRAWINGS

- A. Raceways, boxes, and ground connections are shown diagrammatically only and indicate the general character and approximate location. The drawings do not necessarily show the total number of raceways or boxes for the circuits required, nor are the locations of indicated runs intended to show the actual routing of the raceways. The Contractor shall furnish, install and place in satisfactory condition all raceways, boxes, conductors, and connections and all

other materials required for the electrical systems shown or noted in the contract documents to be complete, fully operational and fully tested upon completion of the project.

- B. The drawings do not show all requirements of the specifications. The drawings and specifications are complimentary and what is called for (or shown) in either is required to be provided as if called for in both.
- C. The horsepower of motors and apparatus wattages shown on the drawings are estimated requirements of equipment furnished under other Sections of this contract and bid shall be based on these sizes. Overload elements shall be provided to suit actual equipment nameplate current. Advise Engineer of any equipment changes or substitutions affecting electrical systems.
- D. Any minor changes in the location of the raceways, outlets, boxes, devices, wiring, Utility equipment, etc., from those shown on the drawings shall be made without extra charge.
- E. When inserts or sleeves for outlet boxes, conductor, pump cables and/ or raceways are required, Contractor shall provide and shall fully coordinate the installation with other trades.
- F. Electrical drawings shall be used for construction of electrical systems only. The electrical drawings do not show construction features of other trades.

#### 1.012 ELECTRICAL SUBMITTALS

- A. Electrical submittals shall be submitted in electronic .pdf format, labeled with the project and Contractor's name.
- B. The files shall include an index showing each product being submitted. Submittals shall be clearly identified per the electrical specifications by section and paragraph or equipment.
- C. Each equipment submittal sheet shall clearly indicate the individual equipment name and part number. Submittals shall include:
  - 1. Manufacturer's name, address, and telephone number
  - 2. Trade name, catalog model or number, nameplate data and size clearly indicated
  - 3. Layout dimensions, capacity, project specification and paragraph reference
  - 4. Local manufacturers representative
- D. Submittals shall be largely complete prior to the first submittal. Long lead items may be submitted separately. Each item shall be clearly marked and provided with adequate sales and technical information to clearly show conformance with all aspects of the specification. Packages not provided as described above or largely incomplete shall be returned to the Contractor, without review or comment.
- E. The Contractor shall ensure that the material being proposed conforms to the Contract requirements. In the event of any variance, the Contractor shall state specifically which portions vary and shall request a variance in writing.



- F. The Contractor shall certify that all furnished equipment can be installed in the spaces allocated. Any costs for modifications to door openings etc required to move equipment to the final locations shall be the responsibility of the Contractor.
- G. The Contractor shall provide shop drawings in .pdf format scaled for 11" x 17" paper, and shall be scaled using standard engineering or architectural scales. Wiring diagrams shall identify circuit terminals, and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment.
- H. Failure to submit a specified item does not relieve the Contractor from meeting the requirements of the Specification.
- I. The Engineer will review the original submittal and one re-submittal on each item. Subsequent submittal reviews shall be conducted at the Contractor's expense. The Contractor shall be billed at the Engineer's current hourly rates for these subsequent submittal reviews.

#### 1.013 EXISTING SYSTEMS

- A. Prior to bidding, the existing site, existing site electrical systems and systems adjacent to the work shall be investigated thoroughly.
- B. Any damage resulting from performance of work under this contract shall be repaired to assure continuing operation and integrity during and at completion of the project a no increase in contract cost.
- C. Any existing wiring serving devices to remain in service and which is interrupted by work performed under this contract shall be rerouted to maintain circuit continuity.
- D. Contractor shall assume responsibility for unscheduled interruptions and expedient repair.
- E. The Contractor shall inspect the existing systems prior to bidding and shall make his own judgment as to the work required to provide a complete installation within the intent of the contract documents.

#### 1.014 DEMOLITION WORK

- A. All demolition work required under this contract is not shown on the drawings.
- B. The Contractor shall inspect the existing sites and installations prior to bidding and shall make his own judgment as to the work required to provide complete demolition as shown or within the intent of the contract documents.
- C. Existing equipment, systems, and materials removed during demolition shall be made available for his inspection and decision as to whether the Owner will retain possession. Items selected for retention shall be turned over to the Owner. These items shall be delivered to a location on the premises selected by the Owner.
- D. All material not selected for retention by the Owner and debris shall be legally disposed of by the Contractor.

#### 1.015 CONSTRUCTION POWER

- A. The electrical contractor shall provide a dedicated electrical service for construction power. This includes power for construction equipment, job trailer, and any other construction power needs.
- B. The coordination with the serving electrical utility and all associated costs for the temporary construction power equipment and installation shall be provided and paid for by the Contractor.
- C. The Contractor shall pay the for the energy costs as billed by the utility on the construction power meter.

#### 1.016 FACILITY DOWNTIME LIMITATIONS

- A. The work for this project is at an existing operational wastewater treatment facility. Contractor shall maintain power to the facility at all times during construction.
- B. Power interruptions will be required during the upgrade of the electrical service. A minimum of one week notification to the Eastsound Sewer and Water District is required prior to any utility service disruption.
- C. Contractor must provide all required temporary equipment (power generator, pumps, piping, etc.) and submit a schedule and written plan for all wastewater treatment plant disruptions that will last longer than 20 minutes. The plan shall require written approval by the Owner and Engineer prior to the service disruption.

#### 1.017 RECORD DRAWINGS

- A. The Contractor shall record the actual electrical system installation on a set of prints kept readily available at the project during construction. These prints shall be used for this purpose alone. Accurately locate with exact dimensions all underground and under slab raceways and stub-outs. At the completion of the work, Contractor shall furnish the Engineer a set of record drawings and the set of markups. Final payment to the Contractor will not be authorized until these prints have been submitted to and accepted by the Engineer. The contractor shall maintain one set of record drawings at the job showing any deviations in the electrical systems from the original design.
- B. Markings shown on the drawings shall conform to the following color coding conventions:
  - 1. Red - Additions or changes showing placement different than shown on the original drawings
  - 2. Green - Deletions or modifications depicting placements different than shown on the original drawing
  - 3. Blue - Notes and Dimensional data showing exact placement of concealed or buried equipment, raceways, etc.

#### 1.018 WARRANTY

- A. The Contractor shall guarantee all work installed under this specification. He shall repair or replace, at his own expense, defective work, materials or parts which are identified within one year after final acceptance.

## **PART 2 PRODUCTS**

### **2.01 GENERAL**

- A. All materials must be new, free from defects and not less than the quality herein specified.
- B. Each type of materials furnished shall be of the same make and shall be of the standard products or manufacturers regularly engaged in the production of such materials and shall be the manufacturer's latest standard design.
- C. All materials and equipment installed shall have been tested and listed by Underwriters Laboratories or other approved testing organization and shall be so labeled unless otherwise permitted by the Code Inspector (AHJ).

### **2.02 NAMEPLATES**

- A. Nameplates shall be provided on all electrical devices. This includes motor control equipment, MCC buckets, control stations, junction boxes, panels, motors, instruments, switches, indicating lights, meters, and all electrical equipment enclosures.
- B. Nameplates shall be made of 1/16" thick machine engraved laminated phenolic having engraved black filled letters not less than 3/16" high on white background.
- C. Warning nameplates shall be provided on all panels and equipment which contain multiple power sources or which may have energized circuits with the main disconnecting means in the off position. Lettering shall be white on red background.
- D. All nameplates shall be secured to equipment with stainless steel screws or fasteners. Epoxy glue may be used where fasteners are not practical as determined by the Engineer.

### **2.03 OPERATION AND MAINTENANCE (O&M) MANUALS**

- A. The Contractor shall prepare O&M manuals for all equipment furnished under Section 26 of the specifications.
- B. The information included must be the exact equipment installed. Where sheets show the equipment installed and other equipment, the installed equipment shall be neatly and clearly identified on such sheets.
- C. The O&M manuals shall contain all the information needed to operate and maintain all systems and equipment provided in the project. It shall be presented and arranged in the logical manner for efficient use by the Owner's operation personnel. The information provided shall include but not be limited to the following:
  - 1. Equipment manufacturer, make, model number, size, etc.
  - 2. Equipment nameplate data.

3. Description of system configuration and operation including component identification.
  4. Dimensional and performance data for specific unit provided.
  5. Manufacturer's recommended operation instructions.
  6. Manufacturer's recommended lubrication and servicing data.
  7. Complete parts list including reordering information and recommended spares. Parts lists shall give full ordering information assigned by the original parts manufacturer.
  8. Shop drawings and wiring diagrams.
- D. Wiring diagrams for each system shall be complete drawings for the specific system installed under the contract.
- E. Operation and Maintenance Manuals shall be provided as described in Section 01 33 00 – Submittal Procedures.

#### 2.04 HOUSEKEEPING PADS

- A. Provide a concrete housekeeping pad under each floor mounted motor control center and other floor mounted electrical equipment. Pad shall be 3" wider on both ends than base of equipment mounted on it. Minimum height is 3".

### **PART 3 EXECUTION**

#### 3.01 STORAGE AND HOUSEKEEPING

- A. The Contractor shall store all electrical equipment in a dry environment free from dust, moisture, sprays or vapors which may be detrimental to their new condition. After installation of equipment, the Contractor shall take care to protect all equipment from all dust, moisture, paint and other sprays, and harmful vapors.
- B. The premises shall be kept free of accumulated materials, rubbish and debris at all times. Surplus material, tools and equipment must not be stored at the job site. Upon completion of the project, all equipment and fixtures shall be cleaned and in proper condition for their intended use.

#### 3.02 SCHEDULING WORK WITH UTILITIES

- A. The Contractor shall be fully and completely responsible for all scheduling and coordination with the Utility companies, including the electrical utility provider, Orcas Power and Light Cooperative (OPALCO).
- B. The Contractor shall coordinate and schedule power outages, power service for operation and construction, telephone and power service as required by the facility prior to Certificate of Occupancy.

### 3.03 TESTS

- A. The Contractor shall conduct testing for installed feeder cables, motors, and other electrical equipment.
- B. Functional testing of all electrical systems shall be performed. Prior to functional testing, all protective devices shall be adjusted and made operative. Prior to energizing the equipment, the Contractor shall perform a functional checkout of each individual control circuit. Checkout shall consist of energizing each control circuit and operating each control device and verifying that the specified action occurs. The Contractor shall submit a description of the proposed functional test procedures prior to the performance of the functional checkout.

### 3.04 TRAINING

- A. After substantial completion of the work, O&M manuals have been delivered to the owner, all testing is complete and final inspection of the work by the Authority(s) Having Jurisdiction, the Contractor shall demonstrate the electrical systems and instruct the Owner's designated operation and maintenance personnel in the operations and maintenance of the various electrical systems. The Contractor shall arrange scheduled instruction periods with the Owner. The Contractor's representatives shall be knowledgeable in each system and suppliers representatives, when so specified.
- B. Scheduled minimum instruction period at each location shall be:
  - 1. Electrical Systems 8 Hours
  - 2. Control Systems 24 Hours

### 3.05 FINAL ACCEPTANCE

- A. Prior to final acceptance, the Engineer will perform one or more site observation trips to develop a punch list of items deemed incomplete. The Electrical Contractor shall be present while these inspections are taking place and shall be available for opening cabinets and operating and adjusting the system as is necessary for the Engineer to verify all equipment is installed and operates to the requirements of the contract documents.
- B. The Contractor shall complete all items of work, including wire markers, nameplates, final tests and final test reports prior to requesting final acceptance inspections. All equipment shall be checked for proper operation and all signals verified for correct calibration and wiring. Fixtures shall have been cleaned, and burned out or defective lamps shall have been replaced.

### 3.06 STANDARD ABBREVIATIONS

Abbreviation	Definition
Accepted	Reviewed with no exceptions taken to submittal material.
AHJ	Authority Having Jurisdiction
ANSI	American National Standards Institute
Approved	Inspected and accepted by the Authority Having Jurisdiction
ASTM	American Society for Testing Materials
Boxes	Outlet, Junction or Pull Boxes

Code	All codes currently enforced at project location
Compression	Compressed using a leverage powered crimping tool
Connection	All materials and labor required for equipment to be fully operational
CSI	Construction Specifications Institute
EMT	Electrical Metallic Tubing
Exterior	Outside of outer surfaces of the location building
Fully Operational	Tested and approved and operating to the satisfaction of the AHJ, manufacturer and contract documents
Furnish	Purchase and deliver material
Install	Install and make fully operational
kcmil	Thousand circular mils (also MCM)
Mfr	Manufacturer
NEC	National Electric Code NFPA #70 current revision as adopted by AHJ
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
Noted	Shown or specified in the contract documents
PVC	Polyvinyl Chloride
Provide	Furnish and install
RGS, GRS	Rigid Galvanized Steel
Required	As required by code, AHJ, or contract documents for the installation to be fully operational
Shop Drawing	Hand drafted document which fully details the equipment and intended installation relative to this specified project
Shown	As indicated on the drawings or details
Submittal	Material for Engineer review which may include catalog cuts, shop drawings, wiring diagrams, etc., of the actual material being furnished.
UL	Underwriters Laboratories, Inc.
Wiring	Raceway, conductors and connections

\*\*\* END OF SECTION \*\*\*

## **SECTION 26 05 19**

### **LOW VOLTAGE WIRE AND CABLE**

#### **PART 1 GENERAL**

##### **1.01 DESCRIPTION**

- A. This section specifies conductors and cables rated to 600 volts used for power, lighting, receptacle, signal, and control circuits.

#### **PART 2 PRODUCTS**

##### **2.01 GENERAL**

- A. With the exception of lighting, communication, paging, security and receptacle circuits, the type, size and number of conductors shall be as specified on the drawings or schedules. Lighting and receptacle circuit conductors are unscheduled and shall be sized by the Contractor in accordance with the NEC to limit voltage drop to 3 percent. Number and types of communication, paging, and security cables shall be as required for the particular equipment provided.

##### **2.02 LIGHTING AND RECEPTACLE BRANCH CIRCUIT CONDUCTORS**

- A. Lighting and receptacle conductors shall be stranded except for 12 AWG which shall be solid. Minimum conductor size shall be 12 AWG.
- B. Conductors shall be provided with the following characteristics:
  - 1. Voltage: 600 volts
  - 2. Conductor: Bare soft annealed copper, Class B stranded per ASTM-8; solid per ASTM B-3
  - 3. Insulation: THWN/THHN, 90 degree C dry, 75 degree C wet polyvinylchloride (PVC)
  - 4. Jacket: Nylon
  - 5. Flame resistance: UL 83
  - 6. Manufacturer: Okonite; Southwire; or equal

##### **2.03 POWER AND CONTROL CONDUCTORS AND CABLE, 600 VOLT**

- A. Single Conductor:
  - 1. Single conductor cable shall be stranded and shall be used in conduits for power and control circuits.

2. Conductor shall be provided with the following characteristics:
  - a. Voltage 600 volts
  - b. Conductor: Uncoated, soft annealed copper, Class B stranded per ASTM B-8
  - c. Insulation: Power #6 AWG and larger: XHHW-2, 90 degrees C cont. rating, wet or dry.
  - d. Power up to #6 AWG: THHN/THWN, 90 degrees C cont. rating, wet or dry
  - e. Control: THHN/THWN, 90 degrees C cont. rating, wet or dry
  - f. Flame resistance: UL 83
  - g. Manufacturer: Okonite, Southwire; Anaconda; or equal

#### 2.04 CONNECTORS

- A. Pre-insulated Connectors for splices and taps in conductors 10 AWG and smaller shall be Ideal Industries "Wing Nut" or 3M Company "SCOTCHLOCK", or equal. For 8 AWG and larger conductors shall be T&B compression connectors, or equal. Compress using manufacturers recommended die and tools.
- B. Waterproof silicone filled "wing nut" type connectors or spade/lug type terminations and terminals and coat with liquid insulation shall be used for all connections of wire to cord to removable equipment provided with integral cords (such as floats, transmitters, limit switches, etc.) in junction boxes in underground hand holes or outdoor junction boxes. Insulators shall be Thomas and Betts multi splice insulator MSLT112-4, or equal.

#### 2.05 SPLICE INSULATION

- A. Splice insulation shall be equal or greater than the insulation level of the conductor used.
- B. All permanent splices that are underground or in damp or corrosive environments shall be insulated with cast epoxy type insulation which covers the jacket of all cords and the insulation on all wire. Epoxy splice shall be Scotch #3570 or equal.

#### 2.06 WIRING SCHEDULE

- A. Refer to cable schedule for description of conductors required.

#### 2.07 MOTOR TERMINAL SPLICE INSULATION

- A. Motor terminal splice insulation in the motor connection box shall be provided which will withstand constant vibration and abrasion without degrading the insulation of the splice. A product shall be used that is specifically designed for the purpose of motor terminations in accordance with the following:



1. Motor splices in general purpose areas: bolted splice with a TY-RAP boot type insulator, Thomas and Betts Splice insulator Series MSC, or equal. Splices using wire larger than 8 AWG may be heat shrinkable motor connection stub splices, Raychem, MCK-V series, or equal.
2. Motors in outdoor, damp, or corrosive environments: waterproof motor stub insulator, Thomas and Betts multi splice insulator MSLT112-4, or equal. Splices using wire larger than 8 AWG may be heat shrinkable motor connection stub splices, Raychem, MCK-V series, or equal.

## 2.08 WIRE MARKERS

- A. Field installed wire markers shall be T&B SMS pre-printed clip-on markers, or equal.

## PART 3 EXECUTION

### 3.01 GENERAL

- A. Each power and control conductor shall be identified at each terminal to which it is connected.
- B. Pulling wire and cable into conduit or trays shall be completed without damaging or putting undue stress on the cable insulation. Soapstone, talc or UL listed pulling compounds are acceptable lubricants for pulling wire and cable. Grease is not acceptable. Raceway construction shall be complete, cleaned, and protected from the weather before cable is placed in the raceway.

### 3.02 600 VOLT CONDUCTOR AND CABLE

- A. Conductors in panels and electrical equipment, 6 AWG and smaller, shall be bundled and laced at intervals not greater than 6 inches, spread into trees and connected to their respective terminals. Lacing shall be made up with plastic cable ties. Lacing is not necessary in plastic panel wiring duct. Conductors crossing hinges shall be bundled into groups not exceeding 12 and shall be so arranged that they will be protected from chafing when the hinged member is moved.
- B. Slack shall be provided in junction and pull boxes and hand holes. Slack shall be sufficient to allow cables or conductors to be routed along the walls of the box. Amount of slack shall be equal to largest dimension of the box. Where plastic panel wiring duct is provided for wire runs, lacing is not required.
- C. Solid wire shall not be lugged, nor shall electrical spring connectors be used on any except for solid wires in lighting and receptacle circuits. Lugs and connectors shall be installed with a compression tool.
- D. All splices and terminations are subject to inspection by the Engineer prior to and after insulating. Terminations at 460-volt motors shall be made by bolt-connecting the lugged connectors. Connections shall be insulated and sealed with factory-engineered kits. Bolt connection area shall be kept free of mastics and fillers to facilitate rapid stripping and re-entry. Motor connection kits shall accommodate a range of cable sizes for both in-line

and stub-type configurations. Connection kits shall be independent of cable manufacturer's tolerances.

- E. In-line splices and tees, where approved, shall be made with tubular compression connectors and insulated as specified for motor terminations, except that conductors 10 AWG and smaller may be spliced using self-insulating connectors. Splices and tees in underground handholes or pull boxes shall be insulated using Scotch-cast epoxy resin splicing kits. Terminations at devices with 120 volt pigtail leads shall be made using self-insulating tubular compression connectors.
- F. Terminations at solenoid valves, 120 volt motors, and other devices furnished with pigtail leads shall be made using self insulating tubular compression connectors.
- G. In the case where multiple field located instrumentation and control devices require parallel or series wiring configuration, it shall be done at one location in one junction box with terminals. Interconnection of instrumentation and control devices shall not be done within conduit bodies (i.e. LBs, condulets, etc.)
- H. Provide shielded power cable for leads extending from VFDs to motors, where indicated.

### 3.03 SIGNAL CABLING

- A. Circuit runs shall be of individually shielded twisted pairs or triads. In no case shall a circuit be made up using conductors from different pairs or triads. Triads shall be used wherever 3-wire circuits are required. Terminal blocks shall be provided at instrument cable junctions unless otherwise specified. Signal circuits shall be run without splices between instruments, terminal boxes, or panels.
- B. Shields shall not be used as a signal path, except for coaxial cable circuits operating at radio frequencies.
- C. Unless otherwise specified, shields shall be bonded to the signal ground bus at the control panel and isolated from ground and other shields at other locations. Terminals shall be provided for running signal leads and shield drain wires through junction boxes.
- D. Spare circuits shall be terminated on terminal blocks at both ends of the cable run and be electrically continuous through terminal boxes. Shield drain wires for spare circuits shall not be grounded at either end of the cable run. Terminal boxes shall be provided at instrument cable splices. If cable is buried or in raceway below grade at splice, an instrument stand shall be provided as specified with terminal box mounted approximately 3 feet above grade.
- E. Cable for paging, telephone, and security systems shall be installed and terminated in compliance with the manufacturer's recommendations.

### 3.04 COLOR CODING

- A. Wiring shall conform to the following color code, unless otherwise specified.

- B. Insulation on phase conductor sizes 8 AWG and smaller shall be colored, 6 AWG and larger may have black insulation with plastic tape of the appropriate color from the table below.
- C. Insulation on the grounded conductor (neutral) sizes 6 AWG and smaller shall be colored; 4 AWG and larger may have black insulation with plastic tape of white or gray in accordance with the table below.

Description	208Y/120V	480Y/277V	Control
Phase A (Left, Top, Front)	Black	Brown	--
Phase B (Center, Center, Center)	Red	Orange	--
Phase C (Right, bottom, Back)	Blue	Yellow	--
Neutral	White	Gray	White
Ground	Green	Green	Green
120 VAC Control	--	--	Red
120 VAC Control	Neutral	--	White
DC Control (+)	--	--	Blue
DC Control (-)	--	--	Blue/Wht Stripe
External Source	--	--	Yellow

- D. All control wiring in control panels or other enclosures that is powered from an external source and is not disconnected by the control panel disconnect shall be terminated at a disconnecting terminal block upon entering the enclosure. The color of the wire shall then be changed to yellow to identify it as being powered from an external source. Provide identification nameplate on exterior of enclosure to indicate sources of external power.

### 3.05 TERMINAL MARKING

- A. All terminals in instrument and relay compartments, motor control centers, in control panels, instrument panels, field panels and control stations, as well as connections to mechanical equipment shall have reference number and letter.

### 3.06 WIRE BENDING RADIUS

- A. The radius of bends in all non-shielded wire (conductors and cables) shall not be less than eight (8) times the outside diameter of the wire. Shielded or lead covered wire shall not be bent to a radius less than twelve (12) times the diameter of the wire. Any wire installed with bends less than the allowed diameter and which the Engineer deems has caused that insulation to be damaged, shall be removed and new wire shall be installed.

### 3.07 GENERAL TESTS

- A. The Contractor shall perform voltage, current and resistance tests as required in this section. Test reports shall be submitted to the Engineer prior to final acceptance by the

Owner. The Contractor shall inform the Engineer of scheduled testing a minimum of 5 days prior to the testing.

- B. The Contractor shall undertake all such corrective measures if the test results indicate corrective measures are required. No additional compensation will be paid for corrective measures

- C. Test Scope

- 1. The Contractor shall provide all material, equipment, labor and technical supervision to perform tests and inspections as specified herein.
  - 2. It is the intent of these tests to assure that all electrical equipment as supplied and installed by the Contractor is operational within the industry and manufacturer's tolerances and is installed in accordance with the design documents.
  - 3. The tests and inspection shall determine the suitability for energization.

- D. Conductor Tests

- 1. Following the completion of installation, the following conductors shall be tested:
    - a. All power feeders scheduled in Conduit and Cable Schedule.
    - b. Service conductors and feeder conductors
    - c. All new grounding; measure ground resistance at each ground rod.

- E. Visual and Mechanical Inspections

- 1. Inspect exposed section for physical damage.
  - 2. Verify cable is supplied and connected in accordance with specifications and one line diagram, and that phases are labeled correctly.

- F. Electrical Tests

- 1. Perform insulation resistance test on each cable in reference to ground and adjacent conductors in the same raceway.
  - 2. Perform continuity test to ensure proper cable connection.
  - 3. Perform thermal imaging inspection on all power terminations.

- G. Test Values

- 1. Insulation resistance tests shall be performed at 1000 volts DC for one-half minute.
  - 2. Minimum megger readings at 20 degrees C shall be one megohm.

3. The maximum acceptable reading for an individual ground rod shall be 25 ohms as required by the NEC and measured by the three rod method. The composite ground electrode shall have a maximum acceptable reading of 15 ohms.

\*\*\* END OF SECTION \*\*\*

## **SECTION 26 05 26**

### **GROUNDING AND BONDING**

#### **PART 1 GENERAL**

##### **1.01 SCOPE OF WORK**

- A. This specification describes the requirements for the grounding of electrical systems and equipment.
- B. Installation shall be in accordance with the National Electrical Code (NEC).

#### **PART 2 PRODUCTS**

##### **2.01 MATERIALS**

- A. Ground wire: Soft drawn bare stranded copper wire, sized as noted on the drawings.
- B. Terminals and connectors: Burndy Hyground compression system.
- C. Exothermic type weld: Erico Cadweld process, or Fuseweld/T&B corp. Exothermic welding system.
- D. Rod Electrodes: Copper clad (minimum 0.010 jacket) ground rods minimum 3/4" diameter x 8' long.
- E. Grounding Electrode conductors and bonding conductors: Copper conductors, bare or insulated, as shown on drawings.

#### **PART 3 EXECUTION**

##### **3.01 PREPARATION**

- A. All contacting surfaces of ground connections shall be cleaned to bright metal before connection is made.

##### **3.02 INSTALLATION**

- A. Grounding conductors: Install in PVC conduit where subject to damage. All grounding conductors smaller than #6 AWG must be protected.
- B. Connections and splices: Provide as required and as shown on drawings.
- C. Connections, taps, and splices shall be made by compression connectors, Burndy Hyground compression system.
- D. Provide equipment grounding conductor in all PVC conduits.

\*\*\* END OF SECTION \*\*\*

## **SECTION 26 05 33 – RACEWAYS AND BOXES**

### **PART 1 GENERAL**

#### **1.01 DESCRIPTION**

- A. This section specifies raceways for electrical conductors including fittings and supports. Raceways shall be provided for power, control, instrumentation, grounding, lighting, receptacles, and signaling systems. Raceways consist of conduits, tubing, and tray systems. For the purpose of this specification, conduit and tubing is described collectively as conduit.

### **PART 2 PRODUCTS**

#### **2.01 GENERAL**

- A. Material
  - 1. All materials shall be new, free from defects, of current manufacture, of quality specified or shown. Each type of material shall be of the same manufacturer throughout the work.
- B. Unscheduled Raceway
  - 1. With the exception of lighting, communication, paging, security and receptacle circuits, the type and size of raceway shall be as specified on the drawings or schedules. Lighting and receptacle raceway are unscheduled and shall be sized by the contractor in accordance with the NEC. Minimum size shall be 1/2 inch for exposed and 1 inch for embedded raceway.
- C. Scheduled Raceway
  - 1. The size and type of raceway shall be as specified on the drawings or schedules. In case of conflicts between the drawings and paragraph 3.1, the drawings shall prevail.

#### **2.02 RACEWAY**

- A. Application – also see Area Classifications Section 26 05 00.1.10.
  - 1. All above-ground exterior conduit on this project shall be PVC coated Galvanized Rigid Steel conduit, aluminum, or stainless steel.
  - 2. Exposed conduit, boxes and fittings in the Dewatering building shall be PVC coated Galvanized Rigid Steel conduit, aluminum, or stainless steel.
  - 3. Connections to vibrating equipment or motors shall be liquid-tight flexible metallic conduit with PVC fittings.



4. Underground power, control and telephone conduits shall be schedule 40 PVC. (All sweeps and risers for transition from below grade to above grade shall be PVC coated, GRS), unless indicated otherwise.
- B. Rigid Steel Conduit (RGS)
1. Rigid conduit shall be steel, hot dipped galvanized. Final conduit terminations shall be by means of threaded hubs or double locknuts and insulating grounding type bushings.
- C. Liquid Tight Flexible Metallic Conduit
1. Flexible conduit shall be interlocking single strip, hot dipped galvanized and shall have a polyvinyl chloride jacket extruded over the outside to form a flexible watertight raceway.
- D. Nonmetallic Conduit
1. Nonmetallic conduit shall be rigid PVC, Schedule 40 or 80. Fittings shall be of the same material as the raceway and installed with solvent cement per the manufacturer's instructions. Conduit, fittings and solvent cement shall all be manufactured by the same manufacturer.
- E. PVC Coated Rigid Steel Conduit
1. Conduit shall be hot dip galvanized, then coated with urethane inside and outside, then covered with 40 mil PVC coating. Ocal, or equal.
- F. Aluminum Conduit
1. Aluminum conduit shall be rigid ANSI C80.5, threaded.
- G. Electrical Metallic Tubing (EMT)
1. EMT shall be UL 797 and ANSI C80.3, steel tubing, hot-dip galvanized. EMT fittings shall be ANSI/NEMA FB 1, steel, rain-tight, insulated throat, compression type.

## 2.03 FITTINGS AND BOXES

- A. Material
1. Materials for fittings and boxes shall be chosen to satisfy the requirements of Paragraph 26 05 00.1.10 - Area Classification. All screws, nuts, bolts, and other hardware used with fittings and boxes shall be stainless steel unless installed in general purpose areas.
- B. Unions

1. All unions of the type designated as UNF and UNY and shall be suitable for use in moist atmospheres. Unions used in damp and outdoor areas shall be stainless steel.

C. Locknuts

1. All locknuts used in general purpose areas shall be extra heavy steel electroplated with zinc for sizes  $\frac{3}{4}$  inch to 2 inches. Locknuts larger than 2 inches shall be of malleable iron, electroplated with zinc. Locknuts used in damp and outdoor areas shall be stainless steel. Locknuts in corrosive areas shall be FRP.

D. Bushings

1. All bushings shall be steel or malleable iron threaded type electroplated with zinc or hot-dip galvanized. Bushings shall have a molded-phenolic or nylon insulating collar. Bushings used in damp and outdoor areas shall be stainless steel.
  - a. Grounding Bushings: Grounding-type bushings shall have a projecting portion drilled for the size grounding cable used and shall be provided with a clamp or set screw for securing the cable. In addition, a set screw shall be provided to securely lock the bushing to the conduit. Grounding bushings shall be GEDNEY Type IBC-L-BC, or T&B No. 3870 through 3880, or T&B BG Series, or equal.
  - b. Bushed Openings: Bushings for protection of cables passing through metal boxes or troughs shall all be phenolic type and shall be OZ Type ABB, or equal.
  - c. Hubs for connection of conduit to boxes shall be of zinc. Hubs for use in damp or corrosive areas shall be non metallic or aluminum to match the raceway. The hubs shall provide a liquidtight connection to the box and an insulating bushing for the wiring. Hubs shall be Thomas and Betts bullet type, or equal.

E. Liquidtight Flexible Metallic Conduit Connectors:

1. Connectors for liquidtight flexible metallic conduit shall be electroplated zinc malleable iron. An O-ring gasket and an approved grounding insert shall be part of the unit. Where applicable, 45 degree and 90 degree fittings may be used. Liquid-tight connectors shall be by O.Z. GEDNEY, or equal.

F. Expansion Fittings

1. Expansion fittings in exposed runs shall be weatherproof type and shall be provided with an external bonding jumper. The expansion fittings shall allow for 4 inch longitudinal movement and shall be designed so that when completely assembled the end of each conduit entering the fitting is bushed. Fittings shall be O.Z. GEDNEY Type EX, or equal.
2. Deflection fittings in embedded runs shall be of the watertight type and shall be provided with an internal bonding jumper. The expansion material shall be neoprene and shall allow for  $\frac{3}{4}$  inch movement in any direction. Fittings shall be O.Z. GEDNEY Type DX, or equal.

#### G. Junction Boxes

1. Junction boxes, device boxes, fixture support boxes, oblong, round and rectangular conduit fittings (condulets) shall be of the same material as required by the area classification for the raceway. Junction boxes for use in general purpose areas shall be zinc electroplated cast ferrous alloy. Integrally cast threaded hubs or bosses shall be provided for all conduit entrances and shall provide for full 5 thread contact on tightening. Drilling and threading shall be complete before finishing. Boxes shall be Crouse-Hinds type FS, FD, or approved equal.
2. Cover plates shall be of similar cast ferrous alloy material and finish. Full body neoprene gaskets shall be provided with all covers and shall fastened with stainless steel screws.
3. NEMA 12 boxes shall be of heavy gauge sheet steel, or cast metal. All NEMA 12 boxes shall be provided with a 5 mil thick light gray thermo-epoxy finish, and designed so that moisture will drain away from the gasketed cover joint. Covers for sheet steel boxes shall have turned edges, ground smooth to form a tight seal against the gasket when the cover is closed.

### 2.04 CONDUIT & CABLE SUPPORTS

#### A. Conduit Supports

1. Stainless steel framing channel shall be used to support groups of conduit. Individual conduit supports shall be one-hole pipe straps used with stainless steel clamp backs and nesting backs where required. Conduit supports for PVC or epoxy coated rigid steel and PVC conduit systems shall be one hole PVC or epoxy coated clamps or PVC conduit wall hangers.

#### B. Ceiling Hangers

1. Ceiling hangers shall be adjustable stainless steel rod hangers as specified. Straps or hangers of plumber's perforated tape are not acceptable. Unless otherwise specified, hanger rods shall be 1/2-inch all-thread rod and shall meet ASTM A193. Hanger rods in corrosive areas and those exposed to weather or moisture shall be stainless steel.

#### C. Racks

1. Racks shall be constructed from stainless steel framing channel. Channels and hanger rods shall be stainless steel, 1.5 oz. / sq. ft. after fabrication. Channels attached directly to building surfaces shall be 14 gauge minimum thickness, 1-5/8 inch deep.
2. Framing channels on all exterior areas and in corrosive areas shall be aluminum, stainless steel, or fiberglass. All hardware shall be stainless steel. Framing channel shall be as manufactured by Unistrut or equal.

### 2.05 CONDUIT SCHEDULE

- A. Refer to conduit schedule on the drawings for raceway sizing and routing description.
- B. Conduit sizing and conductor quantities shall be adjusted as necessary for minor changes based on equipment submittals, at no additional cost to the Owner.

#### 2.06 CONDUIT TAGS

- A. Conduit tags shall be corrosion resistant and remain legible after exposure to abrasion or aggressive fluids. Tags shall be crosslinked polyolefin construction. Manufacturer shall be Impact Industries, or equal.

#### 2.07 HAND HOLES

- A. Hand holes shall be precast concrete with checker plate, galvanized, traffic covers designed for H-20 loading. Dimensions shall be as specified on the drawings. Hand holes shall be provided with precast solid concrete slab bottoms with sumps, with drains, or as shown on the drawings. Hand holes shall be construction of 3000 psi reinforced concrete.

#### 2.08 UNDERGROUND MARKING TAPE (DETECTABLE TYPE)

- A. Underground marking tape shall be for location and early warning protection of buried power and communication lines. Tape shall be detectable by a pipe / cable locator or metal detector from above the undisturbed ground. Tape shall be nominally 2 inches wide with a type B721 aluminum foil core laminated between two layers of 5 mil thickness polyester plastic. The plastic color shall be red for electrical lines and orange for telephone lines. A warning shall be imprinted continuously along the length, with message reading similar to: "CAUTION - STOP DIGGING - BURIED ELECTRIC (TELEPHONE) LINE BELOW." Tape shall be Brady "Detectable Identoline"; Services and Materials "Buried Underground Tape, Detectable", or equal.

### PART 3 EXECUTION

#### 3.01 CONDUIT

##### A. General

1. The Contractor shall limit the number of directional changes of the conduit to a total not more than 270 degrees in any run between pull boxes. Conduit runs shall be limited to 400 feet, less 100 feet or fraction thereof, for every 90 degrees of change in direction. Bends and offsets shall be avoided where possible but, where necessary, shall be made without flattening or kinking, or shall be factory preformed bends. Turns shall be made with case metal fittings or conduit bends. Welding, brazing or otherwise heating of conduit is not acceptable.
2. Where required for pulling cable and as necessary to meet the requirements of the previous Paragraph, the Contractor shall provide cast junction or pull boxes.
3. Conduit entering NEMA 1 type sheet steel boxes or cabinets shall be secured by locknuts on both the interior and exterior of the box or cabinet and shall have an insulating grounding or bonding bushing constructed over the conduit end.

Conduit entering all other boxes shall be terminated with a threaded hub. Cast boxes and nonmetallic enclosures shall have threaded hubs. Joints shall be made with standard couplings or threaded unions. Metal parts of nonmetallic boxes and plastic coated boxes shall be bonded to the conduit system. Running threads shall not be used in lieu of conduit nipples, nor shall excessive thread be used on any conduit. The ends of conduit shall be cut square, reamed and threaded with straight threads.

4. Unless otherwise specified, conduit entering field equipment enclosures shall enter the bottom or side of the box. Where conduit comes from above, it shall be run down beside the enclosure and a tee conduit and drip leg shall be installed.
5. When new conduit is added to areas which are already painted, the conduit and its supports shall be painted to match the existing facilities. Where new conduit is used to replace existing conduit, the existing conduit and supports shall be removed, resulting blemishes shall be patched and repainted to match original conditions.

#### B. Conduit Support

1. Exposed conduit shall be run on supports spaced not more than 10 feet apart and shall be constructed with runs parallel or perpendicular to walls, structural members, or intersections of vertical planes and ceiling.
2. Where three or more conduits are located in a parallel run, they shall be spaced from the wall using framing channel. Support systems shall be galvanized steel unless otherwise specified.
3. Conduit rack and tray supports shall be secured to concrete walls and ceilings by means of cast-in-place anchors. Individual conduit supports shall use cast-in-place anchors, die-cast, rust-proof alloy or expansion shields. Wooden plugs or plastic inserts are not acceptable as a base to secure conduit supports.

#### C. Conduit Penetrations

1. Unless otherwise specified, conduit routed perpendicular through floors, walls or other concrete structures shall pass through cast-in-place openings wherever possible. In cases where cast-in-place openings are not possible, appropriate size holes shall be bored through the concrete to accommodate the conduit passage. The size and location of the holes shall not impair the structure's integrity. After completion, grout or caulk around conduit and finish to match existing surroundings. Unless otherwise protected, conduits that rise vertically through the floor shall be protected by a 3 1/2-inch high concrete pad with a sloping top.
2. Conduits entering manholes and handholes shall be horizontal. Conduits shall not enter through the concrete bottom of handholes and manholes.
3. Wherever conduits penetrate outdoor concrete walls or ceilings below grade, the Contractor shall provide a watertight seal as manufactured by O.Z. Gedney Co., Type CSM Series; Thunderline Corp., Link Seal; or equal.

4. Wherever conduits enter buildings or structures below grade, seal the conduit opening (after installation of conductors and cables), with conduit sealing material, to prevent water from entering the structure, enclosure, etc. Sealing compound to be a pliable, removable putty-type compound listed for the application.

D. Conduit Separation

1. Signal conduits shall be separated from AC power or control conduits. The separation shall be a minimum of 12 inches.

E. Conduit Seals for Hazardous or Corrosive Areas

1. Each conduit passing from a hazardous or corrosive area into a non-hazardous or non-corrosive area shall be provided with a sealing fitting which may be located on either side of the boundary. The seal shall be located at the boundary in accordance with NEC article 500.
2. Seal fittings for conduit systems in hazardous atmosphere locations shall be hot-dip galvanized case ferrous alloy. Sealing compound shall be hard type, Chico A, or equal, UL listed for explosion-proof sealing fittings. Sealing compound shall be non-hardening type for corrosive areas. Provide reducing bushings and larger seals as required to meet NEC 25% fill.

3.02 HAND HOLES

1. Hand holes shall be set plumb and the tops shall be at finished grade level, or as shown on the drawings.
2. Drainage systems shall be installed to prevent the buildup of standing water inside the hand hole.

\*\*\* END OF SECTION \*\*\*

## **SECTION 26 05 73**

### **POWER SYSTEM REPORTS**

#### **PART 1 GENERAL**

##### **1.01 DESCRIPTION**

- A. Provide the services of a recognized independent testing laboratory or qualified consultant to provide the following power study reports:
  - 1. Short Circuit Report. Includes a computer-based, fault-current study to determine the minimum interrupting capacity of circuit protective devices.
  - 2. Protective Device Coordination Report. Includes a computer-based, overcurrent protective device coordination study to determine overcurrent protective devices and to determine overcurrent protective device settings for selective tripping.
  - 3. Arc Flash Report. Includes a computer-based, arc-flash study to determine the arc-flash hazard distance and the incident energy to which personnel could be exposed during work on or near electrical equipment.
- B. Contractor shall use the electrical distribution and loads as specified on the Drawings for the electrical model to prepare the new reports.
- C. Contractor shall use the actual overcurrent devices and electrical hardware and devices submitted for the project.

##### **1.02 REFERENCE STANDARDS**

- A. Institute of Electrical and Electronic Engineers (IEEE) Publications.
- B. IEEE 1584 – IEEE Guide for Performing Arc-Flash Hazard Calculations.
- C. NFPA 70 – National Electric Code.
- D. NFPA 70E – Standard for Electrical Safety Requirements for Employee Workplaces.

##### **1.03 SUBMITTALS**

- A. Computer software program to be used for studies.
- B. Study Submittals: Submit the following submittals after the approval of system protective devices submittals. Submittals shall be in digital form.
- C. Study input data, including completed computer program input data sheets.
- D. Study reports; signed, dated, and sealed by a qualified Professional Engineer in Washington State.
- E. Submit study reports for action prior to receiving final approval of the distribution equipment submittals. If formal completion of studies cause delay in equipment

manufacturing, obtain approval from Engineer for preliminary submittal of sufficient study data to ensure that the selection of devices and associated characteristics is satisfactory.

#### 1.04 QUALITY ASSURANCE

- A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are unacceptable. Approved software packages are:
  - 1. ETAP
  - 2. SKM
  - 3. EasyPower
  - 4. Other software as approved by Engineer.
- B. Coordination Study Software Developer Qualifications: An entity that owns and markets computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.
- C. The computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.
- D. Coordination Study Specialist Qualifications: Professional engineer in charge of performing the study and documenting recommendations, licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.
- E. Field Adjusting Agency Qualifications: An independent agency, with the experience and capability to adjust overcurrent devices and to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

## PART 2 PRODUCTS

#### 2.01 SHORT CIRCUIT, COORDINATION, AND ARC FLASH REPORTS

- A. Scope of Reports:
  - 1. The report summary shall provide an overall evaluation of the three report sections: Short Circuit Report, Coordination Study, and Arc Flash Study.
  - 2. The executive summary shall list any concerns or problems stated within the individual reports and studies specified within this section.
  - 3. The reports shall include all equipment shown on the one-line diagram, or provided for the project.

#### 2.02 SHORT-CIRCUIT STUDY REPORT CONTENTS



- A. Executive summary.
- B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of the computer printout.
- C. One-line diagram, showing the following:
  - 1. Protective device designations and ampere ratings.
  - 2. Cable size and lengths.
  - 3. Transformer kilovolt ampere (kVA) and voltage ratings.
  - 4. Motor and generator designations and kVA ratings.
  - 5. Switchgear, switchboard, motor-control center, and panelboard designations.
- D. Comments and recommendations for system improvements, where needed.
- E. Protective Device Evaluation:
  - 1. Evaluate equipment and protective devices and compare to short-circuit ratings.
  - 2. Tabulations of circuit breaker, fuse, and other protective device ratings versus calculated short-circuit duties.
  - 3. For 600-V overcurrent protective devices, ensure that interrupting ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
  - 4. For devices and equipment rated for asymmetrical fault current, apply multiplication factors listed in the standards to 1/2-cycle symmetrical fault current.
- F. Short-Circuit Study Input Data: As described in "Power System Data" Article in the Evaluations.
- G. Short-Circuit Study Output:
  - 1. Low-Voltage Fault Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
    - a. Voltage.
    - b. Calculated fault-current magnitude and angle.
    - c. Fault-point X/R ratio.
    - d. Equivalent impedance.
  - 2. Momentary Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
    - a. Voltage.
    - b. Calculated symmetrical fault-current magnitude and angle.
    - c. Fault-point X/R ratio.

- d. Calculated asymmetrical fault currents:
  - 1) Based on fault-point X/R ratio.
  - 2) Based on calculated symmetrical value multiplied by 1.6.
  - 3) Based on calculated symmetrical value multiplied by 2.7.
- 3. Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
  - a. Voltage.
  - b. Calculated symmetrical fault-current magnitude and angle.
  - c. Fault-point X/R ratio.
  - d. No AC Decrement (NACD) ratio.
  - e. Equivalent impedance.

## 2.03 PROTECTIVE DEVICE COORDINATION STUDY REPORT CONTENTS

- A. Executive summary.
- B. Study descriptions, purpose, basis and scope. Include case descriptions, definition of terms and guide for interpretation of the computer printout.
- C. One-line diagram, showing the following:
  - 1. Protective device designations and ampere ratings.
  - 2. Cable size and lengths.
  - 3. Transformer kilovolt ampere (kVA) and voltage ratings.
  - 4. Motor and generator designations and kVA ratings.
  - 5. Switchgear, switchboard, motor-control center, and panelboard designations.
- D. Study Input Data: As described in "Power System Data" Article.
- E. Protective Device Coordination Study:
  - 1. Report recommended settings of protective devices, ready to be applied in the field. Use manufacturer's data sheets for recording the recommended setting of overcurrent protective devices when available.
    - a. Phase and Ground Relays:
      - 1) Device tag.
      - 2) Relay current transformer ratio and tap, time dial, and instantaneous pickup value.

- 3) Recommendations on improved relaying systems, if applicable.
2. Circuit Breakers:
    - a. Adjustable pickups and time delays (long time, short time, ground).
    - b. Adjustable time-current characteristic.
    - c. Adjustable instantaneous pickup.
    - d. Recommendations on improved trip systems, if applicable.
  3. Fuses: Show current rating, voltage, and class.
- F. Time-Current Coordination Curves: Determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices installed in series, including power utility company's upstream devices. Prepare separate sets of curves for the switching schemes and for emergency periods where the power source is local generation. Show the following information:
1. Device tag and title, one-line diagram with legend identifying the portion of the system covered.
  2. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed.
  3. Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.
  4. Plot the following listed characteristic curves, as applicable:
    - a. Power utility's overcurrent protective device.
    - b. Low-voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.
    - c. Low-voltage equipment circuit-breaker trip devices, including manufacturer's tolerance bands.
    - d. Transformer full-load current, magnetizing inrush current.
    - e. Ground-fault protective devices.
    - f. The largest feeder circuit breaker in each motor-control center and panelboard.
  5. Provide adequate time margins between device characteristics such that selective operation is achieved.
  6. Comments and recommendations for system improvements

## 2.04 ARC-FLASH STUDY REPORT CONTENT

- A. Executive summary.
- B. Study descriptions, purpose, basis and scope.

- C. One-line diagram, showing the following:
  - 1. Protective device designations and ampere ratings.
  - 2. Cable size and lengths.
  - 3. Transformer kilovolt ampere (kVA) and voltage ratings.
  - 4. Motor and generator designations and kVA ratings.
  - 5. Switchgear, switchboard, motor-control center and panelboard designations.
- D. Study Input Data: As described in "Power System Data" Article.
- E. Arc-Flash Study Output:
  - 1. Perform the Arc Flash Hazard Study after the short circuit and protective device coordination study has been completed.
  - 2. For each major part of the electrical power system, determine the following:
    - a. Flash hazard protection boundary.
    - b. Limited approach boundary.
    - c. Restricted approach boundary.
    - d. Prohibited approach boundary.
    - e. Incident energy level.
    - f. PPE hazard/risk category.
    - g. Equipment Voltage.
    - h. Type of PPE required.
  - 3. Produce Arc Flash warning labels listing the items above for Contractor installation.
  - 4. Provide labeling at each separately derived system indicating calculated available fault current per NEC Article 110.24.
  - 5. Arc Flash labeling shall conform to the 2021 NFPA 70E and the National Electrical Code (NEC).

### **PART 3 EXECUTION**

#### **3.01 POWER SYSTEM DATA**

- A. Obtain all data necessary for the conduct of the arc-flash hazard analysis.
  - 1. Verify completeness of data supplied on the one-line diagram on Drawings.
  - 2. For new equipment, use characteristics submitted under the provisions of action submittals and information submittals for this Project.
- B. Electrical Survey Data: Gather and tabulate the following input data to support study.

1. Product Data for overcurrent protective devices specified in other Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
2. Obtain electrical power utility impedance at the service.
3. Power sources and ties.
4. For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating, and breaker settings.
5. Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
6. Motor horsepower and NEMA MG 1 code letter designation.
7. Low-voltage cable sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).

### 3.02 SHORT-CIRCUIT STUDY

- A. Perform study following the general study procedures contained in IEEE 399.
- B. Calculate short-circuit currents according to IEEE 551.
- C. Base study on the device characteristics supplied by device manufacturer.
- D. The extent of the electrical power system to be studied is indicated on Drawings.
- E. Begin short-circuit current analysis at the service, extending down to the system overcurrent protective devices as follows:
  1. To normal system low-voltage load buses where fault current is 10 kA or less.
  2. Exclude equipment rated 240-V ac or less when supplied by a single transformer rated less than 125 kVA.
- F. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study all cases of system-switching configurations and alternate operations that could result in maximum fault conditions.
- G. The calculations shall include the ac fault-current decay from induction motors. The calculations shall also account for the fault-current dc decrement, to address the asymmetrical requirements of the interrupting equipment.
  1. For grounded systems, provide a bolted line-to-ground fault-current study for areas as defined for the three-phase bolted fault short-circuit study.
- H. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault at each of the following:
  1. Electric utility's supply termination point.
  2. Incoming switchgear.

3. Low-voltage switchgear.
  4. Motor-control centers.
  5. Control panels.
  6. Automatic transfer switches.
  7. Branch circuit panelboards.
  8. Disconnect switches.
- I. Adjusting
1. Make modifications to equipment as required to accomplish compliance with short-circuit study.

### 3.03 PROTECTIVE DEVICE COORDINATION STUDY

- A. Comply with IEEE 242 for calculating short-circuit currents and determining coordination time intervals.
- B. Comply with IEEE 399 for general study procedures.
- C. The study shall be based on the device characteristics supplied by device manufacturer.
- D. The extent of the electrical power system to be studied is indicated on Drawings.
- E. Begin analysis at the service, extending down to the system overcurrent protective devices as follows:
  1. To normal system low-voltage load buses where fault current is 10 kA or less.
  2. Exclude equipment rated 240-V ac or less when supplied by a single transformer rated less than 125 kVA.
- F. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study all cases of system-switching configurations and alternate operations that could result in maximum fault conditions.
- G. The calculations shall include the ac fault-current decay from induction motors. The calculations shall also account for the fault-current dc decrement, to address the asymmetrical requirements of the interrupting equipment.
  1. For grounded systems, provide a bolted line-to-ground fault-current study for areas as defined for the three-phase bolted fault short-circuit study.
- H. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault and single line-to-ground fault at each of the following:
  1. Electric utility's supply termination point.
  2. Switchgear.
  3. Low-voltage switchgear.
  4. Motor-control centers.
  5. Standby generators and automatic transfer switches.

6. Branch circuit panelboards.
- I. Protective Device Evaluation:
    1. Evaluate equipment and protective devices and compare to short-circuit ratings.
    2. Adequacy of switchgear, motor-control centers, and panelboard bus bars to withstand short-circuit stresses.
- 3.04 ARC-FLASH HAZARD ANALYSIS
- A. Comply with NFPA 70E and its Annex D for hazard analysis study.
  - B. Calculate maximum and minimum contributions of fault-current size.
    1. The minimum calculation shall assume that the utility contribution is at a minimum and shall assume no motor load.
    2. The maximum calculation shall assume a maximum contribution from the utility and shall assume motors to be operating under full-load conditions.
  - C. Calculate the arc-flash protection boundary and incident energy at locations in the electrical distribution system where personnel could perform work on energized parts.
  - D. Include low-voltage equipment locations, except equipment rated 240V AC or less fed from transformers less than 125 kVA.
  - E. Safe working distances shall be specified for calculated fault locations based on the calculated arc-flash boundary, considering incident energy of 1.2 cal/sq.cm.
  - F. Incident energy calculations shall consider the accumulation of energy over time when performing arc-flash calculations on buses with multiple sources. Iterative calculations shall take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors shall be decremented as follows:
    1. Fault contribution from induction motors should not be considered beyond three to five cycles.
  - G. Arc-flash computation shall include both line and load side of a circuit breaker as follows:
    1. When the circuit breaker is in a separate enclosure.
    2. When the line terminals of the circuit breaker are separate from the work location.
  - H. Base arc-flash calculations on actual overcurrent protective device clearing time. Cap maximum clearing time at two seconds based on IEEE 1584, Section B.1.2.
- 3.05 DEMONSTRATION
- A. Engage the Power System Study Specialist to train Owner's maintenance personnel in the following:

1. Acquaint personnel in the fundamentals of operating the power system in normal and emergency modes.
2. Explain the objectives of the study, study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpreting the time-current coordination curves.
3. Adjust, operate, and maintain overcurrent protective device settings.
4. Train Owner's maintenance personnel in the potential Arc Flash hazards associated with working on energized equipment and the significance of the arc-flash warning labels.

\*\*\* END OF SECTION \*\*\*



## **SECTION 26 22 13**

### **LOW VOLTAGE DISTRIBUTION TRANSFORMERS**

#### **PART 1 GENERAL**

##### **1.01 DESCRIPTION**

- A. This section specifies dry-type transformers rated 600 volts and less used for power distribution, lighting and control purposes.

##### **1.02 MATERIALS**

- A. All materials shall be new, free from defects, of current manufacture, of quality specified or shown. Each type of material shall be of the same Manufacturer throughout the work.

##### **1.03 STANDARDS AND CODES**

- A. All materials and equipment specified herein shall be within the scope of Nationally Recognized Testing Laboratory (NRTL) examination services, be approved by the NRTL for the purpose for which they are used, and shall bear the appropriate listing label.

##### **1.04 EQUIPMENT SIZE**

- A. Electrical equipment shall fit in the space provided on the plan drawings or as specified. Equipment heights shall not exceed those shown or specified. Larger equipment shall not be considered equivalent or acceptable.

##### **1.05 SUBMITTALS**

- A. Submit all catalog data in accordance with the Submittals requirements in Section 26 05 00. Show material information and confirm compliance with these specifications.

#### **PART 2 PRODUCTS**

##### **2.01 ACCEPTABLE PRODUCTS**

- A. Reference drawings for transformer size and windings. Transformers shall conform to ANSI/IEEE C57.12.01 and ANSI/ UL 506. The voltage, frequency, number of phases and KVA rating shall be as specified. Transformers shall be General Electric, Square D, Westinghouse, or equal.

##### **2.02 INSULATION**

- A. Transformers 15 KVA and above shall have a Class 220 insulation system in accordance with NEMA ST20. Transformers 2 KVA and less shall be designed not to exceed 80 degrees C temperature rise. Transformers 3 KVA and greater shall be designed not to exceed 115 degree C temperature rise.

##### **2.03 COILS**

- A. Transformer coils shall be copper. Transformer coils 15 KVA and above shall be impregnated with varnish. Transformer coils 10 KVA and below shall be encapsulated.

#### 2.04 WINDING CONFIGURATION

- A. Transformers shall have electrically isolated primary and secondary windings. Primary and secondary winding configurations shall be as specified. Provisions shall be made to permit separate grounding of the neutral conductor and enclosure. Single-phase transformers shall be the four winding type.

#### 2.05 TRANSFORMER TAPS

- A. Transformers 15 KVA and above shall be provided with two 2-1/2 percent full capacity taps above normal voltage and four 2-1/2 percent full capacity taps below rated voltage on the primary winding.

#### 2.06 TERMINAL COMPARTMENTS

- A. Terminal compartments shall be sized to permit termination of cables specified. Terminal connections shall be made in the bottom third of the enclosure. The terminals shall be copper and sized for cable specified.

#### 2.07 ENCLOSURES

- A. Transformers rated 15 KVA and smaller shall be provided with weatherproof, non-ventilated enclosures.
- B. Indoor transformers rated greater than 15 KVA shall be provided with drip proof, ventilated enclosures. Outdoor transformers shall have weatherproof enclosures.

#### 2.08 MOUNTING

- A. Transformers 15 KVA and below shall be suitable for wall mounting.
- B. Transformers 20 KVA and larger shall be floor mounting type.

#### 2.09 SOUND LEVELS

- A. The sound levels shall not exceed the following values:

<u>KVA</u>	<u>dB</u>
0-9	40
10-45	42
50-150	45
225-300	50
500	54

#### 2.010 TRANSFORMER EFFICIENCY

- A. Transformers shall be energy-efficient and shall meet the following minimum ratings:

Single Phase		Three Phase	
kVA	Efficiency (%)	kVA	Efficiency (%)
15	97.7	15	97.0
25	98.0	30	97.5
37.5	98.2	45	97.7
50	98.3	75	98.0
75	98.5		

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Transformers shall include internal "rubber-in-shear" isolation mounts selected per Manufacturer's recommendations or shall be installed with "KORFUND" or equal external vibration isolators. Wall mounting shall be allowed on masonry. Mounting hardware shall be per Manufacturer's instructions. Transformers with enclosures designed for floor mounting where suspended from above shall be suspended on a trapeze constructed of a minimum of two horizontal structural channels hung from threaded rod attached to structural slab with inserts. Channel rod and inserts shall be sized for not less than 400% load safety factor. Transformer raceway connections shall be flexible metal conduit as specified hereinbefore for equipment subject to vibration.

#### **3.02 CONNECTION**

- A. Transformers shall be considered "grounded neutral separately derived systems" and neutral shall be grounded accordingly to the building ground grid utilizing a direct connection.

#### **3.03 IDENTIFICATION**

- A. The transformer shall be identified with engraved, phenolic nameplates.

\*\*\* END OF SECTION \*\*\*

## **SECTION 26 24 16**

### **PANELBOARDS**

#### **PART 1 GENERAL**

##### **1.01 DESCRIPTION**

- A. This section specifies panelboards for lighting and power distribution.

##### **1.02 SUBMITTALS**

- A. Submit all catalog data in accordance with the Submittals requirements in Section 26 05 00. Show material information and confirm compliance with these specifications.

#### **PART 2 PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. Panelboards shall be manufactured by Square D, Cutler Hammer, or equal.

##### **2.02 MATERIALS - LIGHTING AND APPLIANCE PANELBOARD**

- A. Interior
  - 1. Continuous main current ratings, as indicated on associated panel schedules or drawings, not to exceed 600 amperes maximum for main breaker panelboards and not to exceed 800 amperes for main lug panelboards.
  - 2. Provide one (1) continuous bus bar per phase. Each bus bar shall have sequentially phased branch circuit connectors limited to bolt-on branch circuit breakers. The bussing shall be fully rated. Panelboard bus current ratings shall be determined by heat-rise tests conducted in accordance with UL 67. Bussing rated 100-400 amperes shall be plated copper. Bussing rated for 600 and 800 amperes shall be plated copper as standard construction. Bus bar plating shall run the entire length of the bus bar. Panelboards shall be suitable for use as Service Equipment when application requirements comply with UL 67 and NEC Articles 230-F and -G.
  - 3. All current-carrying parts shall be insulated from ground and phase-to-phase by high dielectric strength thermoplastic.
  - 4. A solidly bonded copper equipment ground bar shall be provided. An additional copper isolated/insulated ground bar shall also be provided.
  - 5. Split solid neutral shall be plated and located in the mains compartment up to 250 amperes so all incoming neutral cable may be of the same length. UL Listed panelboards with 200% rated solid neutral shall be plated copper for non-linear load applications. Panelboards shall be marked for non-linear load applications.
  - 6. Interior trim shall be of dead-front construction to shield user from energized parts. Dead-front trim shall have pre-formed twistouts covering unused mounting space.

7. Nameplates shall contain system information and catalog number or factory order number. Interior wiring diagram, neutral wiring diagram, UL Listed label and short circuit current rating shall be displayed on the interior or in a booklet format.
8. Interiors shall be field convertible for top or bottom incoming feed. Main circuit breakers in 125A interiors shall be vertically mounted. Main circuit breakers over 125A shall be vertically mounted. Sub-feed circuit breakers shall be vertically mounted. Main lug interiors up to 400 amperes shall be field convertible to main breaker. Interior leveling provisions shall be provided for flush mounted applications.
9. Interior phase bus shall be pre-drilled to accommodate field installable options. (i.e., Sub-Feed Lugs, Sub-Feed Breakers, Thru-Feed Lugs)
10. Interiors shall accept 125 ampere breakers in group mounted branch construction.

#### B. Main Circuit Breaker

1. Main circuit breakers shall have an overcenter, trip-free, toggle mechanism which will provide quick-make, quick-break contact action. Circuit breakers shall have a permanent trip unit with thermal and magnetic trip elements in each pole. Each thermal element shall be true rms sensing and be factory calibrated to operate in a 40° C ambient environment. Thermal elements shall be ambient compensating above 40° C.
2. Two- and three-pole circuit breakers shall have common tripping of all poles. Circuit breakers frame sizes above 100 amperes shall have a single magnetic trip adjustment located on the front of the breaker that allows the user to simultaneously select the desired trip level of all poles. Circuit breakers shall have a push-to-trip button for maintenance and testing purposes.
3. Circuit breaker handle and faceplate shall indicate rated ampacity. Standard construction circuit breakers shall be UL Listed for reverse connection without restrictive line or load markings.
4. Circuit breaker escutcheon shall have international I/O markings, in addition to standard ON/OFF markings. Circuit breaker handle accessories shall provide provisions for locking handle in the ON or OFF position.
5. Lugs shall be UL Listed to accept solid or stranded copper conductors only. Lugs shall be suitable for 90° C rated wire, sized according to the temperature rating per NEC Table 310-16. Lug body shall be bolted in place; snap-in designs are not acceptable.
6. The circuit breakers shall be UL Listed for use with the following accessories: Shunt Trip, Under Voltage Trip, Ground Fault Shunt Trip, Auxiliary Switch, Alarm Switch, Mechanical Lug Kits, and Compression Lug Kits.

#### C. Branch Circuit Breakers

1. Circuit breakers shall be UL Listed with ampere ratings, interrupting ratings, and number of poles as indicated on the panelboard schedule.
2. Molded case branch circuit breakers shall have bolt-on type bus connectors.
3. Circuit breakers shall have an overcenter toggle mechanism which will provide

quick-make, quick-break contact action. Circuit breakers shall have thermal and magnetic trip elements in each pole. Two- and three-pole circuit breakers shall have common tripping of all poles.

4. There shall be two forms of visible trip indication. The circuit breaker handle shall reside in a position between ON and OFF. In addition, there shall be a red indicator appearing in the clear window of the circuit breaker housing.
5. The exposed faceplates of all branch circuit breakers shall be flush with one another.
6. Lugs shall be UL Listed to accept solid or stranded copper conductors only.
7. Breakers shall be UL Listed for use with the following factory installed accessories: Shunt Trip, Auxiliary Switch, and Alarm Switch.

D. Enclosures

1. Type 1 Boxes

- a. Boxes shall be galvanized steel constructed in accordance with UL 50 requirements. Galvannealed steel will not be acceptable.
- b. Boxes shall have removable endwalls with knockouts located on one end. Boxes shall have welded interior mounting studs. Interior mounting brackets are not required.
- c. Box width shall not exceed 26" wide.

E. Type 1 Fronts

1. Front shall meet strength and rigidity requirements per UL 50 standards. Shall have ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.
2. Fronts shall be 1-piece with door, or hinged 1-piece with door. Mounting shall be as indicated on associated schedules and drawings.
3. Panelboards rated 250 amperes and below shall have MONO-FLAT fronts with concealed door hinges and trim screws. Front shall not be removable with the door locked. Panelboards rated above 250 amperes shall have vented fronts with concealed door hinges. Doors on front shall have rounded corners; edges shall be free of burrs.
4. Front shall have flat latch type lock with catch and spring loaded stainless steel door pull. All lock assemblies shall be keyed alike. One (1) key shall be provided with each lock. A clear plastic directory card holder shall be mounted on the inside of door.

F. Type 3R, 5, and 12

1. Enclosures shall be constructed in accordance with UL 50 requirements. Enclosures shall be painted with ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.
2. All doors shall be gasketed and equipped with a tumbler type vault lock and two (2) additional quarter turn fasteners on enclosures 59 inches or more in height. All lock assemblies shall be keyed alike. One (1) key shall be provided with each lock. A clear plastic directory card holder shall be mounted on the inside of

door.

3. Maximum enclosure dimensions shall not exceed 21" wide and 9.5" deep.

G. Circuit Breaker ratings

1. The following interrupting capacity shall be considered minimum. Other ratings shall be as specified on the drawings.
  - a. 240V and 208Y/120V Panelboards 10,000 AIC symmetrical
  - b. 480V and 480Y/ 277V Panelboards 25,000 AIC symmetrical
2. Breakers shall be mounted in panelboards so that breaker handles operate in a horizontal plane. Common trip shall be provided on all multiple pole breakers. Circuit breaker shall be the bolt-on type.
3. Spare breakers shall be provided where indicated, complete for future connection of wiring circuits. Where "Space" is indicated for breakers, bussing and breaker mounting hardware shall be provided in the panelboards; with steel knockouts in dead front metal closure of unused part of panel. If any steel knockouts are removed, breakers shall be provided in such spaces or approved cover plates. Open spaces are not permitted.

H. Surge Arresters

1. Surge arresters, with indicators, shall be provided on all panels to protect against overvoltage transients.

I. Panel schedules

1. Panel Schedules are shown on the drawings.

## **PART 3 EXECUTION**

### **3.01 MOUNTING**

- A. Secure in place with top of cabinet at 6' – 6", unless otherwise noted. Top of cabinet and trim shall be level.

### **3.02 CIRCUIT INDEX**

- A. Each branch circuit panelboard shall be provided with as built information for each panelboard by circuit with its proper load designation. Panelboard index card shall be typed (handwritten not acceptable) and mounted inside the door of each panelboard in a clear plastic sleeve. One spare blank card shall be provided for each card used.

### **3.03 FIELD QUALITY CONTROL**

- A. Inspect complete installation for physical damage, proper alignment, anchorage, and grounding.
- B. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads within 20% of each other. Maintain proper

phasing for multi-wire branch circuits.

- C. Check tightness of bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written specifications.

\*\*\* END OF SECTION \*\*\*



## SECTION 26 27 26

### WIRING DEVICES

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. This section covers furnishing and installing all receptacles, switches and other wiring devices indicated on the drawings.

##### 1.02 PRODUCTS

- A. General

- 1. Wiring devices shall be UL approved for the current and voltage specified and shall comply with NEMA WD-1. Devices shall contain provisions for back wiring and side wiring with captively held binding screws. Devices shall be brown except those located in finished areas, which shall be ivory.

- B. Receptacles and Plugs

- 1. General:

- a. Receptacles shall be grounding type.

- 2. 120 Volt Receptacles:

- a. Indoor Clean Areas: Receptacles shall be duplex 20 ampere, NEMA 5-20R, and shall accept NEMA 5-15P and 5-20P plug caps. Receptacles shall be Hubbell 5362 or equal.
    - b. Ground Fault Circuit Interrupter (GFCI) receptacles: GFCI receptacles shall be provided in all areas as required by local codes and NEC article 210.8. Hubbell GF-5362, or equal.
    - c. Outdoor, Process or Corrosive Areas: Receptacle shall be duplex, 20 ampere, NEMA 5-20R, and shall accept NEMA 5-15P and 5-20P plug caps. Receptacle and plug caps shall be corrosion resistant. Covers shall be rated for "while-in-use" and installed per manufacturer's directions. Manufacturer shall be Hubbell Series WP, or approved equal.

- C. Switches

- 1. General Purpose (Indoor, Clean Areas):

- a. General purpose switches shall be quiet AC type, specification grade, and shall be provided in accordance with rated capacities as required. Switches shall match receptacles in color. Switches shall be manufactured by General Electric, Hubbell, or equal.

2. Switches for Outdoor and Corrosive Areas

- a. Switches shall be 20 amp with weatherproof/corrosion resistant neoprene plate as manufactured by Hubbell, Arrow-Hart, or equal.
- b. Switches shall be mounted in "FS" type copper-free aluminum or PVC mounting boxes.

D. Device Plates

1. Device plates shall be provided with switches. In noncorrosive indoor areas, receptacle device plates shall be made of sheet steel, zinc electroplated with chrome finish. Device plates in corrosive or outdoor areas shall be corrosion-resistant type. Device plates for explosion-proof equipment shall be factory provided with the equipment.
2. Device plates shall be provided with engraved laminated phenolic nameplates with 1/8 inch white characters on black background. Nameplates for switches shall identify panel and circuit number and area served. Nameplates for receptacles shall identify circuit and voltage if other than 120 volts, single phase.

## PART 2 EXECUTION

### 2.01 GENERAL

- A. Boxes shall be independently supported by galvanized brackets, expansion bolts, toggle bolts, or machine or wood screws as appropriate. Wooden plugs inserted in masonry or concrete shall not be used as a base to secure boxes, nor shall welding or brazing be used to attachment. Wiring devices shall be tested for correct connections.
- B. Position of Outlets
  1. All outlets shall be centered with regard to building lines, furring and trim, symmetrically arranged in the room. Set outlets shall be set plumb and extend flush outlets to the finished surface of the wall, ceiling or floor without projecting beyond same. All receptacles, switches and outlets shown on the drawings shall be installed symmetrically along trim and where necessary, set the long dimension of the plate horizontal or gang in tandem.
- C. Mounting Heights
  1. Unless otherwise noted, wall mounted outlet devices shall generally be 24 inches above the floor, 18 inches in architecturally treated areas. Switches shall be 48 inches above the floor. All measurements are to centerline of device.

\*\*\* END OF SECTION \*\*\*

## **SECTION 26 28 16**

### **DISCONNECTS AND SWITCHES**

#### **PART 1 GENERAL**

##### **1.01 DESCRIPTION**

- A. This section specifies all disconnects, fused and unfused, required by code for equipment furnished under this and other Divisions of these specifications.

##### **1.02 STANDARDS AND CODES**

- A. All equipment, materials, and the design, construction, installation, and application thereof shall comply with all applicable provisions of the national electrical code (NEC), the occupational safety and health act (OSHA), and any applicable federal, state, and local ordinances, rules and regulations. All materials and equipment specified herein shall be within the scope of nationally recognized testing laboratory (NRTL) examination services, be approved by the NRTL for the purpose for which they are used, and shall bear the appropriate listing label.

##### **1.03 SUBMITTALS**

- A. Submit all catalog data in accordance with the Submittals requirements in Section 26 05 00.1.12. Show material information and confirm compliance with these Specifications.

#### **PART 2 PRODUCTS**

##### **2.01 DISCONNECTS**

- A. Disconnect switches shall be heavy duty type, shall be horsepower rated, quick-make, quick-break construction. Switch blades shall open all ungrounded conductors and shall be single throw, unless otherwise noted.
- B. Disconnect switch enclosures shall be NEMA rated and mounted in accordance with Section 26 05 00.1.10.
- C. Fusible disconnects shall be as specified above with fuse space and clips to accept Class R fuses. Fusible disconnects shall only be utilized where required by equipment manufacturer to meet UL installation requirements.

##### **2.02 MANUFACTURER**

- A. Disconnect switches shall be manufactured by Cutler Hammer, Square D, Westinghouse, or equal.

#### **PART 3 EXECUTION**

##### **3.01 INSTALLATION**

- A. Switches shall be mounted at locations shown on plans. Installation shall be in accordance with the following methods:
1. Mounting
    - a. Disconnects shall be fastened securely to supporting structure at walls and stands:
    - b. Wood screws or lag screws to wood boards or timbers
    - c. Machine bolt to metal framing or plates
    - d. Expansion anchors to concrete walls
    - e. Expansion toggle wing bolts or sleeve anchors to hollow block
    - f. Provide 1 inch spacers to set enclosure out from concrete or block wall
  2. Stands and Supports
    - a. Disconnect stands and support shall be constructed of and secured by:
    - b. Corrosion-resistant materials and finishes
    - c. Unistrut-type materials for fabrication
    - d. Expansion anchors for bolts in concrete floor
    - e. Machine bolt to metal framing or plates
    - f. Wood screws or lag screws to wood boards or timber
    - g. Backing plate for mounting units.
    - h. Fasten stand securely to floor
    - i. Dimensions as required by equipment to be mounted
  3. Arrangement
    - a. Disconnects shall be arranged for driven equipment use or function:
    - b. Similar units adjacent
    - c. Adequate space for operation and servicing
  4. Mounting Height
    - a. Center of handle shall be 4 feet 6 inch above the finished floor or work platform.

### 3.02 IDENTIFICATION

- A. Nameplates shall be provided for all disconnects in accordance with Section 26 05 00.2.2.
- B. Nameplate to state load designation and power source equipment.

\*\*\* END OF SECTION \*\*\*

## **SECTION 26 51 19**

### **LED LIGHTING**

#### **PART 1 GENERAL**

##### **1.01 SCOPE**

- A. Provide lighting equipment complete and operational as indicated on the plans. All fixtures are to be new, complete with lamps and fully operational in conformance with code and U.L. listing requirements.

##### **1.02 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including Division 01, General Requirements, apply to this Section.

##### **1.03 CATALOG NUMBERS**

- A. Model and series numbers indicate design intent in terms of fixture quality and general requirements. The actual fixtures submitted shall correspond with the number of lamps, wattage, ceiling type and any other specific performance and installation requirements specified or shown on drawings. Verify actual requirements prior to ordering fixtures.
- B. Light fixture schedule series numbers are a design series reference and do not necessarily represent the exact catalog number, size, voltage, wattage, type of lamp, ballast, finish trim, ceiling type, mounting hardware, ceiling trim or special requirements as specified hereinafter or as required by the installations. Provide complete fixtures to correspond with the number of lamps, wattage and/or size specified.
- C. If there are discrepancies between fixture illustrations and the written description in the fixture schedule, the written description in the fixture schedule shall take precedence.

##### **1.04 SUBSTITUTIONS**

- A. Substitutions will be allowed for fixtures listed on the lighting fixtures schedule as 'or equal', with Engineer approval.
- B. Proposed substitutions shall include complete photometric calculations in plan view showing lighting levels based on proposed fixtures.
- C. Final determination of equivalence shall be by the Engineer.

##### **1.05 REFERENCES**

- A. National Electrical Manufacturer's Association (NEMA) LE5-1993: Procedure for determining Luminaire efficiency ratings.
- B. Underwriters Laboratories, Inc. (UL).

- C. Washington State Energy Code, WSEC latest edition, and WAC 51-11C.

#### 1.06 SUBMITTALS

- A. For standard catalog items, provide original product sheets, to indicate that light fixtures and accessories fully comply with contract documents. Include photometric report by an independent certified testing laboratory when required in fixture schedule. Manufacturer's test report is not acceptable.
- B. Submittals shall have fixture types and project name clearly indicated and shall be prepared by the authorized manufacturer's representative serving the project area. A list of manufacturer's representatives (including address, telephone and fax numbers) identifying which light fixture types they represent shall be included with submittals. Submittals or requests for substitutions not meeting these requirements will be rejected.
- C. Product samples complete with housing, trim, plug, and specified lamp shall be submitted upon request.
- D. Submit lighting control devices as required by Washington State Energy Code

#### 1.07 QUALITY ASSURANCE

- A. Fixtures and components shall be new and listed by Underwriters Laboratories (UL) or other testing lab acceptable to local jurisdiction.

#### 1.08 WARRANTY

- A. LED Lamp Technology: Provide manufacturer's warranty for a period of not less than five years including parts and labor for full replacement of defective product.

### **PART 2 PRODUCTS**

#### 2.01 GENERAL MATERIAL REQUIREMENTS

- A. Fixtures shall be free of light leaks and designed to provide sufficient ventilation of lamps to provide the photometric performance required.
- B. All sheet metal work shall be free from tool marks and dents and shall have accurate angles bent as sharp as compatible with the gauges of the required metal. Intersections and joints shall be formed true and of adequate strength and structural rigidity to prevent any distortion after assembly. Finish exposed edges so no sharp or ragged edges are exposed. All miters shall be in accurate alignment with abutting intersecting members.
- C. Lamp holders shall hold lamps securely against normal vibrations and maintenance handling.
- D. Exterior Fixtures
  - 1. Painted surfaces shall have an outdoor life expectancy of not less than 20 years without any visible rust or corrosion.

2. Diffusing materials shall be UV stabilized.
3. Finish colors shall be as specified.

## 2.02 LIGHTING CONTROLS

- A. Provide lighting controls including switches, contactors, occupancy sensors etc where indicated on the drawings and schedules.
- B. Lighting controls shall be provided to conform with the latest version of WSEC Energy Code requirements in Washington State. Electrical Contractor shall submit Code-compliant materials, fixtures, and control devices.

## PART 3 EXECUTION

### 3.01 LIGHTING FIXTURES, GENERAL

- A. Provide mounting accessories and trims as required for wall and ceiling construction types shown in Finish Schedule and on Drawings. The lighting fixture schedule does not differentiate between grid and flange mounting. The contractor shall review the architectural reflected ceiling plan to confirm locations where flange or other special mounting conditions are applicable.
- B. Verify weight and mounting method of fixtures and provide suitable supports. Fixture mounting assemblies shall comply with local seismic codes and regulations.
- C. Refer to architectural reflected ceiling plans for coordination of lighting fixtures with mechanical and fire safety equipment. Where conflicts occur, coordinate with Architect prior to installing lighting fixtures.
- D. Install lighting fixtures such that vent holes are free of air blocking obstacles.
- E. Recessed lighting fixtures located in ceilings with fire resistive rating of one hour or more shall be enclosed in an approved fire resistive enclosure with a rating equal to that of the ceiling.
- F. Adjust finish trim rings on all recessed fixtures to be flush and level with the finished ceiling.
- G. Adjust variable position lamp holders for proper lamp position.
- H. Replace all burned out or inoperative lamps at the end of the construction prior to Owner occupancy.
- I. Test and demonstrate lighting control system, as applicable.

\*\*\* END OF SECTION \*\*\*

## **SECTION 26 80 00**

### **INSTRUMENTATION AND CONTROL SYSTEMS**

#### **PART 1 GENERAL**

##### **1.01 SUMMARY**

- A. This Section covers includes the general requirements for furnishing, installing, programming, adjusting, testing, documenting and commissioning of the complete and operational Instrumentation, SCADA and PLC based control system.
- B. The control system includes the complete instrumentation, PLC's and control panels, Motor Control Center, operator interface, and SCADA system and related equipment for complete monitoring and control of the entire facility treatment system.
- C. Major components of this system include, but are not limited to, all materials, equipment, and work required to implement a complete and operating system as described herein. The system shall include primary elements for process variable measurements, control elements, analog displays, communication systems, and all hardware and software required to program, calibrate and monitor the instrumentation, communication and control devices.
- D. The Contractor shall provide, program, calibrate, test and commission the complete and operational Instrumentation, SCADA and PLC based control system.
- E. The Contractor shall place the completed system in operation, including programming, tuning loops, testing and adjusting communications and making final adjustments to instruments and equipment as required during system start-up. The Contractor shall provide the services of trained and qualified instrument technicians for these services.

##### **1.02 RELATED SECTIONS**

- A. 26 05 00 – Electrical General

##### **1.03 DEFINITION OF TERMS**

- A. General – Refer to Standard abbreviations, Section 26 05 00.3.7.
- B. PLC – Programmable Logic Controller. Industrial computer system that interfaces with instrumentation and equipment and allows for automated control of process equipment.
- C. OIU – Operator Interface Unit. Local display to display graphical status of instrumentation and equipment status, alarm monitoring, set point control and visualization.
- D. SCADA – Supervisory Control And Data Acquisition computer system. Computer based system with custom software to allow for supervisory monitoring and control, data logging, alarm monitoring and reporting for the overall facility control and treatment system.
- E. Contractor: The party who furnishes and installs all tools, materials, and equipment to complete the work shown and implied in the drawings and these specifications. This



includes the Prime Contractor, the Electrical Contractor, System Integrator, Telecom Contractor, and all other Contractors and Subcontractors.

- F. System Integrator: An organization engaged in the business of detail design, component selection and procurement, fabrication, wiring, assembly, programming and testing process control and telemetry systems.
- G. SCADA/PLC Programmer: The organization that has been pre-selected by the Owner to provide the programming and software development for the PLC and SCADA process control and telemetry systems. Programmer shall be Taurus Controls.
- H. Telecom Contractor: The telecommunications company responsible for all data cabling equipment and testing. This includes all communications cabling shown on the plans. Telecom contractor shall be selected by the Contractor.
- I. Equipment Supplier: The equipment manufacturing company of packaged treatment or other specialty systems and components, furnished by the Equipment Supplier and installed by the Contractor, responsible for providing all materials, equipment, and testing for a fully operational system.

#### 1.04 SPECIAL REQUIREMENTS

- A. The Contractor shall install components including those assembled by the System Integrator at the locations shown in the plans, and in accordance with the requirements of Division 26.
- B. The Contractor shall be responsible for the selection of the System Integrator, and shall be subject to approval by the Engineer. It is recommended that the System Integrator be a control system manufacturing company that conforms to the following requirements:
  - 1. The System Integrator shall be specialized in the design, assembly, programming, testing, installation and service of municipal control and communication systems in the Pacific Northwest for at least the last five years.
  - 2. The System Integrator shall employ technicians and engineers with documented experience in the design, assembly, programming, testing, installation, operation, calibration, troubleshooting, service and repair of control and communication systems for municipal systems and facilities.
  - 3. The System Integrator shall have completed the design, assembly, testing and installation of control systems which include the instruments and devices cited on the Plans by specific manufacturer's name.
  - 4. The System Integrator shall be experienced with the programming and commissioning of Allen Bradley PLC systems, operator interfaces, communications systems and VFD's.
  - 5. The System Integrator shall be an AVEVA registered System Integrator with experience in municipal SCADA system development and shall maintain the required development licenses to develop the project and provide future support

for the project. The System Integrator shall also be experienced with WIN-911 alarm software development.

6. The System Integrators manufacturing and testing facility shall be located within a 150 mile drive from the project location.
  7. The System Integrator shall be a UL-508A and UL-698A listed and certified control panel manufacturing facility.
- C. The System Integrator for this project shall be Taurus Controls, Tualatin, Oregon.
- D. Alternate System Integrators shall require written approval by the Engineer, prior to bid.
- E. The Contractor shall provide all SCADA/PLC Programmer services under the project Force Account; see Division 1.

#### 1.05 DIVISION OF RESPONSIBILITY

- A. All materials and modifications to the existing control system shall be provided under the supervision of a single Contractor, which is regularly engaged in the design and installation of such systems of similar scope and complexity.
- B. The Contractor shall be fully and completely responsible for all work performed and all materials installed under the contract. The contract between the Contractor and subcontractor(s) shall conform to and meet all requirements specified in the contract documents.
- C. Electrical Contractor's Responsibilities:

The Electrical Contractor shall be responsible for the following:

1. Installation of all control system equipment in accordance with these documents, and drawings provided by the Control System Integrator.
2. Provide all electrical permits and inspections as required by the State of Washington.
3. Provide all connections to new and existing electrical equipment including MCC, VFD's, PLC's, instrumentation, control devices, packaged equipment, power generation equipment and other equipment as shown on the drawings.
4. Provide electrical panel modifications, demolition of existing equipment, raceway and other equipment and installation where required.
5. Coordination with the Owner for equipment installation, special operational needs for the facility, and facility scheduling requirements per 260500.1.016.
6. Provide temporary construction power and temporary equipment as listed in 260500.1.015.

- D. System Integrator Responsibilities:

The System Integrator shall be responsible for the following:

1. Provide Motor Control Centers, VFD's, Local Control Panels, PLC and operator interface system, instrumentation, communications and control system equipment as shown on the drawings.
2. Provide and configure all VFDs, instrumentation and other process control equipment in coordination with Electrical Contractor and Programmer.
3. Provide additional system accessories as required for a complete and operational control system.
4. Attend system startup and testing, perform all I/O testing and verification, assist Contractor and Programmer as required.
5. Provide final documentation, training, as-built drawings and Operation and Maintenance manuals.

E. SCADA/PLC Programmer (Programmer) Responsibilities:

The Programmer shall be responsible for the following:

1. Provide and install all SCADA, PLC and alarm monitoring software programming development licenses.
2. Provide treatment facility PLC programming as required for monitoring and control of new and existing control system equipment.
3. Provide treatment facility SCADA and alarm monitoring programming as required for monitoring and control of new and existing control system equipment.
4. Attend system startup and testing in coordination with Electrical Contractor and System Integrator.
5. Fees for equipment and services of the City SCADA/PLC Programmer shall be paid by the Contractor under the project force account. See Division 1.

F. Telecomm Contractor's Responsibility:

The Telecomm Contractor shall be responsible for the following equipment and services:

1. Selection of the networking system cabling, patch panels, patch cables, and other equipment as shown on the drawings, and as required for a complete and operational system.
2. Submittal of communications equipment hardware and topology diagrams for review by Engineer. Submittal shall be approved prior to ordering or installation of communications equipment.
3. Installation of communications system cabling, patch panels, patch cables, and other equipment.

4. Testing, certification and commissioning of the complete communications system.
5. Provide the copper cat 6 system cabling, color coordinated wall jacks and cabling and terminations from wall data jacks to data racks and panels.
6. Testing, certification and commissioning of the complete data communications system.

G. Equipment Supplier Responsibilities

The Equipment Supplier shall be responsible for the following:

1. Furnish all packaged equipment and installation requirements for Electrical Contractor installation.
2. Fully program, commission, adjust, test and put the new equipment into operation.
3. The Equipment Supplier shall address PLCs with IP addresses as specified by the Programmer.
4. The Equipment Supplier shall organize and allocate specific memory locations and PLC tags, as required, for complete monitoring of the equipment by the treatment facility PLC and SCADA system. These listings shall be coordinated with and provided to the Programmer prior to startup and commissioning.
5. The Equipment Supplier shall provide UL or ETL certifications for all equipment and equipment packages, as required by the State of Washington, L&I Electrical Inspection division. Field inspections for unlabeled equipment, including all costs and resulting project delays, shall be the complete responsibility of the Contractor.
6. All final programs shall be provided to the Owner with all passwords given to the owner to access and maintain the programs.

## 1.06 SUBMITTALS

A. Hardware Submittals

1. In addition to the requirements stated elsewhere in these documents, the following information shall be provided:
  - a. Before any components are fabricated, and/or integrated into assemblies, or shipped to the site, the System Integrator shall prepare a complete hardware submittal, including fully detailed shop drawings, catalog cuts, wiring connections, and such other documentation as may be required to fully describe the equipment and to demonstrate its conformity to these plans and specifications. Catalog information shall be submitted for all components and equipment required for the project.
  - b. All submittals shall be complete, organized, and indexed. Partial submittals will not be accepted.

B. System Drawing Submittals

1. Following approval of the Hardware Submittal, the System Integrator shall prepare complete system interconnect wiring diagrams and panel layout drawings for approval.

#### 1.07 OPERATION AND MAINTENANCE MANUALS

- A. Provide Operation and Maintenance (O&M) data for the complete control system and related equipment, in accordance with the general requirements in Section 26 05 00.

## **PART 2 PRODUCTS**

#### 2.01 GENERAL

- A. Material shall be new, free from defects, and of the quality specified. All equipment and materials utilized in the system shall be the products of manufacturers with at least five (5) years experience in the manufacture of similar equipment. Similar items in the system shall be the products of the same manufacturer. All equipment shall be of industrial grade and shall be specifically intended for control, monitoring and operation of motor-driven pumps and equipment. All equipment shall be of modular design to facilitate interchangeability of parts and to assure ease of servicing.

#### 2.02 MAJOR EQUIPMENT LIST

- A. The Contractor shall provide all of the equipment shown on the drawings, including but not limited to, the following major Control System equipment:
  1. PLC control panels as shown on the drawings. Contractor shall provide detailed design drawings, bill of materials and data sheets for complete control system.
  2. Local and remote control panels, as shown on the drawings.
    - a. Dewatering Building PLC Control Panel with Operator Interface
    - b. Ventilation Control Panel and Ventilation Status light boxes
    - c. Dewatering Sump Pump Control Panel
    - d. Modify existing Influent Control Panel to add flow indicator and AC unit
  3. Instrumentation as shown on the drawings, and specified herein:
    - a. Analog Indicator
      - 1) One Flow Indicator at Influent Pump Station
    - b. Dissolved Oxygen (DO) Meters
      - 1) Four complete DO sensing systems, two for each Treatment system.

- c. H2S Sensor
  - 1) Install One Owner-provided sensor near new Dewatering equipment, originally supplied under project Phase 1.
- d. Methane Sensor
  - 1) Install One Owner-provided sensor near new Dewatering equipment, originally supplied under project Phase 1.
- e. Door Switch
  - 1) Two intrusion door switches for Dewatering building entrances.
- f. Smoke detector
  - 1) One heat/smoke detector in Dewatering building.
- g. Float Switches
  - 1) Three float switches for Dewatering Sump wet well.
- 4. Network equipment, cabling, accessories, and testing.
  - a. Network switch in Dewatering Building PLC Control Panel.
  - b. CAT 6 Ethernet communications cabling and connections from Dewatering building PLC Control Panel to Main PLC Control Panel network switch located in existing Blower building.
  - c. CAT 6 Ethernet communications cabling and connections from Dewatering building PLC Control Panel to Level Loder PLC panel network switch.
  - d. CAT6 cabling and data ports in laboratory.
  - e. SCADA remote monitor for laboratory.
- 5. Installation of all packaged equipment system panels, equipment, and instrumentation per manufacturer drawings.
- 6. Programming and commissioning of all PLC, operator interface and SCADA systems.

## 2.03 CONTROL PANELS

- A. Control panels shall be designed, assembled, programmed, tested and placed into operation by the System Integrator with support from the Electrical Contractor.
- B. The control panel shall fit into the space requirements as shown on the drawings. The contract drawings show general control panel layout and space requirements. Final

dimensions shall be selected by the System Integrator to adequately install and wire the required control equipment.

- C. Detailed panel layout and interconnecting drawings shall be submitted prior to ordering of materials, and shall be subject to review and approval by the Engineer.
- D. Material shall be new, free from defects, and of the quality specified. Similar items in the system shall be the products of the same Manufacturer. All equipment shall be of industrial grade and of standard construction, shall be capable of long, reliable, trouble-free service, and shall be specifically intended for control and monitoring industrial equipment.

- 1. Indoor Control Panels in Clean and Dry Environments

- a. Cabinet shall be a NEMA 12 enclosure, with back panel. Cabinet shall be fabricated from 16 ga. minimum thickness sheet steel, and shall be ANSI 61 gray standard phosphate finish. Panel interiors and back panels shall be white. Cabinet shall be provided with an interior frame or otherwise formed so as to provide a rigid structure. Three-point latch hardware shall be provided for doors exceeding 30 inches high. Hoffman Concept series, or equal.
- b. The panel shall include padlocking quick release L-handles to allow the panel to be opened without the use of tools. Hoffman, Hammond, or equal.

- 2. Outdoor Control Panels or in Wet and Corrosive Areas

- a. Cabinet shall comply with NEMA 4X requirements as shown on the drawings and to meet the control equipment manufacturers' environmental requirements. The panel shall be fabricated from Type 316 Stainless Steel, and shall include a hidden hinge and back panel for equipment mounting where indicated. Hoffman, Hammond, or equal.
- b. Panels that are mounted outdoors shall be provided with a sun shield, or with a ventilation/cooling system to maintain the internal temperature of the panel interior within the equipment ratings at typical ambient temperatures for the installation conditions. Drip shields shall be installed to prevent water buildup on top of panel doors. Panel ventilation systems shall be thermostatically controlled.
- c. All outdoor panels shall provide an internal panel heater to prevent the buildup of moisture or condensation inside the panel. Panel fans and/or ventilation systems shall be thermostatically controlled.
- d. The panel shall include thru the door main disconnect and padlocking quick release L-handles to allow the panel to be opened without the use of tools. Hoffman #ELHP, or equal.

- E. Operating and Indicating Devices

1. Operating and indicating devices minimum rating shall be NEMA 13. Operator devices mounted in outdoor panels, corrosive areas or where exposed to moisture shall be NEMA 4X.
2. Selector Switches
  - a. Selector switches shall be for use on 120 volt control circuits. Contacts shall have a continuous current rating of 10 amperes both inductive and resistive. Selector switches shall be of the heavy duty oil tight type. Allen Bradley, Bulletin 800T, 800H, or equal.
3. Push buttons
  - a. Push buttons and illuminated push buttons shall be for use on 120 volt and 24 VDC control circuits and shall have continuous current rating of 10 amperes both inductive and resistive. Pushbuttons for "E-STOP" or emergency applications shall have maintained contacts and red mushroom head operators. Allen Bradley, Bulletin 800T, 800H, or equal.
4. Indicating Lights
  - a. Indicating lights shall be push-to-test oil tight type. Units shall have LED lamps and shall be of the illuminated pushbutton type with the pushbutton wired for the push-to-test function required. Appropriate LED and lens color shall be provided as shown. Allen Bradley, Bulletin 800T, 800H, or equal.
5. Analog Indicator
  - a. Indicator shall have LED process display with minimum 4 digit backlit LED display.
  - b. 24 VDC powered.
  - c. 4-20 mA process input.
  - d. Resolution shall be displayed to one GPM.
  - e. Display shall be Precision Digital model PD765 to match existing meter in Influent control panel.
6. Control Relays
  - a. Relays for general purpose use shall be DPDT, 5 ampere minimum contacts with the appropriate coil voltage for the application. They shall have an 8-pin base, matching socket, and contact status indicator. All relays shall include MOV snubbers (for AC) or diodes (for DC) applied across the relay coils to reduce the surge caused by coil breakdown transients. Relays shall be Idec RH2B-ULD, or equal.
7. Terminal Blocks



- a. Terminal blocks shall be 600 volt modular terminal blocks with tubular screw and pressure plate. Provide a minimum of 20% or four whichever is greater, spare terminals in each panel. Allen-Bradley #1492-J3 series, or equal.
- 8. Seal Fail and Thermal Relays
  - a. Pump seal fail and thermal relays shall be installed for each submersible pump in the system, where required by the pump manufacturer. The relay shall be capable of connecting to a seal failure probe and thermal contacts in the pump housing, and shall have output contacts to energize external indicator lights.
  - b. It is the responsibility of the pump control panel manufacturer to select and install the relays with the pump equipment provider for compatibility.
  - c. Relays shall be Mini-CAS, or engineer and manufacturer approved equal.

## 2.04 INSTRUMENTATION

### A. Float Switch

- 1. Switch shall be free floating, direct acting float switch designed for operation in raw sewage.
- 2. Mounting hardware shall include fixed installation on a 1" pipe, or suspended with a Kellems cord grip/strain relief and a weighted stainless steel support cable.
- 3. The float cable shall be a PVC coated multicore connecting cable which also contains the conductors, and shall be UL listed.
- 4. Float shall contain a non-mercury switch with a minimum rating of 4 amps at 120 Volts.
- 5. Float shall be foam-filled, hermetically sealed and polypropylene coated.
- 6. Floats shall be supplied with cable of sufficient length to reach the junction box without splices.
- 7. Intermediate relays and intrinsic safety barriers shall be provided for all wet well instrumentation in accordance with NFPA 820 and NEC article 500 for Class I, Div 1&2 areas.
- 8. Level switches shall be Orenco, MF series or Anchor Scientific Inc. 'Eco-Float' Model G PART#GP60N0NC. Include cable mounting kit and/or float stem and all required accessories, or equal.

### B. Dissolved Oxygen Monitoring system

- 1. Provide complete Dissolved Oxygen (DO) monitoring systems to be installed in the treatment cell aeration zones. Qty: 2 systems per cell.

2. Probe: Hach LDO series 0-20 PPM range, 10 meter cable with quick disconnect plug
  3. NEMA 4X enclosure with corrosion resistant finish.
  4. Controller: Hach controller Model SC4500, 0-20 PPM range, 4-20 mA output, 120VAC power.
  5. Pole mount kit with service bracket and all required accessories for installation on treatment cell handrail.
  6. Rainproof sunproof cover.
- C. Hydrogen Sulfide Sensor
1. Install Owner provided sensor from Phase 1 of the project.
- D. Combustible Gas Detector (for Methane detection)
1. Install Owner provided sensor from Phase 1 of the project.
- E. Smoke Detector
1. Combination smoke and heat detector.
  2. System sensor model #4WTAR-B with form C relay, sounder, 4 wire, or approved equal.
- F. Door Switch
1. Provide door switch for intrusion sensing.
  2. Magnetic reed style, SPDT, FORM C.
  3. Interlogix Sentrol Model 2707A series, or approved equal.

## 2.05 PROGRAMMABLE LOGIC CONTROLLER AND SUPPORT COMPONENTS

- A. PLC hardware
1. A complete PLC and communication system shall be provided with the logic and communications capabilities as shown on the drawings and in these specifications.
  2. All PLC hardware shall be manufactured by Allen Bradley, no exceptions.
  3. General selection as specified herein. Specific quantities and additional requirements as determined by System Integrator.
  4. PLC Platforms:
    - a. CompactLogix:

- 1) Processor: Model 1769-L33ER
- 2) Communications: Integral Dual port Ethernet/IP
- b. Power supply: 1769 series, sized to accommodate all hardware.
- c. Hardware Chassis: Integral
- d. Input and Output cards: 1769 series for analog and discrete inputs and outputs. Point count to include a minimum of 20% spare for each card type used.

B. Programming of PLC and Operator Interface

1. The System Integrator shall provide all programming and functional testing for the entire control system according to the descriptions in this specification and features shown on the drawings and place the complete system into operation.
2. The specifications indicate minimum system requirements. The programmer shall provide all required programming for a complete and functional control system.
3. Field adjustments or additional features added during startup and commissioning shall be included in the bid price.
4. The Contractor shall provide field technicians to assist with the startup and functional checkout of the complete PLC and control system.
5. All final programs shall become the property of the owner and shall be provided on USB drive with full access rights.

C. Operator Interface Unit (OIU):

1. The operator interface unit(s) shall be a 9 inch wide aspect color touch panel with Ethernet communications and 24VDC powered.
2. Operator interface shall run Windows CE Pro operating system and shall provide for real time monitoring of the terminal displays from a web browser.
3. Provide all required cables and pre-loaded development software and licenses for a complete and operational system.
4. System Integrator shall program, test and commission the OIU in accordance with these specifications.
5. Manufacturer: Allen-Bradley Panelview Plus 7 performance terminal, #2711P-T9W22D9P, or latest approved model at the time of submittal.

D. SCADA Remote Monitor for Laboratory

1. Provide one monitor for installation in the Laboratory.

2. Monitor shall be a minimum 50" screen size, QLED 4K smart TV, Samsung or equal.
  3. Provide adjustable wall mount kit, HDMI cable of sufficient length to reach SCADA computer, and all additional accessories for a complete installation.
- E. Network switches
1. Provide network switches as required for the connection of all Ethernet enabled devices.
  2. Provide switches in control panels, MCCs, and other areas as required for a complete Ethernet communication system.
  3. Switches shall be Allen Bradley Stratix 5200, 8 or 16 x 10/100 Mbps copper ports, 2 or 4x 10/100/1000 Mbps, DLR, 24-48VDC. Port quantities as required.
  4. Network shall be wired in a Ring configuration to provide network redundancy.
- F. DC Uninterruptible Power Supply (UPS)
1. DC UPS systems shall be provided for all PLC control panels.
  2. A complete DC UPS system shall be supplied for each control panel as shown on the drawings, and shall be manufactured by Allen Bradley.
  3. DC systems shall include DC power supply, Allen Bradley 1606-XLE240EN with 1606-XLS240-UPS and 1606-XLSBATASSY2 26 Ah battery assembly. Include all required mounting brackets and accessories.
- G. AC Power Line Filter
1. Provide Active Tracking Line Filter in each control panel with 120 VAC input.
  2. Manufacturer: Islatrol model IE-120, or Engineer approved equal.
- H. PLC Programming Software
1. PLC and OIU programming software shall be provided by the System Integrator for use in developing the software applications for the project, and shall be a current and registered Rockwell Automation programmer with software development licenses and support.
  2. Electronic copies of all final PLC and OIU programs will be provided to the Owner at the completion of the project with full ownership rights and all password protection removed or registered to the Owner.
  3. The System Integrator may offer the Owner ongoing future technical support following final commissioning of the project, and shall be subject to Owners approval. The Owner shall, at any time after final commissioning, have the ability to hire another registered Rockwell Automation registered integrator to support or modify the existing programs.

## 2.06 SPARE PARTS

- A. In addition to spare parts mentioned elsewhere in this section, the Contractor shall supply the following spare parts:
  - 1. 4 Spare LED indicators and one cap of each color used for indicating lights.
  - 2. One spare control, time delay, phase fail, seal fail, etc. relay of each type used, or 20% whichever is the greater number.
  - 3. Two spare fuses for each fuse provided under 10 amperes and one spare fuse for each fuse provided over 10 amperes.

## PART 3 EXECUTION

### 3.01 GENERAL

- A. Install materials and equipment in a workman-like manner utilizing craftsmen skilled in the particular trade. Provide work which has a neat and finished appearance.
- B. Coordinate Instrumentation and Control work with the Contractor, Owner, and work of other trades to avoid conflicts, errors, delays and unnecessary interference with system operations during construction.

### 3.02 COORDINATION WITH CONTRACTOR

- A. The System Integrator shall coordinate directly with the Contractor to ensure all requirements within the scope of this Section are satisfied.

### 3.03 SYSTEM SIMULATION – FACTORY ACCEPTANCE TEST

- A. To the degree possible, the complete control system shall be simulated at the Contractors facility prior to commissioning.
- B. The control panels shall be powered and tested by the System Integrator to demonstrate the operation and functionality indicated on the contract documents.
- C. The System Integrator shall develop test forms for each panel, MCC, or major component to document the results of each test procedure. A copy of the Factory Acceptance Test results shall be submitted by the Contractor for project record.
- D. The Engineer, Contractor and Owner personnel shall be invited to witness simulation and approve test results prior to shipment to Contractor.

### 3.04 PROTECTION DURING CONSTRUCTION

- A. The Contractor shall provide protection for materials and equipment against loss or damage and the effects of weather.
- B. Prior to installation, store items in an indoor, dry location. Provide heating in storage areas for items subject to corrosion under damp conditions.

- C. Specific storage requirements shall be in accordance with the manufacturer's recommendations.

### 3.05 MATERIAL AND EQUIPMENT INSTALLATION

- A. Follow manufacturer's installation requirements, unless otherwise indicated. Wherever any conflict arises between manufacturer's instructions and these Contract Documents, follow Engineer's decision, at no additional cost to the Owner. Maintain a copy of manufacturer's installation instructions on the jobsite at all times.

### 3.06 INSTRUMENTATION INSTALLATION

#### A. Process Connections

- 1. Unless otherwise specified, process taps shall comply with API RP550. Root valves shall be provided at taps, except temperature taps and pump discharge pressure taps. Process connections shall be arranged, where possible, such that instruments may be readily removed for maintenance without disruption of process units or draining of large tanks or vessels. Unions or flange connections shall be provided as necessary to permit removal without rotating equipment. Where process taps are not readily accessible from instrument locations, a block valve shall be provided at the instrument. Block valves shall also be provided for each instrument where multiple instruments are connected to one process tap.

#### B. Electrical Connections

- 1. Final connections between rigid raceway systems and instruments shall be made with jacketed flexible conduit with a maximum length of two feet.

#### C. Identification

- 1. All field instruments shall be labeled with function and instrument number, i.e. (FIT-301/EFFLUENT FLOW METER). Tag shall be 10ga 316 stainless steel with stamped letters and numbers attached to device with 12ga 316 stainless steel wire.

### 3.07 DESCRIPTION OF OPERATION

- A. The System Integrator shall provide all programming and functional testing for the PLC and control systems, and place the complete system into operation.

- B. The control system shall be programmed according to the descriptions in this specification and features shown on the drawings. This description indicates minimum system requirements. The programmer shall provide all required programming for a complete and functional control system. Field adjustments or additional features added during startup and commissioning shall be included in the bid price.

#### C. Power Load Shedding:

- 1. The PLC system shall be programmed for automatic load shed control as described herein.

2. When the Automatic Transfer Switch indicates that the switch position is NOT IN UTILITY, the PLC shall make the following adjustments:
  - a. The Auto operation of the Influent Pump Station shall be limited to one 2.7 HP pump. (the hardwired float switches will still enable high level backup operation).
  - b. The Auto operation of the 2W pump station shall be limited to one 5 HP pump.
  - c. The automatic operation of all Dewatering systems shall be disabled, including the Dewatering Skid, Sludge Pump and the Level Lodor system.
  - d. The Aeration blowers shall reduce speed to a maximum of 45 Hz. The minimum speed shall be adjustable by setpoint at the SCADA screen.

D. PLC control panels:

1. The PLC controllers shall be programmed to monitor and control the complete pump station performance, including system pressures, flow rates and totals, equipment run times, equipment faults, etc.
2. Each pump shall have a local Hand-Off-Auto control switch, mounted to the control panel. When in Auto mode, the pump shall be enabled for Automatic control by the PLC control system. When in Hand mode, the pump shall run at the speed set by the local speed potentiometer.
3. The Automatic Operation of the Train 1 and 2 functions shall be programmed to be similar to the Train #3 logic programmed in Phase 1. Coordinate with the Smith & Loveless manufacturer for any required modifications to improve the process control and make these improvements as part of the contract work.

E. Operator Interface:

1. The operator interface(s) shall be programmed with the following minimum features:
  - a. System overview screen showing pump status, speed, discharge pressure, flow rate, flow total, and other process information.
  - b. Alarm screen with each alarm configured with detailed description and time and date stamp.
  - c. Trending screen to display graphs of process data including system pressure, flow rate and pump speed for each pump in the system.
  - d. Maintenance screen showing equipment run times and start counts.
  - e. Set point screen to allow password-protected system set point changes for all control and alarm points.

- f. Web browser configured for remote access to allow view only access to the screens.

F. Instrumentation:

- 1. All discrete and analog signals monitored by the PLC system shall be scaled and organized in the PLC registers, and displayed on the operator interface system. These include but are not limited to:
  - a. Pressures
  - b. Flow rates
  - c. Flow totals
  - d. Building door and smoke alarm status
  - e. Pump running status for each pump
  - f. Pump fail status for each pump
  - g. Pump run time (hours) for each pump
  - h. Number of starts for each pump
  - i. VFD data including speed output and feedback, drive status.
  - j. Gas sensor readings

G. Alarm signals

- 1. Alarm signals shall be programmed with 5 second debounce timers and shall be displayed on the operator interface. The alarms shall be (minimum):
  - a. Pump Fail for each pump in system
  - b. High and Low pressure
  - c. Pressure transducer out of range
  - d. High and Low flow
  - e. Instrumentation out of range
  - f. Power fail
  - g. Intrusion
  - h. Smoke
  - i. Gas sensor high level alarms



H. Supervisor Control and Data Acquisition (SCADA) System:

1. SCADA System Software

- a. The System Integrator shall develop the custom graphical for the SCADA computer application based on this specification and input from the Owner and Engineer.
- b. The functions and screens shall utilize the full software capabilities of the software provided.
- c. The SCADA screens shall be developed in coordination with the operator interface screens for a similar look and operation between the operator interfaces and new SCADA computer.
- d. The proposed SCADA screens will include, but not limited to:
  - 1) System Overview: Plan view of the Wastewater Treatment Facility showing key process data and operational status of each motor (running/stopped/failure), instantaneous flow rate for each flow meter, total influent and effluent flow, levels and other critical process data. This screen provides a large-scale overview of the entire treatment system.
  - 2) Influent Pump Station: Shows the water elevation of the wet well as measured by the submersible level transducer, float switch status, and pump status (running/stopped/failure). Indicate control set point levels and set point control.
  - 3) 2W pump station: Show status of 2W water well system, pressure setpoint, pressure feedback, VFD speeds.
  - 4) Aeration Screen: Provide a detailed graphical screen with all equipment and process information including Blower status, control setpoints, alarm setpoints, pump starts, pump runtime, and alarm setpoints.
  - 5) Train Screens: Provide a detailed graphical screen with all equipment and process information from each Train control panel and instrumentation. Include motor status, control setpoints, alarm setpoints, DO levels, weir levels, valve position and status, pump starts, pump runtime, and alarm setpoints.
  - 6) Dewatering Building: Provide a detailed graphical screen with all equipment and process information from the Dewatering Skid panel and Level Lodor system.
  - 7) Flow meter Screen: Summary of all flow meter instantaneous flow readings, flow totals for each meter, and daily/weekly/month influent and effluent flow totalizers.

- 8) Sampler Screen: Display Sampler status and provide set point control for flow pace control and alarms, where applicable.
- 9) Chemical Metering Equipment Screen: Chemical metering equipment status and set point control for flow pace control to metering equipment and alarms, where applicable.
- 10) Maintenance Screen: Summary of pump starts and runtimes for each pump. Allows operators to monitor pump usage and determine maintenance schedules.
- 11) Power Screen: Display of power data from the electrical power meter in the MCC. Includes current, voltage and frequency measurements for the 480V three phase system.
- 12) Generator Screen: Automatic Transfer Switch (ATS) position, Utility power source status, Generator status (run/fail), low fuel alarm.
- 13) Alarm Screen: Shows summary of all active alarms and allows each individual alarm to be enabled or disabled for maintenance.
- 14) Trending: Configure AVEVA Insight to log all process data into the online Historian. Configure Historical trend screen allows process data logged into the Historian to be viewed in graphical format.
- 15) Reporting: Configure AVEVA Insight to provide interactive reporting tools and coordinate with Owner and operator for the custom reports to meet Agency requirements.
- 16) Data trending, logging and reports using the Insight software tools and cloud based system
- 17) Common Navigation screen, login tools, time and date display, user and password.
- 18) Set point screen to allow password-protected system set point changes for all control and alarm points.
- 19) Pop up screens as needed for setpoint control, notifications or other common features.
- 20) Additional screens and features not listed herein but required for a complete and operational SCADA application.
- 21) Configure communication status monitoring and comms loss notification.
- 22) Configure security functions per AVEVA software capabilities.

- 23) Configure remote access via VPN to allow for secure remote access by Operator.

I. Alarm Monitoring Software – WIN 911 Mobile

1. Alarm signals shall be programmed for each system alarm. An alarm event logger shall be included to indicate time and date for each alarm, when triggered and when acknowledged.
2. All alarms will be programmed in the PLC for monitoring by the SCADA computer and WIN 911 mobile interactive alarm system.
3. All alarms shall include adjustable de-bounce timers (5 sec) and enable/disable functionality for each alarm.
4. Configure WIN-911 software for treatment system alarm monitoring and remote and interactive notifications. Configure up to 5 remote users, cell phone setup for each, testing and training for system operators to use the system and also adjust and configure schedules and users.

3.08 SYSTEM STARTUP AND TESTING

- A. The control system shall be put into operation by the System Integrator, equipment supplier or representative, and Electrical Contractor. The functionality of all aspects of the system shall be verified at this time. The Contractor will provide all labor and services for a complete installation, based on the schedule determined by the Engineer and Owner.
- B. A witnessed functional acceptance test shall be performed on the completed control system. Each feature and function shall be demonstrated to the satisfaction of the Engineer. The actual testing program shall be conducted in accordance with the prior approved procedures, and shall be witnessed and signed off by both the Contractor and the Engineer upon satisfactory completion.
- C. All special testing materials and equipment required to demonstrate compliance with the specification shall be provided by under the scope of this Section. Where it is not practical to test with real process variables, provide suitable means of simulation. These simulation techniques shall be subject to the approval of the Engineer.
- D. All final software programs shall become the property of the Owner and shall be provided on USB flash drive with full access rights.

\*\*\* END OF SECTION \*\*

## **SECTION 31 10 00 – SITE CLEARING**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION**

- A. Work under this Section includes providing all labor, materials, tools, and equipment necessary for clearing, grubbing, removing and disposing of all vegetation and debris. Prior to the start of clearing and grubbing, the Owner shall clearly mark the clearing limits in the field.

#### **1.02 RELATED SECTIONS**

- A. Section 02 41 00 – Demolition.

### **PART 2 - PRODUCTS (NOT USED)**

### **PART 3 - EXECUTION**

#### **3.01 CLEARING AND GRUBBING**

- A. The Contractor shall clear the entire area within the project limits by clearing and grubbing all vegetation to a minimum of 1-foot below the graded surface.
- B. Contractor shall exercise care as to not encroach or disturb vegetation outside of the marked clearing limits.
- C. Vegetation and debris must be hauled to a legal waste site obtained by the Contractor. All costs associated with disposing of grubbed vegetation and debris shall be incidental to the contract.

**\*\*\*END OF SECTION\*\*\***

## SECTION 31 20 00 - EARTHWORK

### PART 1 - GENERAL

#### 1.01 DESCRIPTION

- A. Description of Work: The work covered by this section consists of excavating, hauling and disposal of excavated material, backfilling, placing, compacting and final site grading as specified herein and as shown on the drawings.

#### 1.02 RELATED DOCUMENTS:

- A. Appendix C: *November 8, 2022 Geotechnical Engineering Report*, GeoEngineers. This report summarizes the geotechnical site explorations and design recommendations for the proposed water/wastewater facility improvements.

#### 1.03 SUBMITTALS

- A. Submit, in accordance with requirements of Section 01 33 00 – Submittal Procedures, the following:
  - 1. Gradation and moisture density curves for all imported materials.
  - 2. Certificates and proctor test reports. The Contractor shall provide certificates of laboratory tests in accordance with Section 01 33 00 – Submittal Procedures, indicating particle size distribution for review of each type of granular material furnished and proctor test reports for all fill material. The certificates and proctor test results shall be provided to the Engineer at least 5 calendar days prior to placement.
  - 3. Separation Geotextile product information
  - 4. Proposed compacting equipment for compacting earth embankments.

#### 1.04 REFERENCES

- A. American Society of Testing and Materials (ASTM)
  - 1. ASTM-D-1556 – Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method
  - 2. ASTM-D-1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
  - 3. ASTM-D-2922 – Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods
  - 4. ASTM-D-3017 – Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

#### 1.05 QUALITY ASSURANCE

- A. All field inspections and tests will be conducted by an independent testing lab/agency hired by the Engineer. Contractor is to coordinate and schedule inspections with the Engineer. The Engineer will pay the testing lab/agency. In addition, additional QA/QC testing may be performed by the Owner/Engineer's independent testing lab/agency as desired by the Owner/Engineer. The Contractor shall allow the Owner/Engineer's

representative to perform additional QA/QC testing and shall make right to the satisfaction of the Engineer all work found to be deficient in meeting the specifications. If the subgrade or fills which have been placed are below the specified density, additional compaction and testing will be required until satisfactory results are obtained. QA/QC testing and inspection by the Owner/Engineer does not relieve the Contractor from the responsibility to provide all adequate quality control measures and all testing to ensure the quality of his own work.

- B. The Engineer will use an independent soils testing lab to measure ASTM D-1557 Methods A through D dry density. Additional tests will be performed as directed by the Engineer in the field. All material samples will be taken at the time and location as agreed by the Engineer and Contractor. The Contractor shall give the Engineer ample time to perform additional QA/QC testing (if desired) of Contractor stockpiled onsite soil tested – at least 5 working days prior to installation of any embankment or backfill using onsite soils.
- C. The Engineer will use an independent soils testing lab and will perform one in place density measurement per every 100 LF of roadway and per every 1,000 square feet of native subgrade prepared and compacted prior to placement of structural backfill materials. The Engineer will perform one in place density measurement per every 500 cubic yards of structural backfill materials placed. The Engineer may increase the frequency if the properties of the soils being placed change or the equipment or procedures used by the Contractor for compacting the soil change. In place density will be measured using ASTM D-1556 or ASTM D2922 and D3017 (nuclear density) test methods. The Contractor shall give the Owner/Engineer ample time to perform additional QA/QC testing (if desired) of the subgrade – at least 24 hours advance notice and a minimum of 4 hours for completion of testing after compaction is completed on 100 LF of roadway or 1,000 square feet of native subgrade. The Contractor shall give the Owner/Engineer ample time to perform additional QA/QC structural fill testing (if desired) – at least 24 hours advance notice and a minimum of 4 hours for completion of testing after compaction is completed on a lift.
- D. The Contractor shall pay for any additional testing deemed necessary to provide quality assurance for the work or to corroborate or protest the Owner's test results.

## **1.06 JOB CONDITIONS**

- A. Existing Conditions:
  - 1. The Contractor shall examine the site before commencing work and shall make his own deductions and conclusions as to the nature of materials to be encountered and difficulties anticipated.
  - 2. Data results of a subsurface investigation of the site and soil conditions are included in the Geotechnical Engineering Report (Appendix A). In addition, the Contractor is encouraged to visually inspect soil conditions at the site.
  - 3. The Contractor is encouraged to visually inspect soil conditions at the site. Contractors shall make whatever investigations as are necessary to determine what measures are necessary to successfully complete the work in accordance with the Contract. The Contractor shall include in the Contract price all work necessary to perform the tasks required to complete the Work as indicated on the Plans and specified herein: including, but not limited to, sheeting, shoring, dewatering, stabilizing slopes, and any other work of temporary nature not a part of the permanent finished structure, lines, and grade.
- B. Subsurface Conditions

1. The Contractor shall notify the Engineer when excavation for compacted fill or structures is complete. No forms, reinforcing steel, fill, or concrete shall be placed until the excavation has been inspected by the Engineer.
2. Groundwater may be encountered, and dewatering measures may be required for construction activities. Contractor is responsible for any dewatering considered incidental to the project. Contractor to plan accordingly.
3. Boulders, buried or otherwise, may be found in the project area, and boulder excavation is considered incidental, if needed.

## **1.07 UNSUITABLE FILL MATERIAL**

- A. Unsuitable materials shall be those defined as containing volcanic ash, topsoil, vegetation matter, sludge, peat, organic clays and silts, sod, mulch, rubbish, and materials which are excessively fine or moist not allowing adequate compaction

## **PART 2 - PRODUCTS**

### **2.01 GEOTEXTILES**

- A. NON-WOVEN GEOTEXTILE WRAP: TenCate Mirafi 160N, Evergreen TG 600, Contech C-60NW, or equal.
- B. UNIAXIAL PRIMARY REINFORCEMENT: TenCate Mirafi 3XT or equal.
- C. BIAXIAL SECONDARY REINFORCEMENT: TenCate Mirafi 2XT or equal.

### **2.02 STRUCTURAL FILL**

- A. See Processed Structural Fill Material Section 2.03. All import fill is to be imported material per WSDOT specifications or as specified. Contractor to submit proposed aggregate materials information from local supplier(s) prior to construction.
- B. Excavated soils shall not be used unless the contractor can demonstrate that the soils meet the WSDOT specification and gradation requirements indicated for the material specified. All excavated materials not used shall be hauled to a waste site.

### **2.03 PROCESSED STRUCTURAL FILL MATERIAL**

- A. CRUSHED SURFACING TOP/BASE COURSE. Per WSDOT 9-03.9(3).
  1. Shall be used as indicated in the plans and specs and compacted to 95% MDD.
- B. GRAVEL BASE. Per WSDOT 9-03.10.
  1. Shall be used as indicated in the plans and specs and compacted to 95% MDD. When used as pavement section gravel base shall have at least 30 percent retained on the U.S. No. 4 sieve.
- C. QUARRY SPALLS. Per WSDOT 9-13.1(5). Unless otherwise noted on the plans.
- D. GRAVEL BACKFILL FOR PIPE ZONE BEDDING. Per WSDOT 9-03.12(3).
- E. GRAVEL BACKFILL FOR DRAINS. Per WSDOT 9-03.12(4).
- F. SAND. Per WSDOT 9-03.13
- G. CAPILLARY BREAK. Per WSDOT 9-03.1(4)C – AASHTO Grading No. 67

1. Shall be used as indicated in the plans and specs and compacted to 95% MDD.
- H. GRAVEL BORROW. Per WSDOT 9-03.14(1)
1. Shall consist of clean, non-plastic, free-draining sand and gravel free from organic matter, with the exception that the percent passing the U.S. No. 200 Sieve shall not exceed 5% and all materials shall be smaller than 4". The percentage passing the No. 200 sieve should be based on that fraction passing the  $\frac{3}{4}$ " sieve. The gradation is summarized below.
- Material shall meet the following gradation specifications:
- | Sieve Size      | Percent Passing by Weight |
|-----------------|---------------------------|
| 4" Square       | 100%                      |
| 2" Square       | 75-100%                   |
| U.S. No. 4      | 50-80%                    |
| U.S. No. 40     | 30 max.                   |
| U.S. No. 200    | 5% max.                   |
| Sand Equivalent | 50 minimum                |
2. Alternatively, crushed surfacing base course, in conformance with Section 9-03.9(3) of the WSDOT Standard Specifications may be used.
- I. GRAVEL BACKFILL FOR WALLS. Per WSDOT 9-03.12(2).
  - J. BANK RUN GRAVEL FOR TRENCH BACKFILL. Per WSDOT 9-03.19.
  - K. COBBLES (3" to 4") for trench drains shall conform to WSDOT 9-03.11(2) Streambed Cobbles (4" cobbles from table gradation).
  - L. CONTROLLED DENSITY FILL (CDF). Per WSDOT 2-09.3(1)E.

## PART 3 - EXECUTION

### 3.01 GENERAL

- A. Weather Limitations: Construction shall progress only when weather conditions will not adversely affect the quality of the finished work. Soils that are not compactable due to saturation shall be aerated or removed and replaced with a compactable material. Contractor shall bear all costs for rework caused by weather conditions.
- B. Control of Water: See Section 31 23 19 – Dewatering.
- C. Water for Compaction: Contractor shall provide all water as necessary to moisture-condition Structural Fill material to achieve required compaction densities.
- D. Excavation for Structures: Conform to elevations and dimensions shown with a tolerance of plus or minus 0.10 feet and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services and other construction.
- E. In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade prior to placement of concrete reinforcement. Trim bottoms to required lines and grade to provide solid base for structure.



- F. Crushed Surfacing Base Course shall be placed under all concrete slabs, footings, and foundations, including pile foundations, to the minimum depth indicated below, unless otherwise indicated, on exposed, undisturbed, compacted subgrade immediately upon completion of excavation, or greater thickness if needed to protect subgrade and support contractor selected construction equipment.

For Mat Foundations and Vaults – 12 inches minimum depth

For Shallow Foundations – 18 inches minimum depth

For Pile Structures – 24 inches minimum depth

- G. Structural fill shall extend a lateral distance equal to the depth below the footing or 2 feet beyond the edge of the footing/mat, whichever is greater.
- H. Disposal of Excavated Materials: The Contractor is responsible for ultimate disposal of all excavated material and such disposal shall be incidental to other work. See grading and erosion control plans.
- I. Over Excavation: Excavation of materials beyond the indicated subgrade elevations shall be backfilled with Structural Fill and compacted to provide a firm and stable base at the desired elevation. Work required to remedy over excavation not authorized by the Owner or the Engineer shall be at the Contractor's expense.
- J. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace, as required, to prevent cave-ins. Remove prior to backfilling unless otherwise specified.
- K. Stockpile excavated materials classified as suitable material where directed, until tested and approved for fill. Place, grade, and shape stockpiles for proper drainage and erosion control as approved by the Owner. The temporary stockpile site, if required, shall be coordinated with the Owner.
- L. The Contractor's bid price shall include all costs associated with providing materials and methods for the geogrid-reinforcement where specified, if any.
- M. Structural fill placed between vaults and concrete structures when the space between is less than 2-feet shall be hand compacted or filled with CDF

### **3.02 SITE PREPARATION**

- A. Prior to placement of Structural Fill under buildings, structures, and roadways embankments, scarify, moisture-condition, and compact subgrade soils to at least 95% of the maximum dry density (MDD) based on ASTM D-1557 if not already at 95% of the MDD. Subgrade preparation per WSDOT Standard Specification section 2-06.
- B. Benching subgrade. Slopes to be filled, which are 5:1 or steeper, shall be benched before receiving structural fill. Each bench shall be level in all horizontal directions and shall be at least 8 feet wide (perpendicular to slope contours).

### **3.03 STRUCTURAL FILL**

- A. Structural Fill shall be placed in lifts not exceeding 10-inches in loose thickness before compaction, unless used as Backfill of Structures, Section 3.04. Structural Fill shall be compacted to 95% maximum dry density (MDD) based on ASTM D-1557.
- B. Where material must be moisture-conditioned before compaction, uniformly apply water to surface of subgrade or to layer of material, to prevent free water appearing on surface during or subsequent to compaction operations. Remove and replace, or scarify and air dry soil that is too wet to permit compaction to required density. Material that has been

removed due to excessive moisture may be stockpiled or spread and allowed to dry. Assist drying by disking, harrowing or pulverizing until moisture content is reduced to satisfactory value.

- C. Maintain Structural Fill areas as a continuous working surface throughout the project. Fill surfaces are to be graded smooth and sealed or covered as appropriate at the end of each work day to prevent unacceptable wetting. After periods of rain, remove any soft material prior to placement of additional fill.
- D. Provide cut and fill slopes reasonably true to line and grade with a tolerance of plus or minus 3 inches.

### **3.04 GRADING**

- A. General. Uniformly grade areas within limits of project site including adjacent transition areas. Smooth finished surfaces within specified tolerances, compact with uniform levels or slopes between points where finish elevations are shown or between points where finish elevations are shown or between such points and existing grades.
- B. Drainage Ditches. If any existing drainage ditches or swales exist, they should be maintained and/or fully restored to pre-construction conditions if altered in any way during construction, unless otherwise noted on the plans.

### **3.05 UNSUITABLE MATERIAL (OVER-EXCAVATION)**

- A. In the event that during excavation unsuitable material is encountered at the subgrade, the Owner/Engineer shall be notified of such areas prior to placing structural fill or pouring concrete. The specific areas of unsuitable material shall be addressed as described herein. Work under this item shall be allowed ONLY upon written authorization of the Owner or Engineer.
- B. Unsuitable material shall be over-excavated 18-inches below the trench neat line and filled with Crushed Surfacing Base Course conforming to WSDOT 9-03.9(3), or locally available approved equal submitted to and reviewed by the Engineer, and compacted to 95 percent of maximum dry density described in ASTM D1557. Fill up to the trench neat line to allow room for the bedding material.
- C. DISPOSAL OF UNSUITABLE MATERIAL (OVER-EXCAVATION)
  - 1. Excavated unsuitable material from over-excavation shall be disposed of off-site.
  - 2. All over-excavated material which is hauled off of the job site shall be documented with receipts, documenting weight (or volume agreed upon with Engineer for truck counts) and certification that it was transferred to a legal fill site. Receipts to be provided to Owner.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 31 23 19 - DEWATERING**

### **PART 1 - GENERAL**

#### **1.01 SCOPE**

- A. The work specified in this Section shall consist of dewatering excavations of any kind and location, including but not limited to groundwater, surface water, and precipitation, until backfilling has been completed to finished grade.

#### **1.02 SUBMITTALS**

- A. Prior to the start of construction, the Contractor shall submit a dewatering plan in accordance with Section 01 33 00 – Submittal Procedures containing both a graphical and narrative presentation identifying proposed methods, equipment sizes and contingency plans should dewatering cause settlement of any adjacent facilities. The dewatering plan shall show specific locations, in plan and section, where dewatering is expected as well as a general discussion of methods to be employed should water be encountered in other locations. The plan shall detail the depth, diameter and anticipated flow for dewatering wells, well points or sumps.
- B. In addition, the dewatering plan shall identify all stormwater diversions around the site, discharge locations from the site, treatment, storage, and conveyance facilities needed to manage construction-related stormwater. All stormwater runoff that is encountered on the site and dewatering water from trenches or excavations, is collectively termed “Construction-Related Stormwater.” The plan shall be a living document that is kept up to date as construction progresses similar to the temporary erosion and sediment control plans. As adaptive measures are employed, and the plan changes, these changes shall be recorded on the approved plan such that it is always up to date and available for inspection by the Engineer or regulatory authorities.
- C. Acceptance by the Owner of the method, installation, and operation and maintenance details submitted by the Contractor shall not in any way be considered to relieve the Contractor from full responsibility for errors therein or from the entire responsibility for complete and adequate design and performance of the system in controlling the water level in the excavated areas, and for control of the hydrostatic pressures to the depths specified herein. The Contractor shall be solely responsible for the proper design, installation, proper operation, maintenance, and any failure of any component of the dewatering system.

#### **1.03 REFERENCES**

- A. “Rossum J.R., 1954, Control of Sand in Water Systems, Journal American Water Works Association, Volume 46, pp. 123-132”
- B. Construction Stormwater Permit
- C. Appendix C: November 9, 2022 Geotechnical Engineering Services Report along with the 2-page Report Addendum dated December 16, 2022, GeoEngineers. This report summarizes the geotechnical site explorations and design recommendations for the proposed wastewater facility improvements.

- D. Appendix B: Groundwater Level Analysis

#### **1.04 QUALITY CONTROL**

- A. It shall be the sole responsibility of the Contractor to control the rate and effect of the dewatering efforts to avoid all objectionable settlement and subsidence. The Contractor shall comply with local codes and ordinances of governing authorities with regard to disposal of water pumped from dewatering operations.
- B. Proposed discharge points shall be approved by the Owner prior to implementation of dewatering. The Contractor shall be responsible for taking all reasonable precautions necessary to ensure continuous, successful operation of the system.
- C. Groundwater levels were monitored for one year and the results are included in Appendix B – Groundwater Level Analysis. Significantly higher groundwater levels and dewatering is anticipated during the winter months. Contractor shall review Appendix B and the Geotechnical report and prepare a dewatering plan appropriate for the conditions.

#### **PART 2 - PRODUCTS**

- A. The Contractor shall have sufficient pumping equipment and/or other machinery available onsite before operations begin to assure that the operation of the dewatering system can be maintained. This shall include providing backup pumps of similar capacity and a standby generator of the capacity required to continuously operate the Contractor's dewatering system.

#### **PART 3 - EXECUTION**

##### **3.01 GENERAL**

- A. To the maximum extent feasible, all clean runoff that would otherwise flow into the project site and become turbid shall be routed around the project site such to not become part of the construction-related stormwater. All Construction-Related Stormwater shall be managed and disposed of in accordance with all local, state, and federal laws. Construction-Related Stormwater that is discharged to the downstream stormwater conveyance system must meet discharge limits for turbidity, pH, and all other discharge limits as specified by the Construction Stormwater General Permit (CSGP) and other applicable permits.
- B. The contractor shall employ all means and methods necessary to clean up Construction-Related Stormwater prior to discharge from the site to meet permit requirements. This may require the stormwater to be stored, filtered, chemically treated, hauled away, or other means as needed to meet permit requirements. In no case will the contractor be allowed to discharge Construction-Related Stormwater to the sanitary sewer, the sanitary sewer outfall, or into the wastewater treatment plan.
- C. All costs related to management, rerouting, and disposal of stormwater and Construction-Related Stormwater shall be included as part of the unit cost
- D. Contractor is responsible for investigating and becoming familiar with all site conditions that may affect the work including surface water, potential flooding conditions, level of groundwater and the time of year the work is to be done.

### **3.02 INSTALLATION AND APPLICATION**

- A. During excavation, the installation of piping, conduits and structures and during the placing of backfill, excavations shall be kept free of water, subsurface or otherwise. The Contractor shall furnish all equipment necessary to dewater the excavations and shall dispose of the water so as not to cause a nuisance or menace to the public. The dewatering system shall be installed and operated by the Contractor so that the groundwater level outside the excavation is not reduced to the extent that would damage or endanger adjacent structures or property. The release of groundwater to its static levels shall be performed so as to maintain the undisturbed state of the foundation soils, prevent disturbance of backfill and prevent movement of all structures and pipelines.
- B. Design, implementation, and maintenance of any dewatering system shall be the responsibility of the Contractor.
- C. All dewatering shall occur a minimum of 2-feet below the base of any structures.
- D. The Contractor shall construct all dewatering wells in accordance with WAC 173-160. The dewatering system shall be sufficient to maintain the groundwater level at an elevation to protect the surface of the trench bottoms, the base of the bedding course or other foundation, and shall be accomplished prior to pipe laying and jointing or placement of reinforcing steel for concrete.
- E. If well points or wells are used, they shall be adequately spaced to provide the necessary dewatering. The dewatering operation, however accomplished, shall be carried out so that it does not destroy or weaken the strength of the soil under or alongside the excavations.
- F. The Contractor shall design filters and screen slot sizes for all sumps, wells and well points which prevents the movement of fines during pumping. The Contractor shall develop the wells such that they produce no more than 10 ppm silica as measured with a Rossum Sand Tester (Rossum, 1954) or equivalent.

### **3.03 MONITORING**

- A. The Contractor shall install water level observation wells in dewatered areas sufficient to determine whether groundwater levels are maintained.

### **3.04 FIELD QUALITY CONTROL**

- A. A continual check by the Contractor shall be maintained to ensure that the subsurface soil is not being removed by the dewatering operation. The Contractor shall test all dewatering discharge using a Rossum Sand Tester or equivalent to determine the silica content of the discharge. The Contractor shall notify the Engineer at least 24 hours prior to testing. Where critical structures or facilities exist immediately adjacent to areas of proposed dewatering, reference points shall be established and observed at frequent intervals to detect any settlement that could develop.
- B. Should settlement be observed, the Contractor shall cease dewatering operations and implement contingency plans as outlined in the Contractor's approved dewatering plan. The responsibility for conducting the dewatering operation in a manner that protects adjacent structures and facilities rests solely on the Contractor. The cost of repairing any damage to adjacent structures and restoration of facilities shall be the responsibility of the Contractor. Permanent piping systems, existing or new, shall not be incorporated into the Contractor's dewatering system.

**\*\*\* END OF SECTION \*\*\***

## **SECTION 31 23 33 – TRENCHING AND BACKFILL**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. This section specifies trench excavation, bedding, backfilling, and compacting for utilities and related facilities.

#### **1.02 RELATED SECTIONS**

- A. Section 01 33 00 – Submittal Procedures
- B. Section 01 41 00 – Regulatory Requirements
- C. Section 01 45 00 – Quality Control
- D. Section 31 20 00 – Earthwork
- E. Section 31 32 11 – Soil Surface Erosion Control
- F. Section 33 31 00 – Sanitary Utility Sewerage Piping
- G. Section 33 41 00 – Storm Utility Drainage Piping

#### **1.03 SPECIFIC STANDARDS**

- A. The specific reference standard for this work will be Washington State Department of Transportation (WSDOT)/American Public Works Association (APWA) Standard Specifications/for Road, Bridge, and Municipal Construction, latest edition.
- B. American Society of Testing and Materials (ASTM) D-1557 – *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort*.
- C. Additional standards may also apply.

#### **1.04 QUALITY ASSURANCE**

- A. The Contractor shall comply with the requirements of all applicable regulatory agencies having jurisdiction over this work including 29 CFR PART 1926 -- SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION.
- B. Material sample and proctor test results shall be provided in advance for any proposed fill material not certified to be compliant with WSDOT Standard Specs.
- C. Use equipment adequate in size, capacity, and numbers to accomplish the work of this section in a timely manner. The Engineer will reject equipment that repeatedly breaks down or fails to produce results within normal tolerances. The Contractor shall have no claim for additional payment or for extension of time due to rejection and replacement of any equipment.

#### **1.05 JOB CONDITIONS**

- A. The Contractor shall provide protection of existing utilities affected by the work and make every effort to minimize disruptions to all utility services.

- B. If, during the course of construction, it is anticipated that excavation will interrupt traffic or parking areas for longer than 10 to 15 minutes the Contractor must provide advance notice to the Owner. For longer intervals or complete shut-downs, the Owner requires 48 hour advance notice. This advance notice allows time to deliver community notices in advance of the route delays or re-routes. In the event of such road closures, the Contractor shall be solely responsible for all traffic control measures including but not limited to flagging, barricades and cones.
- C. The Contractor shall provide a traffic control plan per WSDOT requirements. Traffic control plan to be submitted for review and acceptance prior to commencing work. See Section 01 33 00 – Submittal Procedures.
- D. Trenches shall be closed or covered with steel plates at the end of each work day.

## **1.06 SUBMITTALS**

- A. The Contractor shall furnish the following submittals as part of completing the work associated with this section:
  - 1. Location of disposal sites for excess excavated material.
  - 2. Gradation test results for imported foundation, bedding and backfill material.
  - 3. Proctor tests for proposed imported materials which are not identified as approved for use by WSDOT.
  - 4. Geotextile fabrics cut sheets or WSDOT QPL.

## **PART 2 - PRODUCTS**

### **2.01 TRENCH BACKFILL MATERIAL**

- A. Trench Backfill material to be per WSDOT 9-03.19, “Bank Run Gravel for Trench Backfill”, and be free from debris and organic matter and other extraneous or objectionable materials. No native backfill to be used.
- B. Excavated soils shall not be used unless the contractor can demonstrate that the soils meet the WSDOT specification and gradation requirements indicated for the material specified.

### **2.02 BEDDING MATERIAL**

- A. Bedding material for utilities shall conform to WSDOT 9-03.12(3), "Gravel Backfill for Pipe Zone Bedding," and be free from debris and organic matter and other extraneous or objectionable materials. No native bedding material to be used.
- B. Pipe bedding material and / or backfill around the pipe shall be placed in layers and tamped around the pipe to obtain complete contact per the project plans.

### **2.03 UTILITY WARNING TAPE**

- A. Shall be APWA color-coded detectable underground marking tape. Tape shall be 6-inch wide plastic-encased aluminum foil tape capable of being located by a metal detector. Message and coding shall be per APWA Standards and shall be as follows:



Message	Color Coding
CAUTION: ELECTRIC LINE BURIED BELOW	Red
CAUTION: WATER LINE BURIED BELOW	Blue
CAUTION: SEWER LINE BURIED BELOW	Green
CAUTION: TELEPHONE LINE BURIED BELOW	Orange
CAUTION: CATV LINE BURIED BELOW	Orange
CAUTION: AIR LINE BURIED BELOW	Light Blue

- B. Provide new continuous warning tape for each type of utility installed. Also provide new replacement warning tape for utilities encountered and replace any/all damaged sections of existing warning tape for those utilities. Should no warning tape exist on encountered utilities, provide a section of new tape at the crossing.

## **2.04 DRAIN ROCK & GRAVEL BACKFILL FOR DRAINS**

- A. Drain Rock for trench drains and retaining wall drains shall conform to WSDOT 9-03.12(4) Gravel Backfill for Drains.

## **2.05 COBBLES (3-IN TO 4-IN)**

- A. Cobbles for trench drains shall conform to WSDOT 9-03.11(2) Streambed Cobbles (4" Cobbles from table gradation).

## **2.06 GEOTEXTILE MATERIALS**

- A. Drainage Geotextile for use in trench drains and retaining wall drains – Non-woven, moderate survivability, per Table 1 of WSDOT Standard Specification 9-33.2(1).

# **PART 3 - EXECUTION**

## **3.01 EXISTING UTILITIES AND RELATED FACILITIES**

- A. Keep active utilities intact and in continuous operation. Regarding existing underground utilities, the Contractor shall:
  1. Call the utilities underground location center for field location of utilities.
  2. Pot hole as necessary to locate existing utilities.
  3. Not begin excavation until all known underground facilities in the vicinity of the proposed excavation have been either referenced on Plans, located, and/or marked on the ground.
- B. Location and dimensions shown on the Plans for existing utilities are in accordance with available information without uncovering, measuring, or other verification. Utilities/facilities whose underground location can be reasonably determined from existing above-ground features shall be considered the same as having been individually marked. In the event the Contractor discovers unknown utilities, he shall:
  1. Take reasonable and appropriate steps to avoid damage to the utility and/or Commission property.
  2. Promptly notify the Engineer for individual directions.

3. All costs to repair damage to above-ground or known subsurface structures due to operator error will be borne by the Contractor.

### **3.02 TRENCHING**

- A. Trench excavation shall conform with the most recent version of the WSDOT Standard Specifications. Special attention shall be paid to the requirements for trench safety noting that all work shall be performed in strict compliance with 29 CFR 1926.
- B. The Contractor shall be solely responsible for any shoring, cofferdams or trench safety systems employed on the project. In no way shall the Owner or Engineer assume any responsibility for trench safety or the protection of life or property implied by the use of trench safety systems.
- C. The width of excavation for utility trenches shall be in accordance with WSDOT Standard Specification. No additional payment will be made for extra excavation required due to poor soil conditions.
- D. See Section 00 23 00 – Earthwork for excess material disposal requirements.
- E. The Contractor shall provide and operate all material, equipment and labor necessary to keep excavations and earth embankments free from water during construction. Dewatering shall prevent weakening foundations, undercutting trench walls, or otherwise affecting the stability of sub-grades and foundations. The Contractor shall establish and maintain positive drainage away from excavations to prevent surface water from entering excavations. Water shall be disposed of in a manner which prevents injury to public or damage to property.
- F. The Contractor shall backfill or otherwise cover all trenches at the end of each working day to protect public safety. The length of open trench excavation in advance of pipe laying operations shall not exceed 200 feet unless approved by the Owner. In no case shall the length of an open trench or size of an excavation exceed the Contractor's ability to safeguard the public welfare.

### **3.03 BEDDING**

- A. Pipe bedding and pipe zone backfill installation shall comply with the WSDOT Standard Specifications, Section 7-08 — General Pipe Installation Requirements and per the Plans.
- B. Pipe bedding and pipe zone backfill shall be compacted to 90% of the maximum dry density described in ASTM D1557. Pipe bedding and pipe zone backfill shall be compacted in 6-inch maximum lifts.

### **3.04 BACKFILL**

- A. Trench and structure backfilling shall comply with the most recent version of WSDOT Standard Specifications, Section 7-08 — General Pipe Installation Requirements and per the Plans.
- B. Structure backfilling shall comply with the most recent version of WSDOT Standard Specifications, Section 2-09.3(1)E Backfilling and per the Plans.
- C. In areas beneath driveways, sidewalks, or within 5-feet of the roadway template (including shoulder or structures), backfill shall be compacted to 95% of the maximum dry density described in ASTM D1557. Backfill within the roadway template shall be compacted in 6-inch maximum lifts.

- D. In landscaped or native areas outside roadway templates and not beneath pavement, gravel paving, drives or sidewalks, backfill shall be compacted to 90% of the maximum density described above.
- E. Construction shall progress only when weather conditions will not adversely affect the quality of the finished work. At the same time, the Contractor must be prepared to take such measures as are necessary to complete the construction within the specified contract period. Where soils cannot be compacted due to moisture content, material shall be aerated or removed and replaced with a suitable granular backfill material. Contractor shall bear all costs for necessary extra measures and/or rework if excavated material is made unsuitable by adverse weather conditions and not protected by contractor in accordance with WSDOT Standard Specifications covering contractor requirements for protection of excavated materials.

### **3.05 UNSUITABLE TRENCH OVEREXCAVATION**

- A. In the event that during trenching unsuitable material is encountered at the trench bottom, the Owner shall be notified of such areas prior to placing pipe. The specific areas of unsuitable material shall be addressed as described herein. Work under this item shall be allowed ONLY upon written authorization of the Owner.
- B. Unsuitable material shall be overexcavated 18-inches below the trench neat line and filled with Crushed Surfacing Base Course conforming to WSDOT 9-03.9(3), or locally available approved equal submitted to and reviewed by the Engineer, and compacted to 95 percent of maximum dry density described in ASTM D1557. Fill up to the trench neat line to allow room for the bedding material.

### **3.06 COMPACTING**

- A. Compaction shall be performed in accordance with Section 31 20 00 Earthwork or as detailed on the Contract Plans.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 31 32 11 - SOIL SURFACE EROSION CONTROL**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Work includes but is not limited to following:
  - 1. Temporary measures to prevent soil erosion and sedimentation of storm sewers, streams or other bodies of water.
  - 2. A National Pollution Discharge Elimination System General Permit will be acquired from the Department of Ecology for this project. The Stormwater Pollution Prevention Plan (SWPPP) provides all the requirements and details to comply with the General Permit.
  - 3. Upon execution of the contract, the NPDES General Permit shall be transferred to the Contractor's name, and the Contractor shall be responsible for paying yearly fees as well as maintaining compliance with the permit from that point forward.

#### **1.02 RELATED SECTIONS**

- A. Coordinate related work specified in other parts of the Project Manual, including but not limited to following:
  - 1. Section 02 09 20 – Landscaping
  - 2. Section 31 10 00 – Site Clearing
  - 3. Section 31 23 33 – Trenching and Backfill

#### **1.03 REFERENCES**

- A. WSDOT Standard Specifications for Road, Bridge and Municipal Construction, latest edition.
- B. Washington State Department of Ecology's 2019 Edition of the Stormwater Management Manual for Western Washington.

#### **1.04 SUBMITTALS**

- A. Submit in accordance with Sections 01 33 00 the following
  - 1. Geotextile for temporary silt fence.
  - 2. Compost for compost berm.
  - 3. Inlet protection products.
  - 4. Barrier fence.
  - 5. Track clean plates.
  - 6. Any other erosion control products proposed for use on the site.

## **1.05 QUALITY ASSURANCE**

- A. Installer shall be a Specialist.
- B. Regulatory Requirements: Section 01 41 00.

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS**

- A. Silt Fence. Silt Fence shall comply with WSDOT Standard Specification 9-33 – Construction Geotextile and meet the properties described in Table 6 of said specification.
- B. Quarry Spalls per Earthwork Spec.
- C. Straw Mulch. Per WSDOT 9-14.4(1) – Straw
- D. Compost. Compost shall be in accordance with WSDOT Standard Specification 9-14.4(8).
- E. Inlet Protection Insert. Inlet protection insert shall be in accordance with City of Bellingham Standard Detail EC-620 – Catch Basin Insert.
- F. Orange Barrier Fence. Orange barrier fence shall comply with WSDOT Standard Specification 9-14.5(8) – High Visibility Fencing.
- G. Track Clean Plates. Track clean plates shall be Track Clean™ Construction Entrance Plates or approved equal. Plates must adhere to the guidelines of BMP C105: Stabilized Construction Entrance, found in Volume II of the WA State Ecology Stormwater Management Manual of Western Washington.

## **PART 3 - EXECUTION**

### **3.01 PREPARATION**

- A. Planning Of Construction: Plan and coordinate to reduce sediment pollution. Install all site BMPs prior to the commencement of land disturbing activities. Minimize the area of disturbance. Keep the area of clearing and grubbing to the minimum necessary for construction.

### **3.02 INSTALLATION**

- A. Install in accordance with “Quality Assurance” provisions, “References,” and Specifications. Where these may be in conflict, the more stringent requirements govern.
- B. Pump Water. Practice sound pump water management to reduce sediment production. Discharge pump water into stabilized surfaces and allow to filter through existing vegetation. Repair discharge areas, upon completion of construction, to pre-existing conditions or better. Do not pump water into adjacent wetlands, creeks, or rivers.

- C. Stabilization. Stabilize all slopes, channels, ditches or any disturbed area as soon as possible after the final grade or final earthmoving has been completed. Upon completion of the project, stabilize all areas which were disturbed by the project to prevent accelerated erosion. Maintain any erosion and sedimentation control facility required or necessary to protect areas from erosion during the stabilization period.
- D. Earthwork.
  - 1. Control excavation for site work operations. Stockpile the material removed from the excavation in area where a minimum of sediment will be generated and where other damage will not result from the piled earth.
  - 2. Stockpile topsoil separately and redistribute where shown on plans uniformly after grading.
  - 3. Protect all stockpiled soil materials from erosion through the use of plastic sheeting or similar temporary measures, secured against wind disturbance.
  - 4. Any area stripped of vegetation, where no further work is anticipated for a period of 14 calendar days, shall be immediately stabilized with an approved erosion control method such as seeding, mulching, netting, erosion control blankets, etc.
  - 5. All disturbed areas shall be promptly and thoroughly stabilized against erosion during periods of wet weather, particularly when work is not being performed at the site.

### **3.03 MAINTENANCE AND CLEANING**

- A. Maintenance. Maintain the erosion control measures and facilities in proper condition so that they will individually and collectively perform the functions for which they were designed. In order to insure the effectiveness and proper maintenance of the measures and facilities, the Contractor and Owner shall make periodic inspections at sufficiently frequent intervals to detect any impairments of the structural stability, adequate capacity, or other requisites of the herein approved measures and facilities which might impair their effectiveness. Take immediate steps to correct any such impairment found to exist.
- B. Cleaning: Leave installations clean; premises free from residue of work of this section.
- C. Street Sweeping: If onsite measures fail to prevent soil migration to street, Contractor shall provide regular sweeping.
- D. Inspection, or lack thereof, shall not relieve the contractor of the responsibility of maintaining erosion control at all times. The contractor should, therefore, check all erosion control periodically on their own to ensure adequacy.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 31 40 00 – TEMPORARY SHORING AND BRACING**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION**

- A. The work specified in this Section includes the temporary shoring and bracing for excavations including the trench excavation safety systems as shown on the Plans and as specified herein.

#### **1.02 WORK**

The extent of temporary shoring and bracing work includes, but is not limited to:

- A. Temporary shoring and bracing necessary to protect the following against loss of ground or caving embankments: existing structures, buildings, roads, walkways, utilities, electrical transmission towers and support wiring, other facilities and improvements where required to comply with codes and authorities having jurisdiction.
- B. Trench excavation safety systems, pursuant to RCW Chapter 49.17 and WAC 296-155-655.
- C. Maintenance of shoring and bracing.

#### **1.03 QUALITY ASSURANCE**

##### **A. SHORING CONSULTANT**

The Contractor shall engage the services of a qualified geotechnical engineer and qualified structural engineer registered in the State of Washington to design temporary shoring and bracing when required by applicable regulations.

##### **B. SHORING DESIGN**

The Contractor shall provide layout and design drawings and specifications for shoring and bracing when a trench box is inadequate for the purpose or will not be used and trench depth exceeds 4 feet and back sloping will not be used. Temporary shoring and bracing system design and calculations shall be prepared, stamped, and signed by a Professional Engineer registered in the State of Washington. Embedded portions of temporary shoring systems shall not be driven into the ground. Embedded portions shall be installed using drilling.

##### **C. REGULATIONS**

The Contractor shall design sheeting, shoring, and bracing in accordance with the Washington State Safety Code and any local codes and ordinances of governing authorities having jurisdiction.

#### **1.04 SUBMITTALS**

- A. The Contractor shall submit shoring and bracing layout and design drawings, calculations, and other backup data to the Owner for review in accordance with Section 01 33 00 – Submittal Procedures prior to the start of construction. Submit settlement monitoring and contingency plan for temporary shoring at excavations greater than 10-feet in depth.

## **1.05 PROJECT CONDITIONS**

### **A. SITE SURVEY**

1. The background survey information provided on the Plans is shown for clarity only. The Contractor shall determine, before commencing work, the exact location of all existing features that may be disrupted by new construction, including existing underground utilities. The Contractor shall be fully responsible for any and all damages, which might be caused by the Contractor's failure to exactly locate and/or preserve existing site features. Prior to commencing work, the Contractor shall check and verify governing dimensions and elevations.
2. The Contractor shall survey adjacent structures and facilities, establishing exact elevations at fixed points to act as temporary bench marks to monitor potential settlement from the Contractor's ongoing operations. Clearly identify temporary bench marks and record existing elevations from the control points shown on the Plans.
3. During excavation, the Contractor shall resurvey bench marks weekly. The Contractor shall maintain and make available at the job site an accurate log of surveyed elevations for comparison with original elevations, and promptly notify the Owner if changes in elevations occur or if cracks, sags, or other damage is evident.

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS**

- A. The Contractor shall provide suitable shoring and bracing materials, which shall support loads imposed. Materials for shoring systems need not be new, but shall be in serviceable conditions. Embedded portions of temporary shoring systems shall not be driven into the ground. Embedded portions shall be installed using drilling.

## **PART 3 - EXECUTION**

### **3.01 VERIFICATION OF CONDITIONS**

- A. The Contractor shall notify the Owner immediately if, during construction, subsurface conditions are different from those encountered in the exploratory holes.

### **3.02 INSTALLATION AND APPLICATION**

- A. The Contractor shall provide shoring systems adequately anchored and braced to resist earth and hydrostatic pressures at locations as needed to support excavations during construction. The Contractor shall locate required bracing to clear all permanent work. Bracing which must be relocated shall be installed prior to the removal of original bracing. The Contractor shall not place bracing where it will be cast into or included in permanent concrete work, except as otherwise acceptable to the Owner. The Contractor shall maintain bracing until structural elements are rebraced by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.



### **3.03 SETTLEMENT MONITORING**

- A. Monitoring shall be performed by the Contractor as required to verify that existing items located near temporary shoring systems are not experiencing settlement. Reference points shall be established and surveyed at sufficient frequency to detect any changes prior to adverse impacts occurring. Upon detection of settlement the contractor shall immediately stop work and implement contingency plans per the Contractor's approved temporary shoring monitoring plan. The responsibility for monitoring as required to protect existing items rests solely on the Contractor. See Section 31 23 19 Dewatering for additional monitoring requirements.

### **3.04 REMOVAL**

- A. The Contractor shall remove shoring and bracing in stages to avoid disturbances to adjacent and underlying soils and damage to structures, pavements, facilities and utilities. The Contractor shall repair or replace, as acceptable to the Owner, adjacent work damaged or displaced through the installation or removal of shoring and bracing work.

### **3.05 EXCAVATION SAFETY SYSTEMS**

- A. All work shall be carried out with due regard for public safety. Open trenches shall have proper barricades and at night they shall be distinctly indicated by adequately placed lights, as provided for elsewhere in the Specifications.
- B. The Contractor is reminded that the Owner has not so delegated, and the Owner's Representative does not purport to be a trench or excavation system safety expert, is not so engaged in that capacity under this Contract, and has neither the authority nor the responsibility to enforce construction, safety laws, rules, regulations, or procedures or to order the stoppage of work for claimed violations of trench or excavation safety.
- C. The furnishing by the Owner of resident representation and inspection personnel shall not make the Owner responsible for the enforcement of such laws, rules, regulations, or procedures, nor shall such make the Owner responsible for construction means, methods, techniques, sequences, procedures, or for the Contractor's failure to properly perform the work necessary for proper trench and excavation safety.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 32 12 16 – HOT MIX ASPHALT PAVING**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION**

- A. The work specified in this section includes the construction of hot mix asphalt (HMA) paving as indicated on the Plans in within this Specification. This section also includes temporary asphalt cold-mix for temporary repairs.
- B. Work shall also include the restoration of all asphalt surfaces excavated or disturbed during construction to a condition acceptable to the Owner.
- C. The work in this section shall be accomplished in accordance with the Standard Specifications for Road, Bridge and Municipal Construction, 2024 edition, as issued by the Washington State Department of Transportation (WSDOT) and the American Public Works Association (APWA), Washington State Chapter (hereafter “Standard Specifications”). The Standard Specifications, as modified or supplemented by the Amendments to the Standard Specifications and Technical Specifications shall govern the Work.

#### **1.02 SUBMITTALS**

- A. The Contractor shall provide certificates of laboratory tests indicating current sieve analysis data and mix design for asphalt-treated base and hot mix asphalt pavement mix designs in accordance with Section 01 33 00 – Submittal Procedures and as further specified herein. The certificates shall be provided to the Owner at least 5 consecutive calendar days prior to placement of any materials.

### **PART 2 - PRODUCTS**

#### **2.01 HOT MIX ASPHALT PAVEMENT**

- A. Hot mix asphalt pavement, HMA, CL. 1/2" PG 58H-22, shall conform to Section 5-04.2 of the WSDOT Standard Specifications, 91% minimum density, commercial classification. Prior to the production of HMA, the Contractor shall determine a design aggregate structure and asphalt binder content in accordance with WSDOT Standard Operating Procedure 732. Once the design aggregate structure and asphalt binder content have been determined, the Contractor shall submit the HMA mix design on DOT form 350-042 demonstrating the design meets the requirements of Sections 9-03.8(2) and 9-03.8(6) of the WSDOT Standard Specifications. Mix designs shall be accepted by commercial evaluation. The contractor shall only complete the first page of form 350-042. The contractor shall provide verification of mix design in one of the following processes:
  - 1. Submit samples to WSDOT State Materials Lab for WSDOT verification testing in accordance with WSDOT Standard Specifications.
  - 2. Reference a mix design that has been previously verified by the WSDOT Field Verification Testing Process or verified by WSDOT State Materials Lab on a previous project.

## **2.02 COLD MIX TEMPORARY REPAIR**

- A. Cold-mix material shall be MC-2 asphaltic concrete commonly referred to as “cold-mix”.

## **PART 3 - EXECUTION**

### **3.01 GENERAL**

- A. The Contractor shall maintain access to the facility at all times. The Contractor shall coordinate all work with the Owner to ensure the paving plan does not interfere with the Owners on-going operations.
- B. The Contractor shall provide, place and maintain all temporary markings and signage as required to warn and direct facility traffic as necessary during his paving operations.

### **3.02 ASPHALT CONCRETE PAVEMENT PLACEMENT**

- A. Asphalt concrete pavement materials shall be placed on compacted subgrade materials, as shown on the Plans, as indicated elsewhere in these Specifications, and in conformance with the WSDOT Standard Specifications. All existing asphalt pavement excavated or disturbed during construction shall be removed and replaced per this Specification.
- B. No material transfer devices or vehicles shall be used on this project.
- C. The asphalt shall be placed and compacted in 2-inch lifts.
- D. Asphalt pavement replacing existing asphalt shall match existing asphalt thickness or the minimum pavement repair section indicated on the plans whichever is thicker.

### **3.03 COLD MIX TEMPORARY REPAIR**

- A. During the course of construction, it may be necessary to provide temporary vehicle and/or pedestrian access within the project limits. Such temporary access shall be provided by temporarily patching trench crossings or other areas with cold mix, until such time as the permanent surface restoration is installed. Locations shall include those areas specifically indicated on the Plans, directed by the Owner or as further specified herein. This material will be furnished, placed, compacted, and removed and wastehailed at various locations throughout the project. The trenches and/or subgrade shall be thoroughly compacted and brought to a smooth grade prior to placing the material. It shall be placed, maintained (daily), and removed and wastehailed by the Contractor. Provide a minimum compacted thickness of 2 inches.

### **3.04 ASPHALT JOINTS**

- A. All joints of hot mix asphalt pavement shall be sealed with hot poured sealant meeting the requirements of WSDOT Standard Specification 9-04.2

### **3.05 QUALITY CONTROL**

- A. The Contractor shall be responsible for testing the ATB and HMA paving in accordance with the WSDOT Standard Specifications as specified herein, and with Section 01400. Testing shall include asphalt content and grading testing of hot mix asphalt mix samples, aggregate void content, fracture, and equivalence testing, and in-place density testing.

### **3.06 SAWCUTTING**

- A. Where shown on the Plans or where directed in the field by the Owner, the Contractor shall make a neat vertical sawcut at the boundaries of the area to be removed. Care shall be taken during sawcutting so as to prevent damage to the existing asphalt concrete, or concrete, to remain in place. Any pavement or concrete damaged by the Contractor outside the area scheduled for removal due to the Contractor's operations or negligence shall be repaired or replaced to the Owner's satisfaction by the Contractor at no additional cost to the Owner.
- B. All cuts shall be continuous, full depth, and shall be made with saws specifically equipped for this purpose. No skip cutting, wheel cutting or jack hammering will be allowed unless specifically approved otherwise in writing by the Owner.
- C. However, even if preapproved as a method of cutting, no payment will be made for this type of work, and it shall be considered incidental and included in the various unit contract and lump sum prices listed in the Proposal.
- D. The location of all pavement cuts shall be preapproved by the Owner in the field before cutting commences.
- E. All water and slurry material resulting from sawcutting operations shall not be allowed to enter the storm drainage or sanitary sewer system and shall be removed from the site and disposed of in accordance with the Washington State Department of Ecology regulations.
- F. All existing asphalt concrete pavement edges shall be saw cut back to sound material, in uniform lines immediately prior to paving operations. Any edges broken between the time of cutting and placement of new paving shall be recut to the satisfaction of the Owner at no additional cost to the Owner. All excess excavated materials shall be hauled to waste.

### **3.07 ASPHALT TRENCH PATCH**

- A. This work shall consist of the preparation, placing and compaction of asphalt trench sections, in accordance with the details included on the plans and the requirements outlined herein. The work shall be in conformance with this specification unless specifically directed otherwise by the Owner.
- B. The Contractor shall restore all asphalt surfaces excavated or disturbed to a condition acceptable to the Owner.
- C. Before any HMA material is placed, all pavement cuts shall be trued so that marginal lines of the patch will form a rectangle with straight edges and vertical faces a minimum of 1 foot back from the maximum trench width.
- D. The asphalt shall be placed and compacted in 2-inch lifts. The asphalt trench patch thickness shall match existing asphalt thickness or the minimum pavement repair section indicated on the plans whichever is thicker.
- E. Seal all joints scheduled to not receive an asphalt overlay.

### **3.08 ASPHALT OVERLAY**

- A. The Contractor shall overlay all pavement areas as shown on the Plans or as required by the Owner. The existing asphalt surface shall be prepared in conformance with WSDOT Standard Specifications Section 5-04.3(5)A.

- B. The asphalt work shall be in conformance with this specification unless specifically directed otherwise by the Owner.

### **3.09 ADJUSTING STRUCTURES TO GRADE**

- A. All utility castings and monuments within the existing and/or new pavement area shall be referenced by the Contractor prior to any pavement removal or planning. The Contractor shall keep a record of such references, and submit a copy to the Owner.
- B. Existing structures and new structures shall be adjusted to the finished grade as shown on the Plans and as further specified herein. Existing boxes, rings, grates, covers, and lids shall be reset in a careful and workmanlike manner to conform to the required grades.
- C. The new and existing utility castings and monuments shall be adjusted to grade in the following manner:
- D. As soon as the street or driveway has been paved past each structure or casting, the asphalt concrete mat shall be scored around the location of the structure or casting. After rolling has been completed and the mat has cooled, it shall be cut along the scored lines. The structure or casting shall then be raised to finished pavement grade and the annular spaces filled as indicated on the Plans. The Contractor shall install the pavement to give a smooth finished appearance. All covers, lids, frames, and grates shall be thoroughly cleaned.
- E. After pavement is in place, all new pavement joints shall be sealed with a 6-inch wide strip of hot asphalt sealer. A sand blanket shall be applied to the surface of the hot asphalt sealer immediately after the placement of the sealer to help alleviate the tracking of the asphalt. The sealer shall meet the requirements of Section 9-04.2 of the WSDOT Standard Specifications.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 33 05 00 - COMMON WORK RESULTS FOR UTILITIES**

### **PART 1. GENERAL**

#### **1.01 SECTION INCLUDES**

- A. This section covers information supplementary to the Drawings and the WSDOT Standard Specifications. The Contractor shall furnish and install pipe and fittings as shown on the Drawings, as specified in these Specifications, and as required for a complete and functional installation. All pipe and fittings shall be new.
- B. Piping systems, including pipe, fittings, anchors, and all other elements, shall be detailed, fabricated, and installed to resist all internal and external loads which will be imposed upon them. Pressure ratings and materials stated in these Piping Specification sections are minimum acceptable standards. Systems shall be suitable for the service intended.
- C. The pipe diameters shown on the Drawings and used in these Specifications are inside diameters unless specific reference is made to outside diameter of the pipe or the pipe is a standardized product normally designated by a nominal size, e.g., ductile iron pipe.
- D. The Contractor shall furnish and install pipe and fittings as shown on the Drawings, as specified in these Specifications, and as required for a complete and functional installation. The pipe shall be new, manufactured in accordance with these Specifications and Drawings.
- E. Work includes but is not limited to following:
  - 1. Trenching, unsuitable trench bottom overexcavation, bedding, backfilling, compacting and disposal of excess materials as required for installation of all underground utilities, conduit and other miscellaneous structures.
  - 2. Providing all material, equipment and labor necessary to complete the excavation and backfill operations necessary to install the underground utilities depicted on the plans.
  - 3. Trench dewatering and pumping.

#### **1.02 RELATED SECTIONS**

- A. Coordinate related work specified in other parts of the Project Manual, including but not limited to following:
  - 1. Section 31 23 33 - Trenching and Backfilling
  - 2. Section 33 31 00 – Wastewater Pipe, Fittings and Hoses

#### **1.03 REFERENCES**

- A. WSDOT Standard Specifications for Road, Bridge and Municipal Construction, Latest Edition; Sections 2-09 - Structure Excavation, and 7-08 - General Pipe Installation Requirements.
- B. WSDOT Standard Plans for Road Bridge and Municipal Construction, most recent edition.
- C. Washington State Department of Ecology's Latest Edition of the Stormwater Management Manual for Western Washington.

#### **1.04 SUBMITTALS PRIOR TO CONSTRUCTION**

- A. Submittals during construction shall be made in accordance with Part 3, Section 01 33 00. In addition, the following specific information shall be provided.
  - 1. Field Fabrication - For pipe lines which are assembled in the field from standard fittings, submit complete data on pipe and fittings, including any manufacturer's installation instructions.
  - 2. Material Certification - Certification of all materials, and manufacturing properly executed by the manufacturer, shall be available to show compliance with the Specification of materials being furnished. Test data on tests performed shall be provided as requested by the Engineer.
  - 3. Existing Pipe Verification - Expose all existing pipes which are to be connected to new pipelines. Verify the size, material, elevation, horizontal location, and pipe service of these existing pipes with sufficient lead time to make accommodations as necessary.

#### **1.05 SYSTEM DESCRIPTION**

- A. Provide protection of existing utilities affected by the work and make every effort to minimize disruptions to all utility services.
- B. If, during the course of construction, excavation interrupts traffic for longer than 15 minutes, inform the Owner and make all necessary arrangements for ingress and egress. In the event of such road closures, the Contractor shall be solely responsible for all traffic control measures including but not limited to flagging, barricades and cones.
- C. Trenches shall be closed or covered with steel plates at the end of each work day.

#### **1.06 QUALITY ASSURANCE**

- A. Regulatory Requirements:
  - 1. See referenced Codes, ordinances and the like/Section 01 30 00.
  - 2. Comply with the requirements of all applicable regulatory agencies having jurisdiction over this work including the Washington Industrial Safety and Health Act.

### **PART 2. PRODUCTS**

#### **2.01 BOLTS AND NUTS**

- A. Bolts and nuts shall be Type 316 stainless steel.

#### **2.02 RUBBER GASKETS**

- A. Store all rubber gaskets in a cool, well-ventilated place, and do not expose to the direct rays of the sun. Do not allow contact with oils, fuels, or petroleum solvents.

#### **2.03 JOINT LUBRICANT**

- A. Furnish joint lubricant with the pipe. Furnish the amount and type recommended by the pipe manufacturer. The lubricant shall be a water-soluble, nontoxic, vegetable soap compound conforming to United States Pharmacopoeia No. P39.

## **2.04 TESTING**

- A. Provide all hoses, plugs, and other necessary equipment to complete the tests.

## **2.05 CONCRETE FOR THRUST BLOCKING, THRUST TIES AND ENCASEMENT**

- A. The concrete for all thrust blocking and thrust ties shall develop a minimum compressive strength of 3,000 psi at 28 days.

# **PART 3. EXECUTION**

## **3.01 EXAMINATION**

- A. Verify installation conditions as satisfactory to receive work of this Section. Do not install until unsatisfactory conditions are corrected.

## **3.02 PREPARATION**

- A. Utility Location. Make every effort to identify the location of all existing underground utilities. Contact Utility Locate Service 48-hours in advance of any excavation.

## **3.03 ELECTRICAL AND WATER SERVICE**

- A. Contractor to protect existing electrical and water services as outlined on the Contract Plans. Coordinate with OPALCO, Eastsound Water Users Association, Eastsound Sewer and Water District, and the Engineer at least three business days in advance of any underground work in the vicinity of existing electrical services and/or existing water services.

## **3.04 TRENCH EXCAVATION AND BACKFILL**

- A. Trench Excavation and Backfill.
  - 1. All trench excavation and backfill shall be performed in accordance with Section 31 23 33 – Trenching and Backfill.

## **3.05 SHIPPING AND HANDLING MATERIALS**

- A. During transportation, unloading, and storage, pipe and materials shall be protected, supported, and handled in a manner to prevent damage to the materials, especially linings and coatings. Only implements and equipment suitable for proper and safe handling of the materials shall be used. Fabric slings shall be used to lift pipe and fittings, not chains or cables.

## **3.06 PIPE PREPARATION AND HANDLING**

- A. Each pipe and fitting shall be carefully inspected before the exposed pipe or fitting is installed or the buried pipe or fitting is lowered into the trench. The interior and exterior protective coating shall be inspected, and all damaged areas patched in the field with material similar to the original, except damaged glass-lined pipe. Any damaged glass-lined pipe shall not be used and shall be promptly removed from the site. Any pipe which, in the opinion of the Engineer, is damaged beyond repair shall be removed from the site and replaced with another unit. Clean ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and keep clean during and after installation.
- B. Use proper implements, tools, and facilities for the safe and proper protection of the pipe. Carefully handle pipe in such a manner as to avoid any physical damage to the pipe. Do not drop or dump pipe from trucks or into trenches under any circumstances.



- C. All pipe fittings and appurtenances shall be installed in accordance with the manufacturer's instructions and these Specifications.

### **3.07 CUTTING AND FABRICATING**

- A. Cut pipe with approved cutters, do not flame cut except for mild steel pipe. Cut perpendicular to axis of pipe. Dress ends to suit type of joint being made, removing burrs, mill scale, and debris before making up. Repair damaged linings and coatings.

### **3.08 BELL HOLES**

- A. Excavate bell holes at each joint to permit proper assembly and visual and feeler gauge inspection of the entire joint.

### **3.09 EXPANSION PROVISIONS**

- A. Provisions shall be made for the expansion and contraction which may occur in pipe due to temperature change. Pipe expansion provisions may not be detailed on the Drawings. The absence of these details on any Drawing shall not relieve the Contractor of the responsibility for providing them where required, and at his sole expense.

### **3.010 PIPE IN CONCRETE ENCASEMENTS OR CONCRETE BEDDING**

- A. Except for welded joints, pipe joints shall not be encased in concrete unless specifically required on the Drawings. Pipe coatings shall be continuous through concrete encasements, thrust blocks, anchors, collars, etc., unless otherwise shown on the Drawings.

### **3.011 FLEXIBLE JOINTS AT CONCRETE BACKFILL OR ENCASEMENT**

- A. Except for welded joint pipe, a flexible joint shall be provided within 18 inches or one-half the pipe diameter, whichever is less, from the terminations of any concrete backfill, or concrete encasement.

### **3.012 FLEXIBLE JOINTS AT CONCRETE STRUCTURES**

- A. A flexible joint shall be provided near the exterior face of all structures. The joint may be flush with the face, may be up to one half pipe diameter away from the face, but shall not be more than 18 inches away from the face.

### **3.013 LINE AND GRADE**

- A. Grade the bottom of the trench by hand, if necessary, to the line and grade to which the pipe is to be laid, with proper allowance for pipe thickness and for base. Remove hard spots that would prevent a uniform thickness of bedding or cause non-uniform pressure on the pipe barrel.
- B. Lay pipe to a uniform grade between indicated elevations. Do not deviate more than 1 inch from line or 1/4 inch from established grade. Measure for grade at the pipe invert.
- C. Before laying each section of pipe, check the grade with a straightedge and correct any irregularities found. The trench bottom with bedding shall form a continuous and uniform bearing and support for the pipe at every point between bell holes, except that the grade may be disturbed for the removal of lifting tackle.

### **3.014 PERMISSIBLE DEFLECTION AT JOINTS**

- A. Wherever it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, do not exceed the amount of deflection recommended by the pipe or coupling manufacturer.

### **3.015 L LAYING AND JOINTING PIPE AND FITTINGS**

- A. After a section of pipe has been lowered into the prepared trench with bedding, clean the end of the pipe to be joined, the inside of the joint, and the rubber ring immediately before joining the pipe. Make assembly of the joint in accordance with the recommendations of the manufacturer. Provide all special tools and appliances required for the jointing assembly.
- B. The gasket position shall be checked with a feeler gauge, furnished by the pipe manufacturer, to assure proper seating. After the joint has been made, check pipe for alignment and grade. Provide sufficient pressure in making the joint to assure that the joint is "home", as defined in the standard installation instructions provided by the pipe manufacturer. To assure proper pipe alignment and joint makeup, place sufficient pipe zone material to secure the pipe from movement before the next joint is installed.
- C. Take the necessary precautions required to prevent excavated or other foreign material from entering the pipe during the laying operation. At all times, when laying operations are not in progress, at the close of the day's work, or whenever the workmen are absent from the job, close and block the open end of the last laid section of pipe to prevent entry of foreign material or creep of the gasketed joints.
- D. Take all precautions necessary to prevent the "uplift" or floating of the line prior to the completion of the backfilling operation.
- E. When cutting and/or machining the pipe is necessary, use only tools and methods recommended by the pipe manufacturer.

### **3.016 UNSUITABLE CONDITIONS FOR LAYING PIPE**

- A. Do not lay pipe in water, or when in the opinion of the Engineer, trench conditions are unsuitable.

### **3.017 PREVENTING TRENCH WATER FROM ENTERING PIPE**

- A. When the pipe laying is not in progress, close the open ends of pipe by approved means, and do not permit trench water or other foreign material to enter the pipe. Keep water out of the trench.

### **3.018 LOCATION OF THRUST RESTRAINT**

- A. All pipeline tees, plugs, caps, bends, and other locations where unbalanced forces exist shall be thrust restrained. Thrust blocks and ties are not shown on the Drawings. The Contractor is responsible for providing thrust restraint as incidental items in the Contract Price.

### **3.019 THRUST TIES**

- A. The Contractor shall install thrust ties at all locations necessary to restrain thrust forces. Such thrust ties are subject to the review and approval of the Engineer. The concrete for all thrust ties shall develop a minimum compressive strength of 3,000 psi at 28 days.

### **3.020 THRUST BLOCKING**

- A. Thrust blocking shall be adequate to withstand hydrostatic test pressures as well as normal operating pressures. Place thrust blocking between undisturbed ground and the fitting to be anchored. Place the blocking so that the pipe and fitting joints will be accessible for repairs. The concrete for all thrust blocks shall develop a minimum compressive strength of 3,000 psi at 28 days.

- B. For gravity or low pressure pipeline, when the bearing surface of the fitting against the soil provides an area equal to or greater than the area required for thrust restraint, concrete thrust blocks will no longer be required. The bearing area for fittings without thrust blocks will be determined by the projected area of 70 percent of the internal diameter multiplied by the chord length for the curve along the centerline of the fitting.

### **3.021 INSTALLATION OF EXPOSED PIPING**

- A. Unless shown otherwise, piping shall be parallel to building lines. Hangers on adjacent piping shall be aligned where possible on common size ranges.
- B. All pipe flanges shall be set level, plumb, and aligned. All flanged fittings shall be true and perpendicular to the axis of the pipe. All bolt holes in flanges shall straddle vertical centerline of pipes.
- C. Unions shall be installed where required for piping or equipment installation, even though they are not shown on the Drawings.
- D. Piping shall be installed without springing or forcing the pipe in a manner which would set up stresses in the pipe, valves, or connected equipment.

### **3.022 ANCHORAGE AND EXPANSION PROVISIONS**

- A. All piping shall be anchored against thrust developed by internal pressures. In addition, provisions shall be made for the expansion and contraction which may occur in pipe due to temperature change. Pipe anchorage and expansion provisions are not completely detailed on the Drawings. The absence of these details on any Drawings shall not relieve the Contractor of the responsibility for providing them where required.

### **3.023 INSTALLATION OF FLEXIBLE COUPLINGS, FLANGED COUPLING ADAPTERS, AND SERVICE SADDLES**

- A. Prior to installation, thoroughly clean oil, scale, rust, and dirt from the pipe to provide a clean seat for the gasket. Care shall be taken that the gaskets are wiped clean before they are installed. If necessary, flexible couplings and flanged coupling adapter gaskets may be lubricated with soapy water or manufacturer's standard lubricant before installation on the pipe ends. Install in accordance with the manufacturer's recommendations. Bolts shall be tightened progressively, drawing up bolts on opposite sides a little at a time until all bolts have a uniform tightness. Workmen tightening bolts shall use torque-limiting wrenches.
- B. Flexible couplings with tie rods may be used to tie pipes against thrust. They shall not be used, with or without tie rods, as expansion joints on pipelines with cyclic temperature changes. Readjust tie rod tension after initial filling before pressure testing.

### **3.024 CORROSION PROTECTION OF PIPE AND ACCESSORIES**

- A. Not all corrosion protection details are included, either on the Drawings or in the Specifications. The absence of specific details on corrosion and environmental protection measures shall not relieve the Contractor of the responsibility of providing them, all as part of the Contract price.

### **3.025 CORROSION PROTECTION FOR BURIED PIPE ACCESSORIES**

- A. All buried pipe appurtenances made of steel shall have corrosion protection. Tie rods and similar items shall be heat shrink tube wrapped. Flange bolts, nuts, and similar items shall be coated with a bituminous paint or equal. Flexible couplings, grooved couplings, and similar items shall be heat shrink wrapped or cement coated.

- B. Buried valves and similar elements on wrapped pipelines shall be bituminous paint-coated. On ductile iron or nonmetallic pipelines they shall have exposed nuts and bolts bituminous paint-coated and the entire valve wrapped in 8-mil polyethylene as specified for ductile iron pipe. On cement-coated pipelines they shall be cement-coated similar to detail shown for couplings.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 33 30 00 – PIPING SYSTEMS**

### **PART 1 - GENERAL**

#### **1.01 SCOPE OF WORK**

- A. This section covers the work necessary to furnish and install the piping systems. The pipe system to be used for each process system is shown on the plans.
- B. For trench excavation, backfill, pipe bedding, and material placed in the pipe zone, see Section 31 23 33 – TRENCH EXCAVATION AND BACKFILL.
- C. See Division 1 GENERAL, which contains information and requirements that apply to the work specified herein and are mandatory for this project.
- D. The Contractor shall furnish and install pipe and fittings as shown on the Drawings and as specified in these Specifications. The pipe shall be new, manufactured in accordance with these Specifications and Drawings.
- E. Piping systems, including pipe, fittings, anchors, and all other elements, shall be detailed, fabricated, and installed to resist all internal and external loads which will be imposed upon them. Pressure ratings and materials stated in these Piping Specification sections are minimum acceptable standards. Systems shall be suitable for the service intended.
- F. The pipe diameters shown on the Drawings and used in these Specifications are inside diameters unless specific reference is made to outside diameter of the pipe or the pipe is a standardized product normally designated by a nominal size, e.g., ductile iron pipe.

#### **1.02 SUBMITTALS DURING CONSTRUCTION**

Submittals during construction shall be made in accordance with Section 01 33 00 – Submittal Procedures. In addition, the following specific information shall be provided.

- A. **FIELD FABRICATION**
  - 1. For pipelines which are assembled in the field from standard fittings, submit complete data on pipe, fittings, linings, coatings, any manufacturer's installation instructions, and any required installer certifications.
- B. **FABRICATION AND LAYING DRAWINGS**
  - 1. For shop fabricated piping, the Contractor shall furnish the Engineer with pipe design calculations, the required test data, and shop drawings which shall include a laying plan and details of pipe sections, special fittings, and bends. Dimensions, coatings, and other pertinent information shall be shown. The laying plan shall show the location of each pipe section and each special length, with each piece numbered or otherwise designated in sequence. All outlets and bends shall be made up into special lengths so that, when installed, they will be located as indicated. Each pipe and fitting shall be marked on the outside to indicated the class of pipe, location number on the laying plan, size or diameter, manufacturer's identification, and date of manufacture. Pipe shall be furnished and installed in accordance with the reviewed laying plan.

C. PIPE SUPPORT DRAWINGS

1. Drawings of each major piping system locating each support and hanger. Drawings shall identify the support type by catalog number or shop drawing detail number and show anchor locations, identifying them by shop drawing detail number.

D. MATERIAL CERTIFICATION

1. Certification of all materials, and manufacturing properly executed by the manufacturer, shall be available to show compliance with the Specification of materials being furnished. Test data on tests performed shall be provided as requested by the Engineer.

E. FIELD WELDING PROCEDURE

1. Details of welding procedures for each type of field weld, including base metal, welding method, electrodes, preheating requirements, and other data.

F. PLUMBING CODE

1. All sanitary building drainage and vent systems shall conform to the plumbing laws, rules, and regulations of the state and of the District, whichever represents the higher standard.
2. The Owner will obtain any variances imposed by site constraints.

**1.03 QUALITY ASSURANCE**

- A. Installer shall be a Specialist.

**1.04 PROJECT SITE CONDITIONS**

- A. Locate and provide protection of existing utilities affected by the work. Minimize disruptions to access existing facilities.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

A. GALVANIZING

1. Where galvanizing is specified it shall be hot-dip applied only. Electroplated zinc or cadmium plating is unacceptable.

B. PAINTING

1. All exposed piping, including piping within vaults, basins, and manholes, and except copper, stainless steel, and galvanized piping, shall be painted as specified in Section 09 90 00 PAINTING.

C. PIPE PENETRATIONS

1. Penetrations shall be constructed per specifications and as detailed on drawings.
2. Penetration reinforcing shall be construction as detailed on structural drawings.
3. ABOVE GRADE SLAB, FLOOR, WALL, AND ROOF PENETRATIONS

- a. All ductile iron penetrations of slabs, floors, walls, and roofs shall be poured in place ductile iron wall pipe. It shall be the Contractor's responsibility to verify the size and location of all building and structure penetrations prior to pouring concrete. All sleeves shall be supported by form work to prevent contact with the reinforcing steel.
- 4. STRUCTURAL CONCRETE WALL PENETRATIONS IN NEW BASINS
  - a. Wall and floor penetrations shall use Link-Seal modular seals with 316 Stainless Hardware. Install Link-Seal per manufacturers recommendations and as detailed on the plans. PVC pipe wall and floor penetrations shall use GPK Products sand collars. See structural drawings for reinforcing details.
- 5. STRUCTURAL CONCRETE WALL PENETRATIONS IN EXISTING BASIN WALLS
  - a. Pipe penetrations through existing walls shall be core drilled. Block out all openings. For pipe diameters 6" or less void between pipe and coring shall be sealed completely with Kryton Kim or approved non-shrink grout. For pipe diameters 8" or more penetration shall be constructed by coring and sealing with Link-Seal modular seals with 316 Stainless Hardware. Install Link-Seal per manufacturers recommendations.
- 6. PRECAST MANHOLE/VAULTS WALL PENETRATION SEALS
  - a. Manhole pipe wall penetrations shall be constructed by coring and sealing with Link-seal modular seals or Kor-N-Seal flexible boots.
- D. RUBBER GASKET STORAGE
  - 1. Store all rubber gaskets in a cool, well-ventilated place, and do not expose to the direct rays of the sun. Do not allow contact with oils, fuels, or petroleum solvents.
- E. JOINT LUBRICANT
  - 1. Furnish joint lubricant with the pipe. Furnish the amount and type recommended by the pipe manufacturer. The lubricant shall be a water-soluble, nontoxic, vegetable soap compound conforming to United States Pharmacopoeia No. P39.
- F. HYDROSTATIC TESTING
  - 1. Provide all hoses, plugs, and other necessary equipment to complete the tests.

## **PART 3 - EXECUTION**

### **3.01 SHIPPING AND HANDLING MATERIALS**

- A. During transportation, unloading, and storage, pipe and materials shall be protected, supported, and handled in a manner to prevent damage to the materials, especially linings and coatings. Only implements and equipment suitable for proper and safe handling of the materials shall be used. Fabric slings shall be used to lift pipe and fittings, not chains or cables.

### 3.02 INSTALLATION

#### A. PIPE PREPARATION AND HANDLING

1. Each pipe and fitting shall be carefully inspected before the exposed pipe or fitting is installed or the buried pipe or fitting is lowered into the trench. The interior and exterior protective coating shall be inspected, and all damaged areas patched in the field with material similar to the original, except damaged glass-lined pipe. Any damaged glass-lined pipe shall not be used and shall be promptly removed from the plant site. Any pipe which, in the opinion of the Engineer, is damaged beyond repair shall be removed from the site and replaced with another unit. Clean ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and keep clean during and after installation.
2. Use proper implements, tools, and facilities for the safe and proper protection of the pipe. Carefully handle pipe in such a manner as to avoid any physical damage to the pipe. Do not drop or dump pipe from trucks or into trenches under any circumstances. All pipe fittings and appurtenances shall be installed in accordance with the manufacturer's instructions and these Specifications.

#### B. CUTTING AND FABRICATING

1. Cut pipe with approved cutters, do not flame cut except for mild steel pipe. Cut perpendicular to axis of pipe. Dress ends to suit type of joint being made, removing burrs, mill scale, and debris before making up. Repair damaged linings and coatings.

#### C. BELL HOLES

1. Excavate bell holes at each joint to permit proper assembly and visual and feeler gauge inspection of the entire joint.

#### D. EXPANSION PROVISIONS

1. Provisions shall be made for the expansion and contraction which may occur in pipe due to temperature change. Pipe expansion provisions are not completely detailed on the Drawings. The absence of these details on any Drawing shall not relieve the Contractor of the responsibility for providing them where required, and at his sole expense.

#### E. PIPE IN CONCRETE ENCASEMENTS OR CONCRETE BEDDING

1. Except for welded joints, pipe joints shall not be encased in concrete unless specifically required on the Drawings. Pipe coatings shall be continuous through concrete encasements, thrust blocks, anchors, collars, etc., unless otherwise shown on the Drawings.

#### F. FLEXIBLE JOINTS AT CONCRETE BACKFILL OR ENCASEMENT

1. Except for welded joint pipe, a flexible joint shall be provided within 18 inches or one-half the pipe diameter, whichever is less, from the terminations of any concrete backfill or concrete encasement.

#### G. FLEXIBLE JOINTS AT CONCRETE STRUCTURES

1. Unless shown otherwise on the plans, a flexible joint shall be provided at the face of all manholes or other structures. The joint may be flush with the face, may be



up to one half pipe diameter away from the face, but shall not be more than 18 inches away from the face.

2. A second flexible joint shall be provided within 18 inches of the first joint for pipelines smaller than 18 inches in diameter or within one pipe diameter of the first joint for pipelines larger than 18 inches in diameter.
3. Flexible joints may be rubber ring joints, mechanical joints, flexible couplings, grooved couplings, or Brico Depend-o-Lok couplings.

#### H. LINE AND GRADE

1. Grade the bottom of the trench by hand, if necessary, to the line and grade to which the pipe is to be laid, with proper allowance for pipe thickness and for base. Remove hard spots that would prevent a uniform thickness of base or uniform pressure on the pipe barrel.
2. Lay pipe to a uniform grade between indicated elevations. Do not deviate more than 1 inch from line or 1/4 inch from established grade. Measure for grade at the pipe invert.
3. Before laying each section of pipe, check the grade with a straightedge and correct any irregularities found. The trench bottom shall form a continuous and uniform bearing and support for the pipe at every point between bell holes, except that the grade may be disturbed for the removal of lifting tackle.

#### I. PERMISSIBLE DEFLECTION AT JOINTS

1. Wherever it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, do not exceed 75 percent of the amount of deflection recommended by the pipe or coupling manufacturer.

#### J. LAYING AND JOINTING PIPE AND FITTINGS

1. After a section of pipe has been lowered into the prepared trench, clean the end of the pipe to be joined, the inside of the joint, and the rubber ring immediately before joining the pipe. Make assembly of the joint in accordance with the recommendations of the manufacturer. Provide all special tools and appliances required for the jointing assembly.
2. The gasket position shall be checked with a feeler gauge, furnished by the pipe manufacturer, to assure proper seating. After the joint has been made, check pipe for alignment and grade. After sufficient pressure in making the joint to assure that the joint is "home", as defined in the standard installation instructions provided by the pipe manufacturer. To assure proper pipe alignment and joint makeup, place sufficient pipe zone material to secure the pipe from movement before the next joint is installed.
3. Take the necessary precautions required to prevent excavated or other foreign material from entering the pipe during the laying operation. At all times, when laying operations are not in progress, at the close of the day's work, or whenever the workmen are absent from the job, close and block the open end of the last laid section of pipe to prevent entry of foreign material or creep of the gasketed joints.
4. Take all precautions necessary to prevent the "uplift" or floating of the line prior to the completion of the backfilling operation.

5. When cutting and/or machining the pipe is necessary, use only tools and methods recommended by the pipe manufacturer.
- K. UNSUITABLE CONDITIONS FOR LAYING PIPE
1. Do not lay pipe in water, or when in the opinion of the Engineer, trench conditions are unsuitable.
- L. PREVENTING TRENCH WATER FROM ENTERING PIPE
1. When the pipe laying is not in progress, close the open ends of pipe by approved means, and do not permit trench water or other foreign material to enter the pipe. Keep water out of the trench.
- M. INSTALLATION OF EXPOSED PIPING
1. Unless shown otherwise, piping shall be parallel to building lines. Hangers on adjacent piping shall be aligned where possible on common size ranges.
  2. All pipe flanges shall be set level, plumb, and aligned. All flanged fittings shall be true and perpendicular to the axis of the pipe. All bolt holes in flanges shall straddle vertical centerline of pipes.
  3. Unions shall be installed where required for piping or equipment installation, even though they are not shown on the Drawings.
  4. Piping shall be installed without springing or forcing the pipe in a manner which would set up stresses in the pipe, valves, or connected equipment.
  5. Required straight runs of piping upstream and downstream of flow measuring devices shall be smooth.
- N. ANCHORAGE AND EXPANSION PROVISIONS
1. All piping shall be anchored against thrust developed by internal pressures. In addition, provisions shall be made for the expansion and contraction which may occur in pipe due to temperature change. Pipe anchorage and expansion provisions are not completely detailed on the Drawings. The absence of these details on any Drawings shall not relieve the Contractor of the responsibility for providing them where required.
- O. INSTALLATION OF FLEXIBLE COUPLINGS, FLANGED COUPLING ADAPTERS, GROOVED JOINT COUPLINGS, DEPEND-O-LOK COUPLINGS, AND SERVICE SADDLES
1. Prior to installation, thoroughly clean oil, scale, rust, and dirt from the pipe to provide a clean seat for the gasket. Care shall be taken that the gaskets are wiped clean before they are installed. If necessary, flexible couplings and flanged coupling adapter gaskets may be lubricated with soapy water or manufacturer's standard lubricant before installation on the pipe ends. Install in accordance with the manufacturer's recommendations. Bolts shall be tightened progressively, drawing up bolts on opposite sides a little at a time until all bolts have a uniform tightness. Workmen tightening bolts shall use torque-limiting wrenches.
  2. Flexible couplings with tie rods may be used to tie pipes against thrust. They shall not be used, with or without tie rods, as expansion joints on pipelines with cyclic temperature changes. Readjust tie rod tension after initial filling before pressure testing. Depend-o-Lok type FxF couplings as manufactured by Brico Industries may be used in lieu of flexible couplings with tie rods.

P. CORROSION PROTECTION OF PIPE AND ACCESSORIES

1. Not all corrosion protection details are included, either on the Drawings or in the Specifications. The absence of specific details on corrosion and environmental protection measures shall not relieve the Contractor of the responsibility of providing them, all as part of the Contract price.

Q. CORROSION PROTECTION FOR BURIED PIPE ACCESSORIES

1. All buried pipe appurtenances made of steel shall have corrosion protection. Tie rods and similar items shall be heat shrink tube wrapped. Flange bolts, nuts, and similar items shall be coated with a bituminous paint or equal. Flexible couplings, grooved couplings, and similar items shall be heat shrink wrapped or cement coated.
2. Buried valves and similar elements on wrapped pipelines shall be bituminous paint-coated. On ductile iron or nonmetallic pipelines they shall have exposed nuts and bolts bituminous paint-coated and the entire valve wrapped in 8-mil polyethylene as specified for ductile iron pipe. On cement-coated pipelines they shall be cement-coated similar to detail shown for couplings.

R. UV PROTECTION FOR EXPOSED PVC PIPE AND PVC ACCESSORIES

1. All PVC & accessories exposed to sunlight must have stabilizers and UV inhibitors to shield against ultraviolet radiation.

S. TRACER WIRE FOR PIPE LOCATION

1. All new piping is to include tracer wire for future pipe location work. Tracer wire to be attached to top of piping, and tied down at 10-ft intervals. Prior to construction, the Contractor is required to provide submittal with all proposed tracer wire box locations.
2. Tracer Wire - #12 AWG Solid (0.0808" diameter), steel core soft drawn high strength tracer wire, 380# average tensile break load, 30 mil high molecular weight-high density blue polyethylene jacket complying with ASTM-D-1248, 30 volt rating, (Copperhead Industries Part # 1230-HS Blue, or approved equal).
3. Tracer Wire Color Requirements -
  - a. Sewer Pipe: Green
  - b. Non-Potable Water Pipe: Purple
  - c. Potable Water Pipe: Blue
4. Tracer Box – (Copperhead Industries)
  - a. Materials used to construct products in above specifies scope shall be non-corrosive or corrosion resistant.
  - b. Tube material shall be of high grade ABS, or equivalent rigid plastic that meets or exceeds ASTM D-1788, Type 1 requirements.
  - c. Lid material shall be of cast iron or ductile iron. Tensile strength or ductility of such material shall be equal or superior to hi-tensile cast iron ASTM A-126-B requirements.
  - d. Lid-locking bolt material shall be made of aluminum material equal or superior to ASTM B-253.

- e. Lid-locking mechanism material shall be made of plastic to meet or exceed ASTM A-126-B requirements.
  - f. Box shall be designed to be easily detected by magnetic and electronic locators even when box is covered by a minimum of four (4) inches of soil, sod and / or paving material.
  - g. A magnet shall be securely attached at the top of the upper tube of the box for locating purposes. Material used to retain magnet in place shall remain effective at minus 15 degrees Fahrenheit. A magnetized lid or magnet attached to the lid is not acceptable.
  - h. Locking Mechanism:
    - (i) Lid of valve box shall be designed to employ a locking mechanism that will clamp it to the box collar in a closed position.
    - (ii) Locking mechanism shall incorporate a standard pentagon-shaped head bolt which when measured from flat to vertex shall not be less than 0.830 inches or greater than 0.875 inches.
    - (iii) Locking mechanism shall be such that the lid cannot be removed without using the proper wrench.
  - i. Copperhead Industries Lite Duty Box #LD14 (landscape areas), Copperhead Industries Concrete/Driveway Box #CD14 (concrete pavement), Copperhead Industries Heavy Duty #HS14 (roadway pavement).
5. Tracer Wire Connectors – Connectors suitable for direct-bury with moisture displacement silicone filled caps for resistance protection, (Copperhead Industries Snakepit connectors, or equal). Connectors are to be equal to 3M DBR wire connectors.

#### T. TESTING

- 1. All tests shall be conducted in the presence of the Engineer or his designee.
- 2. Isolate new sections of line to be tested by providing temporary valves, caps, plugs and/or by closing permanently installed valves. Test sections shall normally be limited to 1,500 feet in length or as defined below. Plugs or temporary valves used to close the pipe for the hydrostatic test must be securely braced to prevent the unintentional release of a plug or valve which can become a high velocity projectile. Gauges, air piping manifolds, and valves shall be at the top of the ground. No one is permitted to enter an excavation or structure where a plugged pipe is under test pressure.
- 3. All leaks shall be repaired and remedied, with tests and repairs repeated until the system meets testing requirements to the satisfaction of the Engineer.
- 4. All water necessary for testing shall be provided by the Contractor.
- 5. Upon completion of each portion of the system and prior to connecting to any facility impacted by solids, the system shall be thoroughly flushed to remove and catch all foreign matter such as rocks, misplaced tools, and debris.
- 6. GRAVITY SEWER PIPE TESTING

- a. All new gravity sewer pipes are to be pressure tested per WSDOT 7-17.3(2). In the event piping fails the low pressure air testing, the piping may be hydrostatic pressure tested per WSDOT 7-09.3(23) to fulfill testing requirements. If hydrostatic pressure testing is to be used, the Contractor shall confirm testing pressures with Owner prior to testing.

7. PRESSURE SEWER TESTING AND DISINFECTION

- a. All sewer force main piping shall pass a hydrostatic pressure test per WSDOT 7-09.3(23).
- b. Required Pressure Test Pressures:
  - (i) Influent Pump Station Force Main: 225 psi
  - (ii) Grit Pump System: 225 psi

8. WATER LINE TESTING AND DISINFECTION

- a. All water mains and appurtenances shall pass a hydrostatic pressure test per WSDOT 7-09.3(23).
- b. Required Pressure Test Pressures:
  - (i) Influent Pump Station Force Main: 225 psi
  - (ii) Grit Pump System: 225 psi
- c. All water lines and appurtenances shall be chlorinated and dechlorinated in accordance with WSDOT Section 7-09.3(24)A and a satisfactory bacteriological report obtained prior to placing in service.

9. FOUL AIR DUCTING TESTING

- a. All foul air ducting and buried piping shall pass a low pressure air test per WSDOT 7-17.3(2)F.

**\*\*\*END OF SECTION\*\*\***

## SECTION 33 31 00 – WASTEWATER PIPING

### PART 1 - GENERAL

#### 1.01 SCOPE OF WORK

- A. This section covers the work necessary to furnish and install wastewater lines as shown on the plans and described herein.
- B. See Section 33 30 00 – PIPING SYSTEMS for additional requirements.

#### 1.02 REFERENCES

- A. American National Standards Institute (ANSI)
  - 1. ANSI-B-16.5 – *Pipe Flanges and Flanged Fittings: NPS 1/2 Through NPS 24*
  - 2. ANSI-B-16.21 – *Nonmetallic Flat Gaskets for Pipe Flanges*
  - 3. ANSI-A-21.4 – *Standard for Cement-Mortar Lining for Ductile Iron Pipe and Fittings*
  - 4. ANSI-A-21.5 – *Polyethylene Encasement for Ductile-Iron Pipe Systems*
  - 5. ANSI-A-21.10 – *Ductile-Iron and Gray-Iron Fittings*
  - 6. ANSI-A-21.11 – *Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings*
  - 7. ANSI-A-21.15 – *American National Standard for Flanged Ductile-Iron and Gray-Iron Pipe with Threaded Flanges*
  - 8. ANSI-B-36.19 – *Stainless Steel Pipe*
- B. American Society of Testing and Materials (ASTM)
  - 1. ASTM-A-53 – *Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless*
  - 2. ASTM-A-240 – *Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications*
  - 3. ASTM-A-307 – *Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength*
  - 4. ASTM-A-312 – *Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes*
  - 5. ASTM-A-409 – *Standard Specification for Welded Large Diameter Austenitic Steel Pipe for Corrosive or High-Temperature Service*
  - 6. ASTM-F-477 – *Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe*
  - 7. ASTM-A-536 – *Standard Specification for Ductile Iron Castings*
  - 8. ASTM-F-679 – *Standard Specification for Polyvinyl Chloride (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings*
  - 9. ASTM-A-778 – *Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products*

10. ASTM-D-1784 – *Standard Classification System and Basis for Specification for Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPVC) Compounds*
  11. ASTM-D-2241 – *Standard Specification for Polyvinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series)*
  12. ASTM-D-2466 – *Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40*
  13. ASTM-D-2467 – *Standard Specification for Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80*
  14. ASTM-D-2665 – *Standard Specification for Polyvinyl Chloride (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings*
  15. ASTM-D-3034 – *Standard Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings*
  16. ASTM-D-3212 – *Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible elastomeric Seals*
- C. American Water Works Association (AWWA)
1. AWWA-C-104 – *Standard for Cement-Mortar Lining for Ductile Iron Pipe and Fittings*
  2. AWWA-C-105 – *Polyethylene Encasement for Ductile-Iron Pipe Systems*
  3. AWWA-C-110 – *Ductile-Iron and Gray-Iron Fittings*
  4. AWWA-C-111 – *Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings*
  5. AWWA-C-115 – *American National Standard for Flanged Ductile-Iron and Gray-Iron Pipe with Threaded Flanges*
  6. AWWA-C-153 – *Ductile-Iron Compact Fittings*
  7. AWWA-C-207 – *Steel Pipe Flanges for Waterworks service, Size 4 In. Through 144 In.*
  8. AWWA-C-606 – *Grooved and Shouldered Joints*
  9. AWWA-C-900 – *Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 60 In.*
  10. AWWA-C-905 – *Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 48 In. for Water Transmission and Distribution*
  11. AWWA-C-907 – *Injection-Molded Polyvinyl Chloride (PVC) Pressure Fittings, 4 In. Through 12. In. for Water, Wastewater, and Reclaimed Water Service*

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS**

#### **A. BUILDING / STRUCTURE FOOTING DRAIN PIPE**

1. Perforated Corrugated Polyethylene Drainage Tubing Underdrain Pipe:
2. Pipe per WSDOT 9-05.2(7), 4-inch diameter unless otherwise shown on the plans.

B. PRESSURE SEWER PIPE

1. Exposed:
  - a. Stainless Steel Sch. 80 Pipe or Ductile Iron: AWWA C115, cement lined, thickness class 53 for flanged or grooved piping systems.
2. Buried:
  - a. AWWA C115, Ductile Iron cement lined 8 mil poly wrapped thickness class 50 or 51; unless flanged or grooved piping systems which are required to be thickness class 53.
  - b. PVC, AWWA C900/C905, Class 235 DR 18 (minimum), or
  - c. HDPE (pressure class as specified on drawings) in accordance with WSDOT Section 9-30.1 and Spec Section 33 05 33.
  - d. Or as noted on the plans.

C. GRAVITY SEWER PIPE & DRAINS

1. PVC for wastewater applications:
  - a. ASTM D3034, SDR 35 for 4" through 15" pipe. ASTM F679, SDR 35 (PS46) for 18" & larger pipe. Or as noted on the plans.
2. Ductile Iron for wastewater applications:
  - a. WSDOT 9-05.13 Ductile Iron Sewer Pipe. Ductile Iron cement lined 8 mil poly wrapped thickness class 50 or 51; unless flanged or grooved piping systems which are required to be thickness class 53
3. PVC drain piping shall be:
  - a. Schedule 40 PVC for pipe 4" and smaller. Pipe shall meet ASTM D2241 or ASTM D2665, and D1784. Or as noted on the plans.
  - b. AWWA C900/C905, Class 100 DR 41 (minimum) for 6" and larger.

D. AERATION PIPING

1. Exposed Exterior (Above grade outdoors):
  - a. Unless otherwise specified, stainless steel pipe 2.5 inches and smaller shall be Type 316L, seamless, threaded joints conforming to ASTM A312. The minimum wall thickness shall be Schedule 40S.
  - b. Unless otherwise specified, stainless steel piping 3 inches and larger shall be manufactured from ASTM A240 annealed and pickled sheets and plates, Type 316L, in accordance with ASTM A778 or ASTM A409 HT-0. Only extra-low carbon (ELC) materials with 0.030 percent maximum carbon shall be used. Pipe shall be manufactured to nominal pipe sizes as listed in ANSI B36.19 and shall have the following nominal wall thickness: Schedule 10S
2. Buried:
  - a. Ductile Iron wrapped in 8 mil polyethylene wrap; unlined, thickness class 50 unless flanged or grooved piping systems which are required to be thickness class 53 (as described above).
  - b. Smaller than 4" Air Pipe: Use Exposed Pipe Spec above.



E. 2W/3W WATER PIPING

1. Buried:

- a. All buried 2W and 3W water piping shall be PE4710, IPS HDPE DR11. See spec section 33 33 00. Or as noted on the plans.

2. Exposed:

- a. All above ground exposed 2W and 3W water piping 4" or larger shall be AWWA C115, Ductile Iron cement lined thickness class 50 or 51; unless flanged or grooved piping systems which are required to be thickness class 53.
- b. Unless otherwise specified, all above ground exposed 2W and 3W water piping 3" or smaller shall be schedule 40 316 stainless steel. Pipe shall be Schedule 40 with threaded and coupled fittings. Non-welded parts and pieces such as nuts, bolts, washers, supports, follower flanges, and anchor bolts shall be made from 316 stainless steel. Stainless steel pipe shall be butt-welded in accordance with the applicable standards. After fabrication, all stainless steel piping shall be passivated by immersion in a pickling solution of nitric and hydrofluoric acid. Parts shall be free of iron particles or other foreign materials. A final neutralizing rinse will complete the cleaning.
- c. Where specifically noted in the drawings, exposed 2W and 3W water piping 3" or smaller shall be general service, carbon steel pipe conforming to ANSI B16, B36.10, and ASTM A53, Grade A, Type E. Pipe shall be Schedule 40 with threaded and coupled fittings. Galvanized pipe and fittings shall be hot-dip galvanized (HDG). Grooved joints may be used in lieu of threaded joints. Where grooved joints are used, they shall be Victaulic or approved equal and shall comply with AWWA C606. Fittings and couplings shall be galvanized in accordance with ASTM A-153.

F. EXPOSED WAS DISCHARGE PIPING

- 1. All exposed WAS discharge piping shall be PE4710, IPS, HDPE DR17. See spec section 33 33 00 – HDPE Piping.

G. JOINTS

1. BURIED PIPE

- a. Mechanical or push-on joints to be in accordance with AWWA C111 for ductile iron pipe. Anchoring of mechanical joints with external set screws will not be permitted. PVC gravity pipe to be in accordance with ASTM D3212 - Specification for Joints, for Drain and Sewer Plastic Pipe using Flexible Elastomeric Seals.
- b. All mechanical joints shall be restrained joints with a restrainer. The restrainer shall utilize the full circumference of the pipe for restraining. The restrainer shall be RomaGrip by Romac Industries, Megalug Series 1100, or equal.
- c. All push on joints shall be restrained with field lock gaskets or TR Flex or HDSS from US Pipe, or equal. Field lock gaskets will not be allowed for above ground piping.
- d. Joints for foul air PVC piping shall be glued.

- e. PVC drain piping 4" and smaller shall be solvent welded with press fit.

2. EXPOSED PIPE

- a. Flanged joints shall be in accordance with AWWA C115. Grooved and shouldered joints shall be in accordance with AWWA C-606.

H. FITTINGS

1. Cast or ductile iron in accordance with AWWA C110 and/or AWWA C153, short body type, 250 psi working pressure. Where taps are shown on fittings, tapping bosses shall be provided.
2. PVC gravity sewer pipe fittings to be in accordance with ASTM D3034 or ASTM F679.
3. PVC C900 fittings used for drain piping shall be fabricated and supplied in accordance with AWWA C900. Molded fittings shall be manufactured and supplied in accordance with AWWA C907.
4. Fittings for Schedule 40 & 80 PVC shall conform to ASTM D2466 and D2467 for socket type.
5. Grooved end fittings for AWWA Ductile Iron Pipe shall be cast of ductile iron conforming to A-536, Grade 65-45-12. Fittings conform to ANSI A21.10/AWWA C-110 for center-to-end dimensions and wall thickness, and AWWA C-153 for wall thickness. Grooved ends shall conform to AWWA C606.
6. Grooved end fittings for carbon steel pipe shall be cast of ductile iron conforming to ASTM A-536, Grade 65-45-12, forged steel conforming to ASTM A-234, Grade WPB 0.375" wall (9.53 mm wall), or fabricated from Std. Wt. Carbon Steel pipe conforming to ASTM A-53, Type E or S, Grade B. Fittings provided with an alkylid enamel finish.

I. FLEXIBLE COUPLINGS, FLANGED COUPLING ADAPTERS, and DISMANTLING JOINTS

1. Flanged Coupling Adapters for use with 3-16 inch Ductile Iron piping shall be Romac Style FCA501, or approved equal. For piping larger than 16 inch use Romac Style FC400, or approved equal. When restraining is required use Romac Style RFCA for Ductile Iron piping 3-24 inches and Romac Style RFCA-PVC for PVC piping 3-24 inches, or approved equal. Bolts and nuts shall be stainless steel type 316. Coating shall be fusion bonded epoxy.
2. Flexible couplings for use with Ductile Iron or PVC piping shall be Romac Style 501, or approved equal. When restraining is required use Romac 611 Restraining system. Bolts and nuts shall be stainless steel type 316. Coating shall be fusion bonded epoxy. Center ring shall have a length of 2x the pipe diameter. Ductile iron sleeves with mechanical joints at each end may be substituted for flexible couplings on ductile iron pipe.
3. Dismantling Joints for use with ductile iron piping shall be Romac Style DJ400, or approved equal. When restraining is required use Romac Style DJ405, or approved equal. Bolts, nuts, and tie rods shall be stainless steel type 316. Coating shall be fusion bonded epoxy. Gaskets shall be suitable for contact with wastewater.
4. Protection for Buried Couplings and Adaptors:
  - a. Double wrap with polyethylene encasement, AWWA C105 and tape the edges of the encasement with PVC tape.

J. HOSES FOR 2" YARD HYDRANTS

1. Hoses to be 1.5" fire hose, 50' lengths, NPSH couplings and adaptors as needed, rated for 500# test pressure, USA Bluebook item # 26950. Provide two hoses for each 2" yard hydrant.

K. HOSES FOR 1" YARD HYDRANTS

1. Hoses to be 3/4" fire hose, 50' lengths, NPSH couplings and adaptors as needed, rated for 200# test pressure. Provide two hoses for each 1" yard hydrant.

L. CEMENT LINING

1. All ductile iron pipe and fittings shall be cement mortar lined and seal coated in accordance with ANSI A21.4/AWWA C104 unless aeration piping which shall be unlined.

M. COATING

1. All ductile iron pipe to be buried shall receive a coat of bituminous material. All exposed ductile iron pipe (including all piping in valve vaults) is to be cleaned and shop coated with two coats of epoxy per Section 09 90 00 PAINTS AND COATINGS. All bituminous material on exposed piping is to be sand blasted off, prior to application of epoxy.

N. GROOVED COUPLINGS

1. CARBON STEEL PIPE

- a. Mechanical Couplings, 2 inch (DN50) through 12 inch (DN300): Manufactured in two segments of cast ductile iron, conforming to ASTM A-536, Grade 65-45-12. Rigid Couplings: Victaulic Style 107N.
- b. For transitions between carbon steel and stainless steel, use Victaulic Style 741 with EPDM gasket, a phenolic flange washer (flange washer for Victaulic Style 641 copper flange adapter that is non-metallic), and an EPDM flange gasket. Use bolt isolation kits on the flange connection.

2. DUCTILE IRON PIPE

- a. Manufactured in two or more segments of cast ductile iron, conforming to A-536, Grade 65-45-12. Victaulic Style 31.
- b. For transition couplings between IPS steel and AWWA DI use Victaulic Style 307.
- c. For flange adapters use Vic-Flange Adapter Style 741 with Flange Washers.

O. FLANGES

1. ANSI A21.15/AWWA C115, threaded, 250 psi working pressure, 125-pound ANSI drilling.
2. Carbon steel and stainless steel pipe flanges shall be per ANSI B16.5, Class 150, slip-on, 250 psi working pressure.

P. BOLTS

1. To be ASTM A 307, Grade A hex head bolts and nuts for Class 125 FF Flanges. Required Coatings:
  - a. Flanged Fittings Inside Building 316 Stainless Steel Nuts & Bolts
  - b. Flanged Fittings Outdoor Exposed 316 Stainless Steel Nuts & Bolts

- |    |   |                                  |
|----|---|----------------------------------|
| c. | Flanged Fittings Buried Underground   | Manufacturer's Standard          |
| d. | Flanged Fittings in Contact W/ Sewage   | 316 Stainless Steel Nuts & Bolts |
| e. | Buried T-Head   | Cor-Ten Material                 |
| f. | For Mechanical and Grooved Joints   |                                  |
|    | Manufacturer's Standard, or provide bolt & nut material as described above, as a minimum requirement. |                                  |
| g. | Or provide as noted on plans.   |                                  |

Q. GASKETS

1. Gaskets for mechanical or push-on joints shall be rubber conforming to ANSI A21.11, AWWA C111.
2. All gaskets for ductile iron air piping shall be EPDM (Ethylene Propylene-Diene Monomer) material.
3. Gaskets for flanged joints in sewage or water service shall be 1/8 inch thick, SBR rubber conforming to applicable parts of ANSI B16.21 and AWWA C207. Gasket material shall be free from corrosive alkali or acid ingredients. Gaskets shall be one-piece, full-face, with holes to pass bolts. Gaskets for grooved joints shall be Flushseal type, halogenated butyle or nitrile depending on service.
4. Gaskets for PVC joints shall be elastomeric seals conforming to ASTM F477.
5. Gaskets for grooved fittings shall be Grade "EHP" EPDM compound with red color code designed for operating temperatures from -30 deg F (-34 deg C) to +250 deg F (+120 deg C).

R. LUBRICANT

1. Lubricant for mechanical joint end piping shall be manufacturer's standard.

S. RESTRAINED JOINT PIPE

1. Joints for buried pressure pipe may be "restrained type". However, the use of restrained joints in lieu of thrust blocks will be acceptable only if the pipe configuration, soil conditions, and restrained length are suitable in the opinion of the Engineer.

T. PIPE SUPPORTS

1. Stainless steel adjustable saddle supports with 1/4" neoprene cushion under piping. Standon Model S92 Saddle Supports as supplied by Material Resources (503) 693-0727, or approved equal.

U. SERVICE SADDLES

1. Ford Iron Service Saddles, Style FC202 with stainless steel bands and epoxy coating and 1/4" neoprene cushion, or approved equal.

## V. INSULATION, SHIELDS, AND JACKETING

### 1. PIPE INSULATION

- a. All above grade pipe which transports wastewater shall be insulated with closed cell polyisocyanurate cellular plastic manufactured by ITW Insulation Systems. Insulation shall be Trymer 2000 XP, 1.25" thick (minimum), designed for cold pipe fitting systems, installed per manufacturers recommendation. Minimum temperature range: -100 degree F to +220 degrees F. K factor at 75 degrees Fahrenheit shall not be more than 0.19 BTU-inch/hour-square feet degrees Fahrenheit. Fire rating flame spread of 25 or less. Insulation shall include vapor barrier adhered to insulation. Joints shall be sealed with manufacturer's recommended contact adhesive to form continuous barrier. Density min 2-lb/ft<sup>3</sup>.

### 2. PIPE SHIELDS

- a. All above grade pipe shall have 6" long pipe shields, 1.25 inches thick, at all supports and clamps. Pipe shields shall be Trymer 4000 with a min. 4-lb/ft<sup>3</sup> density. Pipe shields shall be installed per manufacturers recommendations. Insulation shall include vapor barrier adhered to insulation. Joints shall be sealed with manufacturer's recommended contact adhesive to form a continuous barrier.

### 3. PIPE INSULATION JACKETING

- a. Insulation jacketing shall be installed over all exposed insulation and pipe shields to provide complete jacketing for all insulated piping and to provide durability. Jacketing shall be smooth finished aluminum; 0.016-inch (26 gauge) minimum thickness. Overlap circumferential joints 4 inches minimum; overlap longitudinal joints 1-inch minimum; longitudinal joints shall be oriented to minimize water entry. Bands shall be 0.5 inch wide, 0.0508 inch (16 gauge) thick aluminum or 0.0179 inch thick Type 304 stainless steel and shall be installed on 18 inch centers, uniformly spaced and at all fitting joints. Apply waterproof adhesive at joints and overlaps. All fittings shall be of the same jacketing material. Insulation jacketing shall be manufactured by ITW Insulation Systems or approved equal.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

#### A. HANDLING PIPE

1. Handle per manufacturer's recommendations. Take care not to damage lining when handling pipe.

#### B. CUTTING PIPE

1. Cut pipe with milling type cutter, rolling pipe cutter, or abrasive saw cutter. Do not flame cut. Do not damage linings. Cuts shall leave a smooth end at right angles to the pipe axis.

C. DRESSING CUT ENDS

1. Dress cut ends of pipe in accordance with the type of joint to be made. Dress cut ends of mechanical joint pipe to remove sharp edges or projections which may damage the rubber gasket.
2. Dress cut end of push-on joint pipe by beveling, as recommended by the pipe manufacturer.
3. Dress cut ends of pipe for flexible couplings and flanged coupling adapters as recommended by the coupling or adapter manufacturer.

D. FABRICATION OF FLANGED PIPE AND FITTINGS

1. Flanged pipe and fittings shall be fabricated in the shop, not in the field, and delivered to the job site with flanges in place and properly faced. Threaded flanges shall be individually fitted and machine tightened on the threaded pipe by the manufacturer. Flanges shall be faced after fabrication in accordance with AWWA C115.

E. JOINTING PIPE

1. FLANGED

- a. Prior to connecting flanged pipe, the faces of the flanges shall be thoroughly cleaned of all oil, grease, and foreign material. The rubber gaskets shall be checked for proper fit and thoroughly cleaned. Care shall be taken to assure proper seating of the flange gasket. Bolts shall be tightened so that the pressure on the gasket is uniform. Torque-limiting wrenches shall be used to ensure uniform bearing insofar as possible. If joints leak when the hydrostatic test is applied, the gaskets shall be removed and reset and bolts retightened.

2. MECHANICAL, GROOVED, AND PUSH-ON JOINT

- a. Join pipe with mechanical or push-on type joints in accordance with the manufacturer's recommendations. Tools and devices, such as special jacks, chokers, and similar items required for proper installation. Grooved systems may employ Victaulic field grooving tools, including cut and/or roll groovers as needed. Lubricant for the pipe gaskets shall be furnished by the pipe manufacturer, and no substitutes will be permitted under any circumstances.

F. SPECIAL REQUIREMENTS FOR WATER LINES NEAR SEWER LINES

1. Construction requirements for water and sewer lines near sewer line either running adjacent to or crossing shall be in accordance with all requirements as specified in Washington State Department of Ecology, Criteria for Sewage Works Design, C1-9 Special Requirements.

**3.02 TESTING**

- A. See 33 30 00 – Piping Systems.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 33 33 00 – HDPE PIPING**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION**

- A. Work covered in this section includes all labor, material and equipment required to install High Density Polyethylene (HDPE) Pipe.

#### **1.02 SUBMITTALS PRIOR TO CONSTRUCTION**

- A. Submittals shall be made in accordance with Part 3, Section 01 33 00 – Submittal Procedures.
- B. The Contractor shall submit the qualifications of the manufacturer-approved fusion operator/installers to the Engineer for approval prior to ordering pipe.

#### **1.03 QUALIFICATIONS**

- A. HDPE Fusion Welding Operators – Required Qualifications
  1. Fusion welding operators on the project shall have been trained by the pipe manufacturer and shall have welded a minimum of 5,000 lineal feet of HDPE pipe prior to this job. Fusion operators must also have previous experience in at least one pipe project within the last three years that is equivalent pipe diameter or larger.
  2. Current certification on Title #49 section 192.283 and 192.285 (Fusion Operator requirements)
  3. Current certification on Title #49 section 192.287 (Inspector requirements)
  4. Fusion operator shall have certification on the type of fusion machine being used for the project.

### **PART 2 - PRODUCTS**

#### **2.01 HDPE PIPE**

- A. HDPE pressure sewer pipe shall be High Density Polyethylene, manufactured of high molecular weight, high density PE4710 polyethylene pipe grade resin and shall conform to ASTM D3350 in dimensions and workmanship. Pipe shall have DR values as listed in Section 33 14 16 or Section 33 31 00 or as noted on the plans. Pipe is to be DriscoPlex 4000/4100 IPS Pipe, or approved equal. It shall have a cell classification of 445574C as specified by ASTM D3350. The Contractor shall furnish the necessary labor, supervision, butt fusion welding equipment and material to install HDPE pipe where indicated on plans. Contractor shall assure there is no miscommunication with pipe suppliers regarding nominal inside and outside pipe diameters.

## **2.02 HDPE PIPE COLOR REQUIREMENTS**

- A. HDPE piping shall be supplied with colored stripping. Color stripe schedule:
  - 1. Raw Sewage HDPE Pipe – Green Stripe
  - 2. Drainfield Return Pipe – Green Stripe
  - 3. Treated Effluent Pipe – Purple Stripe
  - 4. Plant Water Pipe – Purple Stripe
  - 5. Potable Water Pipe – Blue Stripe

## **2.03 FITTINGS**

- A. HDPE fittings shall be standard commercial products manufactured by injection molding or by extrusion and machining, or shall be fabricated from PE pipe conforming to this specification. The fittings shall be fully pressure rated by the manufacturer to provide a working pressure equal to the pipe.

## **2.04 REFERENCED DOCUMENTS**

- A. ASTM Standards:
  - D 3350 Specification for Polyethylene Plastics Pipe and Fittings Materials
- B. ANSI Standard:
  - B 36.10 Standard Dimensions of Steel Pipe (IPS)

## **2.05 ISO STANDARDS:**

- A. 161 Thermoplastic Pipe for the Transport of Fluids - Nominal Outside Diameters and Nominal Pressures  
3607 Polyethylene Pipe: Tolerances on Outside Diameters and Wall Thicknesses  
4427 Polyethylene Pipes and Fittings for Water Supply Specification

# **PART 3 - EXECUTION**

## **3.01 GENERAL**

- A. Contractor shall bear complete responsibility for the satisfactory performance of the HDPE pipe system, including materials, joining, installation, inspection and quality assurance. All workmanship shall be in accordance with HDPE manufacturer's requirements.

## **3.02 INSPECTION OF HDPE PIPE AT JOB SITE**

- A. The Contractor shall be responsible for inspection of pipe at the job site. Pipe showing damage from transit shall be marked and rejected by the Contractor for return to the manufacturer.



### **3.03 JOINING**

- A. Sections of polyethylene pipe shall be joined into continuous lengths on the job site above ground. The joining method shall be the butt fusion method and shall be performed in strict accordance with the pipe manufacturer's recommendations. The butt fusion equipment used in the joining procedures shall meet the requirements of 400°F, alignment, and 75 psi interfacial fusion pressure. The joint weld strength shall be equal to or greater than the tensile strength of the pipe. The fused joints shall be watertight, and all fused joints shall be subject to acceptance by the Engineer prior to installation. All defective joints shall be cut out and replaced at no cost to Owner. Any section of the pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater in depth than ten percent (10%) of the wall thickness, shall not be used and must be removed from the site. However, a defective area of the pipe may be cut out and the joint fused in accordance with the procedures stated above. In addition, any section of pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing or handling, as determined by the Engineer and/or his representative, shall be discarded and prohibited from use.
- B. All fusion joints shall be visually inspected and meet visual requirements set forth by the pipe manufacturer.
- C. 3 each or 3% of fusion joints, whichever is greater, shall be subjected to destructive testing from the actual pipe project.
- D. Data logging of fusion joints shall be used on all welds and be submitted for review and documentation.
- E. No non-standard and/or non-proven equipment or techniques shall be used to install and fuse the polyethylene pipe.

### **3.04 TESTING**

- A. Pressure testing of the HDPE water mains shall comply with ASTM F2164, "Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure", and Performance Pipe Technical Note 802 – Leak Testing of Polyethylene Pipe for Municipal and Industrial Applications.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 33 41 00 - STORM UTILITY DRAINAGE PIPING**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Work includes but is not limited to following:
  - 1. Installation of new public storm sewer pipes, storm drain catch basins, cleanouts, and trench drains.
  - 2. Drainage for retaining walls.

#### **1.02 RELATED SECTIONS**

- A. Coordinate related work specified in other parts of the Project Manual, including but not limited to following:
  - 1. Section 31 20 00 – Earthwork
  - 2. Section 31 32 11 – Soil Surface Erosion Control

#### **REFERENCES**

- B. WSDOT Standard Specifications for Road, Bridge and Municipal Construction, latest edition.
- C. WSDOT Standard Plans for Road, Bridge and Municipal Construction, most recent edition.
- D. Washington State Department of Ecology's August 2012 Stormwater Management Manual for Western Washington, as amended in 2014.

#### **1.03 SUBMITTALS**

- A. Submit in accordance with Sections 01 33 00 – Submittal Procedures.
  - 1. Catch Basins with frames, grates, lids
  - 2. Storm sewer and roof drain piping & accessories with product installation literature.

#### **1.04 QUALITY ASSURANCE**

- A. Manufacturer/Installer shall be a Specialist.
- B. Regulatory Requirements - See Section 01 41 00.

### **PART 2 - PRODUCTS**

#### **2.01 GENERAL**

- A. Comply with "Quality Assurance" provisions, "References," and Specifications. Where these may be in conflict, the more stringent requirements govern.

## 2.02 MATERIALS

### A. Storm Sewer Pipe

1. Pipe used for storm sewer shall be double walled (corrugated exterior and smooth interior) polyethylene meeting the requirements of WSDOT Standard Specification 9-05.20 - Corrugated Polyethylene Storm Sewer Pipe. Pipe shall be manufactured by Advanced Drainage Systems, Inc. (model N12), Hancor, Inc. (model HiQ), or engineer approved equal.
2. For storm sewer pipes with less than 18 inches (1.5 feet) of cover, the material shall be ductile iron, which shall comply with WSDOT Standard Specifications 9-05.13 Ductile Iron Sewer Pipe.
3. Couplings for storm sewer pipe shall be classified as water tight.
4. Roof Drain Pipe shall be PVC complying with WSDOT Standard Specification 9-05.1(5).
5. Retaining wall footing drain pipe shall comply with WSDOT Standard Specification 9-05.2(7) – Perforated Corrugated Polyethylene Drainage Tubing Underdrain Pipe. Tight line pipe from wall footing to drainage structure shall be PVC Pipe per WSDOT Standard Specification 9-05.1(5).

### B. Drain Cleanout Box. Cleanout box shall be Highline Series 1015-12” SQ, Highline Series 910L-10” Round or approved equal.

### C. Catch Basins.

1. Type 1 Catch Basins shall comply with WSDOT Standard Specification 9-05.50(3) - Precast Concrete Catch Basins, and WSDOT Standard Plan B-5.20-03.
2. Type 1L Catch Basins shall comply with WSDOT Standard Specification 9-05.50(3) - Precast Concrete Catch Basins, and WSDOT Standard Plan B-5.40-02.
3. Adjusting sections shall be precast concrete intended for the application.
4. Metal frame and solid metal covers shall comply with WSDOT Standard Specification 9-05.15 - Metal Castings, and WSDOT Standard Plan B-30.10-03, and B-30.20-04. Herringbone metal grates shall comply with WSDOT Standard specification 9-05.15-metal castings and WSDOT standard plans B-30.10-03 and B-30.50-03.

### D. Bedding and backfill materials for storm sewer pipe, roof drain pipe, and tight line pipe shall be per Section 31 23 33 – Trenching and Backfilling. Controlled Density Fill (CDF) shall be per WSDOT 2-09.3(1) E.

### E. Bedding and backfill materials for retaining wall footing drain pipe, including geotextile fabric, shall be per the recommendations in Sections 3.5 and 3.7 of the Geotechnical Report dated September 7, 2021.

### F. Trench Drains

1. Trench drains shall be Zurn Z886-HD or engineer approved equivalent. The channels shall be manufactured of HDPE with a 0.75% built-in slope. The channels shall have an inside width of four inches and the channel inverts shall be radiused. The channels shall minimize the amount of joints and have mechanically interlocking ends. The channels will be manufactured with vertical ribs twenty inches on center. Black Dura-coated heavy duty steel frames with concrete embedment studs will be attached to the channels prior to installation.

Integral galvanized steel edge rails will not be allowed. Exposed polymer concrete edges will not be allowed.

2. The trench drain grates will be transversely slotted ductile iron with a width of 5.375 inches, and an open area of nominally 18.5 square inches per linear foot of grating. The grates will be locked to the frame with bolts after the final inspection of the system. The trench drain assembly will be rated for Load Class C.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Verify installation conditions as satisfactory to receive work of this Section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.

### **3.02 INSTALLATION**

- A. Install in accordance with "Quality Assurance" provisions, "References," Specifications, and Manufacturer's directions. Where these may be in conflict, the more stringent requirements govern.
- B. Line and Grade.
  1. Survey line and grade shall be established prior to laying pipe per WSDOT Standard Specification 7-08.3(2)A. Contractor to provide construction layout staking.
  2. In areas between survey stakes, transfer line and grade from the Plans to the storm line trench and maintain said line and grade using construction practices in conformance with established industry standards.
- C. Handling, Storage and Cutting of Pipe.
  1. Material shall be stored in such a manner to prevent the pipe from bowing or otherwise being damaged.
  2. Saw cut pipe to leave a smooth end at right angles to the pipe axis. Prior to joining pipe, cut ends shall be de-burred, beveled and in accordance with the type of joint to be made.
- D. Pipe Installation
  1. Storm sewer pipe shall be constructed in accordance with WSDOT Standard Specification 7-08 - General Pipe Installation Requirements.
  2. Pipe shall be installed on a well bedded, prepared foundation throughout its length per Section 31 23 33 - Trenching and Backfilling. Grade the bottom of the trench by hand, if necessary, to the line and grade to which the pipe is to be laid, with proper allowance for pipe thickness and for bedding material.
  3. The pipe shall be uniformly bedded under and around the entire length of the barrel. The bedding shall be dug out to accommodate pipe bells and prevent the joints from supporting excess weight.
  4. Take precautions to prevent water from entering the trench during excavation. Do not lay pipe when, in the opinion of the Owner, trench conditions are unsuitable.

5. Prevent excavated or other foreign material from entering the pipe during the laying operation. When laying operations are not in progress, at the close of the day's work, or when labor is absent from the job, close and block all open pipe ends to prevent entry of foreign material or creep of the joints.
6. Take all precautions necessary to prevent the "uplift" or floating of the line prior to the completion of the backfilling operation.
7. In areas where pipe cover is less than one foot, controlled density fill (CDF) shall be used to encase pipe. The pipe shall have at least one foot of CDF below bottom of pipe and one foot of CDF on either side of pipe, measured from the outer wall of the pipe. CDF shall be used to cover the pipe, bringing it to grade in unpaved areas and up to the bottom of the crushed surfacing if below pavement.

E. Catch Basins.

1. All catch basins shall be installed per WSDOT Standard Specification 7-05.3 including excavation, foundation preparation, installation, plumbing and finishing.
2. Pipes entering catch basins shall be trimmed flush with the grouted fillet between the pipe and catch basin structure. Any damage to grouting during trimming operations shall be corrected to the satisfaction of the Owner.
3. The iron frame and grate shall be set to the plan elevation by means of precast concrete grade rings, adjusting rings, or concrete bricks. Scrap lumber, rocks or other material shall not be used in setting the rim elevations. The bearing surface of the all grade rings, bricks, and casting frame shall rest on a full mortar bed to provide a water tight seal between the precast structure and the casting.
4. Prior to final acceptance, remove all debris from catch basins.

F. Footing Drains.

1. Construct footing drain per the recommendations in Section 3.7 of the Geotechnical Report dated September 7, 2021. Establish elevations and grades of footing drains so as to permit gravity drainage to the onsite tight line storm sewer system.

G. Building Roof Drains and Downspouts.

1. Tight-line roof drains and downspouts to catch basins. Maintain positive slopes to catch basin and 12" minimum cover.

H. Removal of Storm Drain Sections to be Abandoned.

1. Existing storm drain to be abandoned shall be removed as needed where in conflict with proposed facilities. Contractor shall cap or fill existing piping to be abandoned. Excavate and remove existing sections of storm drain and catch basins which conflict with proposed grades. Properly dispose of removal debris offsite. Coordinate drain removal work with new drainage construction to provide satisfactory drainage for onsite and upstream areas at all times. Backfill abandoned trenched with Structural Fill in accordance with Section 31 23 33 Trenching and Backfilling.
2. Any remaining abandoned piping shall be plugged per WSDOT Standard Specifications 7-08.3(4).

I. Surface Drainage.

1. During construction, grade, drain, and maintain work site so as to prevent unnecessary construction delays due to ponding. Protect existing drainage structures and adjacent properties from sedimentation, sediment runoff, and damaging drainage velocities.
2. Provide proper coordination of site grading, landscaping, sidewalk construction, surface trench drain and catch basin rim adjustments to assure positive drainage of entire site with no ponding, and all surface stormwater is directed away from the building.

**3.03 ADJUSTING, CLEANING, AND REPLACEMENT**

- A. Make any adjustments as required.
- B. Clean: Leave installations clean; premises free from residue of work of this section.

**3.04 BACKFILL AND DRAINAGE FOR RETAINING WALLS.**

- A. Backfill retaining wall and landscape walls per WSDOT Standard Plan D-4. Installed underdrain lines and tight line to storm drainage structures as shown on plans.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 41 12 13 – SCREW CONVEYOR SYSTEM**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION**

- A. The Contractor shall furnish and install one (1) fully operational inclined screw conveyor system as shown on the plans and describe in specifications.
- B. The screw conveyor system shall transport mechanically dewatered wastewater treatment plant sludge from the rotary presses to the final discharge point area as shown on the Drawings.
- C. The screw conveyors system shall be provided complete with all necessary components, drives, motors, instrumentation, controls, ancillary items and supports, except as otherwise shown or specified herein.
- D. The design of the sludge conveying and system shall be based upon the Contract Drawings, these Specifications and the manufacturer's experience with existing systems of similar sizes, capacities and handling material with similar characteristics.
- E. The Contract Drawings, and this Section, provide equipment descriptions, minimum requirements and mandatory features of the equipment to be furnished. It is the Manufacturer's responsibility to design and furnish the equipment complete in all details, performance, and reliability meeting the requirements and intent of the Contract Drawings and these Specifications.
- F. The equipment shall be furnished complete with all accessories, special tools, and other appurtenances as specified herein or as may be required for a satisfactory installation.

#### **1.02 REFERENCE SPECIFICATIONS, CODES AND STANDARDS**

- A. The screw conveyors shall be designed and manufactured in accordance with the following listed Standards and Specifications, including applicable addenda in effect as of the date of bid submission. They shall be considered an integral part of this specification and shall govern the design, fabrication, testing and inspection of equipment, except as otherwise shown or specified herein.
  - 1. American Gear Manufacturers Association (AGMA)
  - 2. American Welding Society
  - 3. Conveyor Equipment Manufacturers Association (CEMA)
  - 4. National Electrical Manufacturers Association (NEMA)
  - 5. Anti-Friction Bearing Manufacturers Association (AFBMA)
  - 6. American National Standards Institute (ANSI)
  - 7. National Fire Protection Association (NFPA)
  - 8. American Society for Testing Materials (ASTM)
  - 9. Joint Industrial Council (JIC)
  - 10. American Society of Mechanical Engineers (ASME)
  - 11. Underwriters Laboratories Inc. (UL)

12. Institute of Electrical and Electronic Engineers (IEEE)
13. American Institute of Steel Construction (AISC)

### **1.03 SUBMITTALS**

- A. The following shall be provided in accordance with Section 01 33 00 – Submittal Procedures:
  1. Manufacturer's catalog data showing construction materials, required seals and guides, and required coatings.
  2. Fabrication drawings with full dimensions and installation drawings showing coordination with outlet piping, liner penetration and booting, the outlet structure and pipe supports.
  3. Operations and maintenance information as specified in Section 01 33 00.
- B. The manufacturer shall submit the following:
  1. Data sheets with description of the proposed equipment, size, length, type, capacity, arrangement, materials of construction, motor size, motor type and equipment weight, etc.
  2. Provide a detailed list of components and accessories to be furnished within the scope of this Section. Provide catalog information, drawings and specifications for components of the equipment, showing principal dimensions, parts, materials of construction, material thickness, etc.
  3. Significant dimensional differences between the equipment specified herein, indicated on the Drawings and the proposed equipment.
- C. Design loadings to be transmitted to foundations or supports shall be furnished upon request.

### **1.04 QUALITY ASSURANCE**

- A. All parts furnished shall be amply designed and constructed for the maximum stresses occurring during fabrication, erection and continuous operation.
- B. All materials shall be new and shall be of the very best quality, entirely suitable for the service to which the units are to be subjected.
- C. Exposed welds shall be ground smooth to form a neat uniform fillet without weakening the base metal.

### **1.05 HARDWARE**

- A. Design of all support structures, platforms and bracing shall be in accordance with AISC Standards. Structural Welding shall conform to American Welding Society Structural Code D1.1-82.
- B. Hardware requiring special tools or wrenches shall not be used.



## **1.06 MANUFACTURER**

- A. All equipment included in this section shall be furnished by a single supplier who shall be responsible for the design, coordination, and the satisfactory operation of the system. The screw conveyor system shall be manufactured by JDV Equipment (Dover NJ), FKC Co. LTD, (Port Angeles WA), or approved equal, including all equipment, materials and appurtenances necessary and as specified herein.
- B. Any re-design required to accommodate the OWNER approved alternate bid equipment shall be borne by the contractor and equipment manufacturer.

## **PART 2 - PRODUCTS**

### **2.01 GENERAL REQUIREMENTS**

- A. These specifications shall be considered as minimum requirements. The Contractor or Equipment Supplier shall add such additional features as are necessary for satisfactory operation and functioning of the conveying equipment.
- B. Structural design shall be in accordance with American Institute of Steel Construction AISC Standards.
- C. Except as otherwise indicated, welding shall comply with ANSI/AWWA D100 and AWWA C206, and the following:
  - 1. Welding shall be by the metal-arc method or gas-shielded arc method described in the American Welding Society's "Welding Handbook" as supplemented by other AWS standards. Welding shall conform to American Welding Society Structural Code D.1.1-82. Qualification of welders shall comply with AWS Standard AWS D1.198.
  - 2. During assembly and welding the component parts shall be clamped, supported and restrained to minimize distortion and for control of dimensions. Weld reinforcement shall comply with the AWS code. Upon completion of welding, weld splatter, flux, slag and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance with uniform weld contours and dimensions. Sharp corners on material that is to be painted or coated shall be ground to a minimum of 1/32" on the flat.
- D. Material type, thicknesses and dimensions shall conform to the screw conveyor schedule requirements unless otherwise specified, or required for structural considerations.
- E. Incline conveyor manufacturer is to be FKC, Inc. or approved equal.

### **2.02 SERVICE CONDITIONS FOR SCREW CONVEYORS**

- A. Material Characteristics (See Schedule for Details)
- B. Operating Conditions and Performance Requirements (See Schedule for Details)

## **2.03 TROUGHS, COVERS, END PLATES, CHUTES AND SLIDE GATES**

### **A. Conveyor Troughs**

1. Horizontal and inclined conveyor trough bodies shall be “U” type for horizontal conveyors and “O” type for inclined conveyors with trough dimensions conforming to the requirements of CEMA Standard 300, with exceptions as noted herein. The conveyor trough bodies shall be rolled to shape with both side flanges formed with the trough body. Trough end flanges, welded to each trough section, shall be provided for joining adjacent sections or connecting trough end plates to the trough sections. Each conveyors trough sections must not exceed 8 feet (96 inches) from flange to flange.
2. Conveyor troughs shall be equipped with a wear liner across the entire inside length. The wear liner shall be fabricated of high density UHMW polyethylene. The wear liner shall be provided in 4-foot long sections for ease of replacement. The wear liner shall be held in place using clips welded to the inside of the trough. Clips shall be placed away from the conveyor spiral path.
3. Each conveyor shall be equipped with a drainage valve at its lower end. The drainage valves must be stainless steel ball valve of 2 inches in diameter.
4. Conveyor troughs for shaftless screw conveyors shall be furnished with anti-floatation devices. Anti-floatation devices shall be installed at a minimum distance of every sixteen (16) feet of conveyor length.

### **B. Conveyor Covers (U Shape only)**

1. A sectional plate shall cover the entire trough, with exception of the inlet chute connections located. Cover segments at inlet chute connections shall extend, on each side, beyond the inlet chute connection and shall be bolted in place. Each cover section shall be not greater than 6-feet in length. The cover segments shall be arranged so that the trough flange and a trough stiffener provide support to each edge.
2. The covers open for maintenance and cleaning purposes. The cover shall be bolted.

### **C. Conveyor End Plates**

1. End plates shall be bolted to the trough end flange. End plates shall be designed to support the drives, bearings and gear reduction assembly.
2. Where shafts penetrate the end plates, the end plate shall be provided to accommodate the stuffing box provided.

### **D. Conveyor Chutes**

1. Trough inlet and discharge chutes shall be bolted to the adjoining equipment as shown on the Contract Drawings. Inlet and discharge chutes shall be supplied with reinforced rectangular or circular flanges.

## **2.04 CONVEYOR DRIVE TRAIN EQUIPMENT**

- ### **A.**
- The conveyor drive train equipment shall transmit power to the conveyor drive shaft using a shaft mounted speed reducer connected to an electric motor. Drive units shall be rigidly supported to avoid all visible “wobble” movement under any operating conditions. Any leakage coming from the trough passing through the shaft seal shall leak through the adapter end plate to atmosphere rather than into the gear motor.

B. Drive Shaft Assembly

1. The drive end assembly shall consist of the following components.
  - a. Drive Shaft
  - b. Seal plate
  - c. Hollow Shaft Gear Reducer
2. The tail end shall consist of the following components
  - a. Zero Speed Sensor
3. Drive shafts for the shaftless screw conveyors are to be complete with mating connections appropriate for mating to the shaftless screw assembly. The drive shall be of adequate diameter to handle all radial, thrust and torsion loads. The drive shafts shall be mounted to the shaftless spiral by a flanged connection.

C. Drive Motor

1. Drive motors shall be of the high starting torque (NEMA B or C design), TEFC, squirrel cage, AC induction type suitable for continuous severe duty service. The motor shall have Class F, MG 1 Part 31.4.4.2 Inverter Duty insulation, and a Class B temperature rise at 40°C ambient temperature. The drive motor shall be high efficiency with a 1.15 service factor.
2. The drive motor shall operate at 1800 rpm nominal speed and be sized to operate without overloading when the screw conveyor is operating at, or below, the design capacity. The minimum motor horsepower shall be as specified on the conveyor schedule elsewhere herein.

D. Speed Reducer

1. The speed reducer shall be a gearmotor enclosed shaft mount, type unit with a double or triple reduction ratio, as may be required. The speed reducer shall mount directly on the driven shaft and utilize a standard CEMA mounting to support structure. We highly recommend Screw Conveyor Package design flange from Nord Gear Corp.
2. The speed reducer sealing system shall be a Quadrilip system that has four components for sealing lubricant inside and contaminants outside of the speed reducer. The system must include a double lip seal, a single lip seal and grease pack barrier (grease lip). The sealing system shall also include diverting ports to avoid any possibilities of contamination to the gear reducer oil, even if the first seals broke down.
3. The speed reducer housing shall be constructed of 1-piece corrosion resistant gray cast iron torsional stiff. All housings bore and mounting faces shall be machined in one step to produce extremely precise tolerances. Thus ensuring accurate positioning of gear teeth, bearing & seals and a longer life of all components
4. All speed reducer gearing shall be of helical design. High speed gears shall be ground and low speed gear skive hobbled. Gears hardness shall be 58 Rc minimum. With an overload capacity of 275%

5. The speed reducer bearings shall be ball or tapered roller type and provide a 50,000-hour B-10 life at the expected design loading rate. All seals shall be double lip, spring-loaded type and made of nitrile rubber. Shaft seals shall be quadrilips two nitrile seals, which consists of 2 sealing lips, a trash guard lip and a grease chamber between the seals.
6. The speed reducer shall be manufactured to Quality Class 8 per AGMA Standard 6001-C88, minimum. The gear reducer shall be selected for AGMA Class 11 service with a 1.4 service factor based on motor nameplate horsepower.
7. The speed reducer shall be as manufactured by Nord Gear Corp., or equal.

## **2.05 CONVEYOR SUPPORTS**

- A. The conveyor troughs shall be supported using saddle type supports shaped to the profile of the troughs and extending to a common fixed distance below the centerline of the screw. Saddle type supports shall be located not greater than 16-feet center-to-center. Separate support points shall be provided (when possible) under the drive end and tail end assemblies. These supports are to be bolted to the trough flange.
- B. Troughs thickness shall be design to maintain through shape under loading. Transverse stiffeners shall not be used in order to allow easy maintenance of the UHMW liner and for the flight maintenance.
- C. Support loadings are to be based on a completely filled trough, weight of the conveyor and the dynamic loading when operating.
- D. The Contractor shall coordinate with the Conveyor Equipment Supplier support locations with the facility structural constraints. Access to other process systems and equipment shall not be restricted by the conveyor supports.
- E. Each conveyor shall be field shimmed as required to conform to the manufacturer's installation tolerances.

## **2.06 SHAFTLESS SCREW ASSEMBLIES**

- A. The shaftless screw flights shall be cold rolled spirals fabricated from high strength carbon spring steel bars with a minimum tensile strength of 100,000 psi and a minimum Brinnell hardness of 200.
- B. Shaftless screw conveyor spiral flights shall be formed in a forming machine to the diameter and pitch required. Each formed section shall be factory welded into full lengths. Where the length of the conveyor precludes shipping, sub-sections of flighting shall be divided into maximum shipping lengths and welded together in the field.
- C. Field splicing of flighting sections shall be by full penetration welds done in strict accordance with the manufacturer's instructions using AWS certified welders.
- D. Spiral flighting shall be connected to the drive shaft using a flanged connection plate that shall be welded to the spiral on one end. Transition between the flighting and connection flange shall be smooth and fabricated to the tolerances listed below. The drive shaft shall have a matching mating flange and shall be bolted to the flight connection plate.

## **2.07 SAFETY DEVICES AND LIMIT SWITCHES**

### **A. Zero Speed Switches**

1. Motion failure alarm unit shall equip each conveyor. The motion sensor shall be a non-contacting type probe. This probe shall be able to read screw rotation outside of the process, by reading disruption of the magnetic field by the ferrous target (flight).
2. The electronic unit shall operate on 120 volts AC power supply and shall be rated NEMA 4X or IP67. The probe signal shall be relay interconnected with a PLC digital input.
3. The zero speed sensors shall be located at the opposite end of drive. The PLC is always counting pulses, without any pulse count a PLC digital output shall be activated for an alarm or shall stop the whole system. Relay switch contacts shall be rated 120 VAC and interlocked with MCC motor starter.
4. Zero speed detection switches shall be Siemens model Sitrans WM100, or equal.

## **2.08 CONVEYORS CONTROL**

- A. Conveyors shall be controlled by the Sludge Box Cover System PLC and operator interface.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Deliver valve(s) in manufacturer's original, unopened cartons. Store in a safe place until ready for installation.
- B. Follow manufacturer's printed instructions for installation.
- C. Remove all identifying marks, labels, etc. from exterior.
- D. Conveyors shall be set upon level, fully grout foundations so that connecting flanges, screwed connection, or flexible connection shall meet without strain or distortion.

### **3.02 TESTING**

- A. All screw conveyor equipment shall be fully assembled and operated prior to shipment to the job site. Operation shall be smooth, free of vibration or unwarranted noise, or unwarranted high starting or no load running amperage draw.
- B. Upon receipt, equipment shall be immediately powered on and verified to meet the criteria stated above during operation.

## **SCREW CONVEYOR SCHEDULE**

Identifier	<b>Inclined Conveyor (Secondary Inclined Conveyor)</b>
Conveyor Type	Inclined, Mono-Directional, Shaft
Material handle	Cake from discharge of the Primary Inclined Conveyor
Mass Flow Capacity	0.5 Wet ton/hr
Loading at nominal capacity	45%
Material density	45-60 lbs / cubic feet

Temperature	40°F to 100°F
Flight diameter	9-inches diameter
Flight Pitch	5-inches pitch
Flight section	External section of 2 ½" X ¾" and internal section of 1" X ½"
Flight material	High strength chrome alloy steel, 200 brinnell min
Flight diameter tolerance	+ 0, - 1/4"
Flight pitch tolerance	± 1/4"
Conveyor nominal Length	17'4"
Conveyor slope	30 degrees
Trough body	Tubular O-Trough 304 stainless 10 gage thick
Trough cover	304 stainless 12 gage thick
Trough end flanges	304 stainless 3/8" thick
Trough end plates	304 stainless 1/4" thick
Discharges chutes	304 stainless 1/8" thick
Support	304 stainless 5/16" thick
Liner	UHMW 3/8" thick
Inlet	One (1)
Inlet type	Chute from Receiving Conveyor
Outlet	One (1)
Outlet type	To Bin
Gear reducer manufacturer	Nord Gear
Gear reducer model	SK2282 SCP
Power	1 HP 480V/60Hz/3ph
Output speed	53 RPM
Special Requirements	2" drain Screw Conveyor Package gear motor flange

**\*\*\* END OF SECTION \*\*\***

## **SECTION 45 05 00 – VALVES**

### **PART 1 - GENERAL**

#### **1.01 SCOPE**

- A. This section covers the work necessary for furnishing and installing the various valves in the plant piping systems.

#### **1.02 SUBMITTALS DURING CONSTRUCTION**

- A. Submittals shall be made in accordance with Sections 01 33 00 – Submittal Procedures.

### **PART 2 - PRODUCTS**

#### **2.01 GENERAL**

- A. All valves shall be complete with all necessary operating handwheels, chain wheels, extension stems, floor stands, worm and gear operators, operating nuts, chains, and wrenches which are required for the proper completion of the work included under this section.
- B. For potable water applications, all materials in substantial contact with potable water shall meet NSF 61 certification.

#### **2.02 VALVE OPERATORS**

- A. All valve operators shall open by turning counterclockwise. Buried valve operators with 2-inch nuts shall have AWWA C504 2-inch square operating nuts and be full enclosed, grease packed. Depending upon valve type, size, and operating torques, gear operators shall be provided as needed so as to permit operation of the valve under full operating head with a maximum pull of 40 pounds on the handwheel. The valve operators shall be of the self-locking type to prevent the disc or plug from creeping. Self-locking worm gears shall be a one-piece design of gear bronze material, accurately machine cut. Butterfly valve operators shall be provided with position indicators to show the position of the valve disc or plug. Handwheels shall be galvanized and painted the same color as the valve and associated pipeline.
- B. All operating nuts for buried valves are to be located 18” to 24” (approx.) below the surface and with valve boxes. Provide stem extensions as needed.
- C. Operators for Above Ground Valves unless otherwise noted on drawings:
  - 1. All exposed above ground valves 4” or smaller shall have direct-acting lever or handwheel operators on valves within 6 feet of the floor and chainwheel operators on overhead valves.
  - 2. All exposed above ground valves 4” or larger shall have handwheel operators on valves within 6 feet of the floor and chainwheel operators on overhead valves.
- D. Operators for Below Ground Valves unless otherwise noted on drawings:
  - 1. 6” and smaller valves shall be provided with direct 2-inch nut operator.
  - 2. 6” and smaller valves used for flow control shall be provided with worm gear type manual actuators and shall be suited for buried service with 2” nut operator.

3. 8" and larger valves shall be provided with gear type manual actuators and shall be suited for buried service with 2" nut operator.

## **2.03 VALVE BOXES**

- A. Valve boxes shall be two-piece screw type, cast iron, with min. 5-1/4-inch shaft and shall be of appropriate length for the installation. Extension pieces, if required, shall be the manufacturer's standard type. Units shall be Mueller H-10364, Clow Corporation F-2452, or equal. All units shall be complete with all necessary bases and accessories. All buried valves are to be provided with valve box assemblies unless located in a vault per plans.

## **2.04 SMALL GATE VALVES**

- A. 2" to 12" gate valves shall be Kennedy Valve or approved equal. Gate valves shall be non-rising stem, resilient-seated, conforming to AWWA C509 or C515, transition gaskets where needed, fusion bonded epoxy coated inside and out meeting AWWA C550.

## **2.05 LARGE GATE VALVES**

- A. 14" to 54" gate valves shall be Kennedy Valve or approved equal. Gate valves shall be non-rising stem and shall conform to AWWA Standard C515 covering Resilient Seated Gate Valves and be rated for 250 PSIG working pressure.
- B. The body, bonnet, and stuffing box shall be fusion-bond epoxy coated, both interior and exterior. Epoxy shall be applied in accordance with AWWA C550 and be NSF 61 certified.
- C. Include transition gaskets where needed.
- D. Valves shall be provided with bevel gears (horizontal) or spur gears (vertical) as indicated.
- E. Valves 30" and larger shall have brass bushings where the stem passes through the bonnet.
- F. All external bolting materials shall be stainless steel and have hexagonal heads.

## **2.06 EXPOSED SMALL GATE VALVES**

- A. Exposed gate valves smaller than 4" shall be all stainless steel with NPT threads compatible with smaller pipe sizes. Gate valve to be non-rising stem with resilient wedge design for 2" and larger valves. Protect non stainless steel components with fusion bonded epoxy coating.

## **2.07 CHECK VALVES**

- A. Check valves are to be stainless steel or ductile iron body, bronze mounted swing check valves, with external swing arm and spring, fusion bonded epoxy coated inside and out, meeting design per AWWA C-508. Valve shall be MH 259-02A Lever & Spring with Rubber Face. External spring and lever shall be relocated to opposite side of valve, if directed by the Owner. Spring and lever relocation, if any, shall be considered incidental to Contractor's bid.
- B. Duckbill check valves shall be Tideflex Model TF-2M for vertical installation only. Duckbill shall be EPDM with 316 Stainless Steel Band compression clamps.



## **2.08 SMALL BALL VALVES**

- A. FOR GENERAL USE, NON-POTABLE, EXPOSED: Ball valves smaller than 4" shall be Watts model S-FBV-1, 2-piece full port stainless steel ball valves for air and water applications. Stem shaft shall be 316 Stainless Steel.
- B. INTERIOR POTABLE WATER USAGE: Ball valves 2" and smaller shall be Asahi True Union Type 21, or approved equal. Valves shall be manual operation, meet NSF 60/61 certification, and rated for 200 psi minimum. Construction shall be of CPVC, seat of PTFE, and O rings of FKM.

## **2.09 FLAP GATES**

- A. Flap gates as shown on the drawings and described herein. Flap gates to be M&H Style 47 Flap Valves. Contractor to demonstrate operation of each flap gate during dry test and wet test.

## **2.010 BUTTERFLY VALVES**

- A. FOR INTERIOR PVC PIPE SYSTEMS:
  - 1. Butterfly valves are to be Asahi Type 57 or approved equal with stainless steel components for all valves. Body and disc shall be PVC. Stem Shall be 316 SS, and seats shall be EPDM. Butterfly Valves shall be supplied with corrosion resistant materials designed for the specific application (such as air pipe applications, water pipe applications, etc.). For potable water applications valves shall meet NSF 61 certification.
- B. FOR EXPOSED, DUCTILE IRON, OR STAINLESS AIR PIPE SYSTEMS:
  - 1. Butterfly valves are to be Bray Series 31 (lug style), Dezurik, or approved equal with stainless steel components for all exposed valves. Body material shall match pipe material. Body material shall be ductile iron if pipe material is PVC. Stem shall be 416 stainless steel, disc shall be 316 SS, and seats shall be EPDM – food grade. Butterfly Valves shall be supplied with corrosion resistant materials designed for the specific application (such as air pipe applications, water pipe applications, etc.). For potable water applications valves shall meet NSF 60/61 certification.
- C. FOR BURIED WATER APPLICATION
  - 1. Butterfly valves for mains 10 inches and larger shall be resilient seated and shall meet or exceed AWWA C504, Class 150B. Butterfly valves shall be suitable for direct burial. Shaft seals shall be standard O-ring seals. Seats shall be EPDM – food grade. The size of the butterfly valves shall be the same as the main on which they are located.
  - 2. Valve shall be iron-body, full-bronze mounted, resilient-seat valves and suitable for service with the type and class of pipe used.

## **2.011 COMBINATION AIR RELEASE VALVES**

- A. Combination Air Release Valves shall be A.R.I. D-025 or approved equal. Include stainless steel nipples, adaptors, bottom isolation valve, and accessories.

## **2.012 GLOBE VALVES**

- A. Globe valves 2" and smaller shall be Alloyco stainless steel, Class 150, OS&Y, Plug Type Disc or approved equal. Valves shall be manual operation, meet NSF 61 certification, and rated for 200 psi minimum. Construction shall be of CPVC, seat of PTFE, and O rings of FKM.

## **2.013 HYDRANT ISOLATION VALVES**

- A. All plant water distribution system isolation valves (in buried locations and less than 4" diameter) shall be gate valves, 2" to 12" gate valves shall be Kennedy Valve or approved equal. Gate valves shall be non-rising stem, resilient-seated, conforming to AWWA C509 or C515, transition gaskets where needed, fusion bonded epoxy coated inside and out meeting AWWA C550.

## **2.014 VALVE IDENTIFICATION TAGS**

- A. Each shut-off or control valve shall be provided with a 1 ½ inch minimum diameter heavy stainless steel tag. Tags shall bear the valve ID as listed on the valve schedule.
- B. Numbers and letters shall be block type with ½ inch high font stamped on the tags and filled with black enamel.
- C. Attach tags to the valves by split-key rings soldered so that the ring and tag cannot be removed.
- D. Submit to the Engineer for approval, a drawing and a neatly typed valve directory listing each valve number, type of valve and its location.

## **2.015 VALVE LABEL MARKERS**

- A. Each shut-off or control valve shall be provided with a label marker in concrete pad as detailed on the plans and valve schedule.

# **PART 3 - EXECUTION**

## **3.01 INSTALLATION**

- A. Bolt holes of flanged valves shall straddle the vertical centerline of the pipe run. Prior to installing flanged valves, the flange faces shall be thoroughly cleaned. After cleaning, insert gasket and bolts, and tighten the nuts progressively and uniformly. If flanges leak under pressure, loosen or remove the nuts and bolts, reseal or replace the gasket, retighten and/or reinstall the nuts and bolts, and retest the joints. Joints shall be watertight at test pressures before acceptance.
- B. Thoroughly clean threads of screwed joints by wire brushing, swabbing, or other approved methods. Apply approved joint compound to threads prior to making joints. Joints shall be watertight at test pressures before acceptance.
- C. Generally, unless otherwise indicated on the Drawings, all valves installed in horizontal runs of pipe having centerline elevations 4 feet 6 inches or less above the finish floor shall be installed with their operating stems vertical. Valves installed in horizontal runs of pipe having centerline elevations 4 feet 6 inches or greater above the finish floor shall be installed with their operating stems horizontal. If adjacent piping prohibits this, the stems and operating handwheel shall be installed above the valve horizontal centerline as close to horizontal as possible.

### **3.02 TESTING**

- A. Valves shall be tested at the same time that the adjacent pipeline is tested. Joints shall show no visible leakage under test. Repair joints that show signs of leakage prior to final acceptance. If there are any special parts of control systems or operators that might be damaged by the pipeline test, they shall be properly protected. The Contractor will be held responsible for any damage caused by the testing.
- B. If requested by the Engineer, the valve manufacturer shall furnish an affidavit stating the materials options furnished and/or that he has complied with these and other referenced specifications.

**\*\*\* END OF SECTION \*\*\***

## **SECTION 46 33 44 – PERISTALTIC METERING PUMP EQUIPMENT**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. Work includes: Furnishing and installation of peristaltic metering pump equipment for three (3) carbon feed stations and one (1) alkalinity feed station, as shown on drawings.
- B. Coordination: Verify that the peristaltic metering pump equipment is sized and configured to properly work with the Carbon Feed Equipment (Section 10 56 00) and the Alkalinity Feed Equipment.

#### **1.02 SUBMITTALS**

- A. Product data: Submit product data for each type of product included in this section. Ensure submitted information provides the product dimensions, construction material(s), product weight, and the manufacturer's warranty.

#### **1.03 SPARE PARTS AND SPECIAL TOOLS**

- A. The peristaltic metering pump system shall include the following spare parts, at a minimum:
  - 1. One set of new and unused special tools required for installation, operation, and maintenance of Plant Water System Equipment.
  - 2. One additional #1 Tube for each peristaltic metering pump.
  - 3. Pump Repair Kit for each peristaltic metering pump.

### **PART 2 - MATERIAL**

#### **2.01 CARBON FEED METERING PUMP EQUIPMENT**

- A. Three (3) peristaltic metering pumps. Pumps are to be Stenner S3V02 single head variable output pump for high pressure (up to 100 psi) applications. Metering pump will be used to dose liquid carbon solution to the Anoxic #2 Basin in each of the tree Trains. Metering pump flow rate is to be manually adjustable. Pump is to be located inside Carbon Feed Enclosure and tube accessories are to be provided so pump intake tube is placed inside 55 gallon drum and pump discharge tube is routed up and over the Train wall and directed into the Anoxic #2 Basin. Coordinate tube alignment with Owner. Contractor is to tether tubing to the discharge location and confirm a durable and suitable discharge configuration. Pump features to include:
  - 1. Variable Output: 0.8 gpd (min. capacity) to 17.0 gpd (100% of capacity)
  - 2. Power = 0.6 amp, 120 VAC, 60 Hz
  - 3. Tubing Size = 3/8" OD (tube #2)

4. 6 foot (min.) power cord length. Include extension cord from nearest receptacle to the Carbon Feed Station
5. Discharge tubing. Length as needed. 30 feet, min. Include check valve and isolation valve.
6. Intake tubing for intake from liquid carbon feed solution drum (55 gallon drum). Length as needed. 6 feet, min. Include weight, foot valve, and configure so intake is located at bottom of drum.
7. Additional Accessories: Pump Repair Kit and Injection Check Valve Assembly with 100' of 3/8" Teflon tubing. Everything to be compatible for use with carbon solution.

## **2.02 ALKALINITY FEED METERING PUMP EQUIPMENT**

- A. One (1) peristaltic metering pump. Pump is to be a Stenner S5V5G single head variable output pump for high pressure (up to 100 psi) applications. Metering pump will be used to dose a liquid solution of soda ash to the Flow Splitter Box, upstream of the three Trains. Metering pump flow rate is to be manually adjustable. Pump is to be located inside Alkalinity Feed Enclosure and tube accessories are to be provided so pump intake tube is placed inside 300 gallon tote and pump discharge tube is routed up and over the Flow Splitter Box wall and directed into the main chamber of the flow splitter. Coordinate tube alignment with Owner. Contractor is to tether tubing to the discharge location and confirm a durable and suitable discharge configuration. Pump features to include:
  1. Variable Output: 15.8 gpd (min. capacity) to 315.0 gpd (100% of capacity)
  2. Power = 0.6 amp, 120 VAC, 60 Hz
  3. Tubing Size = 5G
  4. 6 foot (min.) power cord length. Include extension cord from nearest receptacle to the Carbon Feed Station
  5. Discharge tubing. Length as needed. 30 feet, min. Include check valve and isolation valve.
  6. Intake tubing for intake from liquid alkalinity feed solution tote (300 gallon tote). Length as needed. 6 feet, min. Include weight, foot valve, and configure so intake is located at bottom of tote.
  7. Additional Accessories: Pump Repair Kit and Injection Check Valve Assembly with 100' of 5G Teflon tubing. Everything to be compatible for use with alkalinity solution.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Install according to manufacturer's recommendation. Comply with applicable regulations of governing authorities.
- B. Install all shelters where shown in the Drawings and in the approved shop drawings.

- C. Upon completion of the installation, and as a condition of its acceptance, visually inspect all the work under this section, check all components for proper operation and touch up all scratches and abrasions to be completely invisible.

**\*\*\*END OF SECTION\*\*\***

## **SECTION 46 41 23 – SUBMERSIBLE MIXERS**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION**

- A. The Contractor shall furnish and install the following mixing units in each new treatment train: two (2) Mixer assemblies, two (2) Masts, and two (2) Davit Cranes. Two (2) mixer assemblies, one in each of the anoxic zones of each train. The total number of installations across Trains 1 & 2 is four (4) Mixer assemblies, four (4) Masts, and four (4) Davit Cranes.
- B. Mixers shall be designed to operate smoothly and efficiently in each anoxic zone.

#### **1.02 SUBMITTAL DATA**

- A. The following shall be provided in accordance with Section 01 33 00:
  - 1. Manufacturer's catalog data showing construction materials, coatings, dimensions, wiring diagrams, controls, and misc. information.
  - 2. Operations and maintenance information as specified in Section 01 33 00 – Submittal Procedures.

#### **1.03 WARRANTY**

- A. In addition to the standard warranty provided by the equipment manufacturer, the Contractor is to provide an extended warranty covering defects in material and workmanship for 1 year following the date of substantial completion of the equipment (per Supplementary Conditions). The warranty shall be in printed form, shall apply to all similar units, and shall include parts and labor.
- B. Supplied equipment to be free from defect in design, manufacture, workmanship and materials

### **PART 2 - PRODUCTS**

#### **2.01 EQUIPMENT CRITERIA**

- A. The Submersible mixers will adhere to the following criteria:
  - Maximum Motor Nameplate Power: 5 HP
  - Electrical Service: 460 Volt, 60 Hz, 3 phase
  - 1. Materials:

Propeller	Stainless Steel, ASTM A276 Type 316 Ti
Motor/Propeller Shaft	Stainless Steel, ASTM A276 Type 316 Ti
Motor Housing	Stainless Steel, ASTM A276 Type 316 Ti
Motor Casing Cover	Duplex Stainless Steel, ASTM A890 CD 4MCU
Casing Cover	Stainless Steel, ASTM A276 Type 316

O-Rings / seals	Viton (FPM)
Fasteners	Stainless Steel
Outer Seal Faces	Silicon Carbide/Silicon Carbide
Inner Seal Faces	Silicon Carbide/Silicon Carbide
Power Cable Jacket	Chloroprene with non-wicking fillers
Guide Rail (Mast)	Stainless Steel, ASTM A276 Type 304 or 316
Support Frame	Stainless Steel, ASTM A276 Type 316 Ti
Mast Mounting Brackets	Stainless Steel, ASTM A276 Type 304 or 316
Lifting Cable	Stainless Steel, ASTM A276 Type 304 or 316
Lifting Davit	Stainless Steel, ASTM A276 Type 304 or 316 with marine-grade winch
Oil (seal lubrication)	Environmentally safe, mineral or paraffin base

B. Accessories

1. **POWER CABLE:** A cable plug and receptacle at motor housing entry shall be an integral design of the submersible mixer allowing the operator to easily replace or service the mixer without needing an electrician. The plug and receptacle eliminates re-wiring errors and ensures operator safety. Provide a suitable length of power/control cable with each mixer, suitable for submersible application, sized in accordance with NEC requirements. Cable entry shall be sealed, with bare strands embedded in resin to insure that no entry of moisture is possible into the motor/ terminal area even if the cable is damaged or severed below water level. Cable entries providing only rubber grommet (external cable jacket) seals will not be accepted. The mixer manufacturer shall provide carabineer clip and a support clamp to secure the power cable at the top of the basin to prevent excessive movement of the cable.
2. **TEMPERATURE PROTECTION:** The stator shall be equipped with three (3) thermal switches (PTC resistor), one embedded in each stator phase for use in conjunction with and supplemental to external motor overload protection. Arrange controls to shut down mixer should any of the monitors detect high temperature and automatically reset (non-XP motors only) once motor temperature returns to normal.
3. **SEAL LEAK DETECTION:** Provide moisture detector in the motor's stator cavity, which allows a control panel mounted relay to indicate leakage into the motor.
4. **MOTOR SENSOR MONITORING RELAY:** The mixer supplier shall furnish all relays required for monitoring all motor sensors. The relays shall be installed by others in the motor control panel and properly wired in accordance with mixer manufacturer's instructions. Relays shall mount in standard 12-pin socket bases (provided with relays) and shall operate on available control voltage of 24-240 VAC. If relays require an input voltage that is not available in the motor control panel an adequate transformer (with fused input) shall be provided. Relays shall have a power consumption of no more than 2.8 watt, and shall be UL approved. Relays shall be modular in design, with each relay monitoring no more than two motor sensor functions. Each relay module shall include a dual color (red/green) LED to indicate the status of each monitored sensor. Green will indicate "status



OK”; red will indicate a failure or alarm condition. A self-corrected fault will allow the relay output contacts to reset, and cause the LED to change from a steady alarm indication to a flashing signal. The LED shall continue to flash until locally cleared, providing the operator an indication of a potential intermittent fault. Each relay shall also include a power-on LED and both “test” and “reset” pushbuttons. An independent fail-safe (switch on power loss) form-C output contact shall be included for each monitored sensor to provide a normally-open / normally-closed dry contact to initiate a remote alarm device or shut down the motor. Contacts shall be rated for 5 amps at 120 volt.

- C. **GUIDE MAST ASSEMBLY:** Provide a permanently installed guide mast assembly which allows for mixer installation, operation and retrieval without the need to enter the basin. The mast assembly shall allow for adjustment of mixer vertical location. The mast shall be minimum 4” square tube supplied with factory welded sockets at the top, bottom and intermediate levels as needed to provide support at a maximum of 10ft intervals. Sockets shall be lined with an insert to insure easy mast rotation, and shall work in conjunction with supplied mounting brackets to secure the unit to the tank wall. The top mast bracket shall include a rotary positioning plate which allows the mast to be secured in any of 14 locations with a total of 158 degrees of rotation (for 2” masts there shall be 10 locations with a total of 168 degrees of rotation); adjustments shall be possible without the need to drain the basin. Wall extension brackets, if required, shall be provided to insure a straight and true installation. The mixer shall be guided along the mast through an integral stainless steel mounting bracket fastened to the mixer motor end cap. Support frame to be provided with polymer liner allowing contact only between guide rail and the sliding surface of the polymere (galvanic separation). An adjustable mixer stop bracket shall be furnished to support the mixer at manufacturers recommended height.
- D. **MOUNTING PEDESTAL:** Provide a mounting pedestal designed for permanent mounting of the mixer on the basin floor. The pedestal shall firmly support the mixer at the proper distance from the floor, and shall include a retaining strap for retention of the mixer unit.
- E. **PORTABLE LIFTING DAVIT AND LIFTING CABLE:** Provide two (2) portable lifting davit suitable for use with mixers in this section. The davits shall be designed to be mounted on the top mast mounting bracket (optional floor sockets available for covered tanks). It shall include a manual brake winch, and shall be adequately rated to lift the mixer and support arm off the mast and directly onto the adjacent deck surface. If handrail is fitted to the deck, removable sections or safety chain sections shall be provided such that the mixer does not need to be lifted over the handrail. A lifting cable, permanently attached to each mixer, shall be provided in sufficient length for attachment of the upper end to the winch cable reel when the davit assembly is installed. For installations in which the lifting davit is shared between multiple mixers, equipment shall be provided to securely hold the mixer lifting cable taught.
- F. **FABRICATION:**
  - 1. **GENERAL:** The mixer supplied with direct drive, close coupled motor must be sealed to prevent ingress of water in wet-well installations with a depth of up to 100 feet. All exposed surfaces shall be corrosion resistant stainless steel approved for both wastewater and water applications.

2. MAJOR COMPONENTS: Furnish major components (motor housing, motor end caps) of solid thick cross section material as specified with smooth surfaces devoid of blow holes and other irregularities. Designs employing sheet-metal sheathing over cast or fabricated components will be considered inferior and will not be acceptable.
3. PROPELLER (WITH EVERCLEAN BLADES): To optimize mixing, and minimize fouling the propeller shall be completely open to the mixed media. Diffuser devices such as jet rings and shrouds should typically be avoided. Propeller shall be made of 316 stainless steels to resist abrasion. Each blade shall be contoured such that the tangent line at any point on the leading edge is equal or less steep relative to the circumferential direction than the resulting force, causing fibrous materials to always slide toward the outer radius of the propeller.
4. PROPELLER SHAFT SEALS: The propeller end of the shaft shall be sealed by two totally independent mechanical shaft seals, each with its own independent single spring system. An environmentally friendly oil-filled chamber shall separate the seals and provide lubrication. Single mechanical seals or rotary lip seals shall not be considered adequate for this critical sealing area.
5. BEARINGS: The motor shaft shall be supported by two bearing sets sized to provide a B10 of greater than 100,000 hours at all anticipated axial and radial loadings. Shaft bearings shall be maintenance free sealed/shielded (permanently lubricated).
6. MAINTENANCE INTERVAL: The complete mixer unit shall be designed for operation with scheduled maintenance intervals not less than 16,000 running hours (or 2 years whichever occurs first). This scheduled maintenance interval shall be clearly stated in the mixer manufacturer's standard operation and maintenance manual supplied with the mixer.
7. MOTOR: Motor shall be squirrel cage, induction in design, housed in a completely watertight and air filled chamber, with a min 1.10 service factor. Insulate the motor stator with, at minimum, Class F insulation rated for 311 Degrees F. Provide temperature protection and seal leak detection as specified above. Motors shall be designed, rated and warranted for continuous operation and shall be capable of sustaining at least 10 evenly spaced starts per hour.

## **2.02 CONTROLS**

- A. See Section 26 80 00 – Control System

## **2.03 SPARE PARTS**

- A. The manufacturer is to include three complete sets of replacement wear parts for mixer equipment.

## **2.04 FACTORY TESTS**

- A. Prior to shipment the mixer manufacturer shall perform visual and dimensional inspections, electrical testing, and functional testing which include but are not limited to:
  1. Rotor balance and alignment
  2. Leakage testing of motor chamber and lubricant reservoir

3. Checking electrical connections for ground conductor, temperature switches, and moisture sensor
4. Measuring winding and power cable resistances
5. Testing insulation of windings and power cable
6. No-load test to ensure proper direction of rotation and electrical characteristics.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. In accordance with contract drawings, manufacturers' shop drawings and instructions.
- B. VERIFICATION OF PERFORMANCE: All mixers shall be field tested by contractor after installation to demonstrate satisfactory operation without excessive noise, or overheating. Any mixer which fails to meet any of the contract specifications will be modified, repaired or replaced by the contractor at no additional cost to the owner.

### **3.02 MANUFACTURER'S SERVICES**

- A. Installation assistance and certification: As required for proper installation prior to start up.
- B. Start-up and field testing: 2 full days on site, including all travel expenses.
- C. Operator Training: 1 full day on site.
- D. Warranty Service: As required during the warranty period.

**\*\*\* END OF SECTION \*\*\***

## **SECTION 46 41 46 – PORTABLE TANK MIXER**

### **PART 1. GENERAL**

#### **1.01 DESCRIPTION**

- A. The Contractor shall furnish and install the following portable tank mixer unit: one (1) Septic Tank Agitator
- B. Portable tank mixer unit shall be designed to operate smoothly and efficiently at mixing and agitating sludge. In particular septic tank sludge with layers of solids, foam, grease, and liquid.

#### **1.02 SUBMITTAL DATA**

- A. The following shall be provided in accordance with Section 01 33 00:
  - 1. Manufacturer's catalog data showing construction materials, coatings, dimensions, wiring diagrams, controls, and misc. information.
  - 2. Operations and maintenance information as specified in Section 01 33 00.

### **PART 2. PRODUCTS**

#### **2.01 MIXER**

- A. The mixer shall be a Crust Buster Portable Septic Tank Agitator with 50 cc engine, or approved equal. Manufacturer contact info: email: [sales@crustbusters.com](mailto:sales@crustbusters.com) ; phone: 763-878-2296. Mixer is to include the following accessories:
  - 1. Crust Buster Power Head
  - 2. Vinyl Cover for Power Head
  - 3. 80-inch shaft with 2-blade propeller
  - 4. 2-foot removable extension for the shaft
  - 5. Crust Buster aluminum bracket set for mounting. Bracket set is to include quick release attachments.

#### **2.02 SPARE PARTS**

- A. The equipment manufacturer is to include a complete set of replacement wear parts for mixer equipment, including an extra 2-blade propeller.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. In accordance with contract drawings, manufacturers' shop drawings and instructions.

#### **3.02 MANUFACTURER'S SERVICES**

- A. Installation assistance and certification: As required for proper installation prior to start up.
- B. Start-up and field testing: 1 full day on site, including all travel expenses.
- C. Operator Training: 1 full day on site.
- D. Warranty Service: As required during the warranty period.

**\*\*\* END OF SECTION \*\*\***

## SECTION 46 53 00 – BIOLOGICAL TREATMENT SYSTEM

### PART 1. GENERAL

#### 1.01 DESCRIPTION OF WORK

- A. The treatment process selected for this project is a multistage (anoxic and aerobic) activated sludge process. The system shall consist of two (2) additional bullseye style trains (Train #1 and Train #2), as shown on the project plans. The existing Trains (Train #1 and Train #2) are to be retrofitted to match the new 3<sup>rd</sup> Train. Equipment furnished under this section shall include the in-basin aeration system, mixers, clarifier equipment, process instrumentation and controls as specified in this section to provide a completely functional system. To ensure the integrity of the system, all the components listed above must be supplied and guaranteed by the same system manufacturer.
- B. Type 316 stainless steel is required for all in-basin steel components of both Train 1 and Train 2 equipment, excluding FRP components (such as the effluent weirs and covers). This includes exposed and submerged steel components; however, it is noted that the structural supports for these components may be provided as painted steel.

#### 1.02 DESIGN TREATMENT CAPABILITY

A. Influent Parameters

1. The influent to each of the new Trains (Train #1 and Train #2) will be as follows:

FLOW	=	63,333 gpd	Daily Avg.
		73,333 gpd	Max. Monthly Flow
		153,333 gpd	Peak Day flow
		178 gpm	Peak Hour Flow
BOD <sub>5</sub>	=	151.3 lbs./day	at Max. Monthly Flow
TSS	=	72.0 lbs./day	at Max. Monthly Flow
TKN	=	49.7 lbs./day	at Max. Monthly Flow

B. Effluent Required

1. When operated according to the manufacturer's instructions by a certified operator, in the absence of toxicity and when sufficient nutrients and alkalinity are present, the treatment system will produce an effluent of the following quality (max monthly average values):

BOD <sub>5</sub>	=	30 mg/L
TSS	=	30 mg/L
TIN	=	8 mg/L

C. Process Design

1. The process shall be an activated sludge process using two anoxic zones and two aeration zones. In addition, blowers will run on VFD drives and adjust, as needed, to maintain a user determined D.O. concentration (such as 2 mg/L).

- D. Process Performance Guarantee
  - 1. The treatment system supplier is to provide a written process guarantee, guaranteeing the above effluent quality when equipment is operated and maintained per MFR's recommendations. The guarantee shall cover all equipment components, which affect quality including aeration system and clarifiers.

### 1.03 BASIS OF DESIGN

- A. Model R Oxigest Multistage Anoxic and Aerobic System as manufactured by Smith and Loveless, Inc.
- B. Approved equals.
- C. Equipment of all manufacturers must be in accordance with these specifications and plans. Being named as a manufacturer does not eliminate their responsibility of providing equipment in compliance with the following specification section. Any deviations without sufficient evidence proving equal or superior quality shall be rejected without further review or comment.
- D. The Oxigest System is the base bid system. The decision of the Engineer with respect to approval of any proposed alternate systems is final.
- E. Contractors may submit an approval package for equipment of alternate manufacturers for review with their bid and included as an Equipment Alternate on the Bid Proposal. A pre-approval review prior to bid will not be done. Contractors proposing alternate manufacturers will be responsible for all costs associated with system evaluation and redesign including all electrical, mechanical, and civil aspects of the installation. Alternate manufacturer shall submit the information in Section 1.04.
- F. The valves, equipment, materials of construction, and controls specified under this section supersede any other specifications located elsewhere in the contract documents.

### 1.04 ALTERNATE SYSTEMS

- A. SUBMITTAL REQUIREMENTS FOR ALTERNATE TO OXIGEST SYSTEM
  - 1. To be considered acceptable as alternate process equipment, the manufacturer shall send the Engineer sufficient information, which is to include such drawings, specifications, literature, performance data, and other information necessary to describe the proposed equipment as meeting the minimum requirements of the project.
  - 2. The submittal data must include, but not be limited to, a list of at least five Domestic U.S. installations of a similar size and equipment of design similar to the specified aeration/clarification system that have been in operation for five years in similar applications. The information on each plant shall include:
    - Name and location of facility.
    - Brief description of plant size including design flow, peak flow, organic loading, and effluent requirements (must have 10 mg/l nitrate limit or lower).
    - Minimum of twelve months operating data including daily flows, influent and effluent quality for BOD, suspended solids, and ammonia nitrogen, TKN, nitrate nitrogen.
    - Name, address and telephone numbers of owner, plant operator, design engineer and general contractor.

## PERFORMANCE

### B. Mechanical Guarantee

1. All equipment manufactured by the supplier shall be guaranteed to be free from defective material and workmanship, under normal use and service, for a period of 12 months from the date of Substantial Completion of the construction of the ESWD WWTP Upgrade (phase I).
2. Any equipment supplied by the supplier, but not of their manufacture, shall be provided with all guarantees and warranties provided by the original equipment manufacturer passed on to the end user.

### C. Experience

1. The minimum acceptable experience level is 5 installations in the US provided by the supplier, using a long sludge age, single basin total nitrogen removal process with moving aeration chain equipment, similar to that specified for this project, that have been operating for a minimum of five years.

### D. Process Performance Guarantee and Bond

1. The treatment system supplier shall provide a written process performance guarantee (PPG), guaranteeing the final effluent quality in accordance with this specification section. The PPG shall be supplied as part of the equipment submittal.
2. The PPG shall guarantee effluent requirements as listed in this specification and shall remain in effect for a period of two years from start up.

## PART 2. PRODUCTS

### 2.01 TREATMENT SYSTEM

#### A. GENERAL

1. The biological treatment system shall be designed for BOD, total suspended solids, and total inorganic nitrogen removal. It consists of submerged diffusers, mixers, dissolved oxygen sensors, and control system. To ensure the integrity of the system, all the components listed above must be supplied and guaranteed by the same manufacturer.
2. The aeration system shall include all the aeration system components specified below.
3. All concrete required for support or installation of any equipment supplied as part of the system shall be provided as shown on the plans and as required by the manufacturer.

#### B. CONSTRUCTION

##### 1. General

Each unit shall form a complete wastewater treatment system. The outer wall shall be reinforced concrete. The inner vertical walls shall be structural grade steel plate not less than 1/4" (6 mm) thick. All welded steel structural members shall be joined by electric arc welding with fillets of adequate section for the joint involved. Where required for additional sectional strength or watertight integrity such welds shall be continuous. Inlet and outlet connections shall be as shown on the drawings.

2. Access Walkway

A 3'-0" (0.9 m) wide access walkway shall span the entire length of the clarifier and extend to the outer tank wall as shown on the drawings. The walkway bridge shall be capable of supporting a live load of 150 lbs. per linear foot (68 kg per m<sup>2</sup>), in addition to the dead load. Deflection shall not exceed 1/360 of the unsupported span. A 42" (1,068 mm) high handrail and a midrail shall be provided for both sides of the walkway. Openings shall be provided for transition to the clarifier service walkway. A 2'-0" (0.6 m) wide clarifier service walkway shall be provided with outboard and inboard protection as described above. The clarifier service walkway shall cover the full circumference of the clarifier for convenient access to the diffuser assemblies and air control valves. It shall further provide for maintaining the effluent weir and effluent trough. Bar grating shall be aluminum and shall extend over the entire length of walkway. Handrail shall be aluminum.

3. Ladder Access

An aluminum ladder attached to the end of the walkway shall be provided, as shown on the drawings. Treads shall be of nonskid design and handrails on both sides shall be provided.

C. SYSTEM

1. Anoxic and Aeration System.

The aeration and anoxic compartments shall have an outer wall inside diameter of 32 ft, a normal static water depth of 15.5 ft and an overall wall height of 16.9 ft. The total capacity of the annular aeration compartments shall be 43,000 gallons. The annular compartment shall be divided by steel plate partition walls. All necessary internal valves, piping, mixers, supports, etc. shall be provided to permit operation of the unit using the Multistage Anoxic Aerobic Process.

System includes two anoxic compartments and two aerobic compartments as shown on drawings.

The anoxic tanks shall have a combined capacity of 26,508 gallons, and be divided into two (2) compartments. Dimensions shall be as shown on the drawings. Each anoxic compartment shall include a submersible mixer with a 5 HP, 3 phase, 460 volt, 60 Hz motor. A 6 inch recycle airlift shall be installed in the second anoxic compartment, capable of pumping 101 GPM. All airlift accessories such as solenoids, limit switches and controls shall be included by the manufacturer.

It is the intent of this specification that the manufacturer provides a complete system including all equipment and hardware required for the in-basin components.

The aeration system must be easily accessible for service and maintenance without basin dewatering or a complete aeration system shutdown.

System includes two anoxic compartments and two aerobic compartments as shown on drawings.

The design AOR (actual oxygen requirement) of the aeration system is 269 lbs O<sub>2</sub>/day for Aerobic Zone 1 and 57 lbs O<sub>2</sub>/day for Aerobic Zone 2 (Train #3). This is to be accomplished with an air transfer rate of 240 SCFM using the S&L medium bubble diffusers. In addition, airlift pumping requirements are 75 SCFM, and total air requirement = 315 SCFM.



2. Air Diffusion Equipment

An air distribution header and individual air diffusion assemblies shall be provided. The air header shall be rectangular tubing and the air supply duct shall extend from the header to a point just outside the outer tank. A 125 lb. flanged connection shall be supplied at the outer end of the supply duct. The header shall support drop pipes to which are attached air diffusion devices. Each drop pipe assembly shall include a union to permit convenient removal of the diffuser assembly and an air control valve to permit regulation of the air supply. The air diffusion devices installed on the air drop-pipe assemblies shall be medium bubble style diffusers as manufactured by Smith & Loveless, Inc., designed to minimize clogging as well as to insure proper air diffusion and distribution over the entire aeration tank. The diffusers and piping shall be of corrosion resistant construction and the entire assembly shall be removable for inspection of servicing. The air diffusion efficiency of the devices shall be such that an adequate supply of dissolved oxygen can be maintained in the aeration zones to meet the treatment requirements at the organic load for which the plant is designed

3. Clarifier

The circular clarifier shall have a diameter of 18 ft. The air header shall rest on the top and be welded to the clarifier tank forming part of the freeboard for the tank and also providing reinforcing. The freeboard above the static water level of the aeration compartment at the inner tank shall be 1.4 ft. The clarifier shall be of all-welded construction providing a leak-proof barrier between the clarifier and the aeration tankage. The clarifier bottom shall be formed by the purchaser by placing concrete at a 1 in 12 slope inside the steel tank walls. The finished floor shall conform to the drawings and shall provide a clearance between the floor surface and scraper blades of the sludge collector mechanism.

A complete sludge collector mechanism, support bridge, continuous scum baffle, mechanical skimming system with anti-rotation bar, peripheral effluent trough with adjustable aluminum weir plates, scum baffle and service walkway as specified herein, shall be furnished.

A 10 inches in diameter steel inlet pipe extending from the aeration compartment to the center inlet well shall be furnished as shown on the plans. The collector mechanism shall be complete with center inlet well, drive assembly, drive shaft and adjustable rake arms.

Other connections shall be provided as shown on the drawings.

The inlet well shall be fabricated from 1/4" (6 mm) steel plate, and shall be supported from the drive shaft by a steel frame.

The drive mechanism shall be designed for a rated torque of 800 foot-pounds. It shall consist of a primary gear motor and a secondary speed reducer. Power shall be transmitted from the primary to the secondary unit by means of a roller chain drive, which shall be enclosed for protection from the weather and for operator safety.

The primary and secondary units shall be of the heavy-duty type running in oil. Anti-friction bearings shall be used throughout. The primary unit shall have an integral NEMA C face, ½ horsepower motor, suitable for operation on 460 volt, 3 phase, 60 Hz current. An overload protection system shall be provided to protect the motor should the drive become overloaded. The protection system shall consist of a sprocket on the input shaft of the secondary reducer mounted between two friction facings, which are spring loaded. When an overload occurs, the driven sprocket shall “slip” between the two facings limiting the torque placed on the drive.

The rake arms shall be attached to the drive shaft with a hinged joint to allow easy adjustment of the end elevation of the rake arm. The rakes shall be individually adjustable for height. The rakes shall be made from 3-ply canvas reinforced rubber belting to provide enough rigidity to keep the sludge blanket agitated and flexible enough to pass over any moderate size object.

The clarifier bridge shall be a steel structure as specified herein and shown on the drawings.

A continuous scum baffle shall be provided as shown on the drawings.

The surface of the clarifier shall be skimmed by a mechanical skimming system. A rotating skimming arm shall be attached tangent to the stilling well. This arm shall have a flexible rubber end section to contact the scum baffle. A stationary anti-rotation skimming arm shall be suspended from the clarifier bridge structure to prevent the surface scum from rotating. It shall also act in conjunction with the rotating skimming arm to wedge the floating scum outward toward the airlift scum ejector, located on the circumference of the clarifier. The airlift shall operate intermittently. It shall be controlled by an adjustable microswitch. The airlift shall discharge into the aerobic digester to prevent grease balls and other scum from recycling through the system. The clarified liquid shall pass over the edges of the effluent weirs into the effluent trough which shall be connected to the effluent pipe.

4. Clarifier Reinforcing

The inner tank shall be reinforced to withstand a 15'-6" liquid level differential. Extra structural reinforcing rings shall be installed on the inner steel shell of the wastewater treatment plant structure to withstand external hydrostatic pressure, which will exist if the clarifier is dewatered without dewatering the entire annular aeration compartment. Under these conditions, the inner tank joints shall be continuously welded inside an out.

5. Clarifier Drive Failure Alarm Contacts

A drive failure alarm contact shall be furnished to actuate a suitable alarm device if the drive should become overloaded or stop turning for any reason, i.e., overtorque condition, chain breakage, motor failure, or power failure. A contact shall also be provided to shut off the drive motor when a fault condition occurs.

6. RAS Airlift System

The settled sludge in the clarifier shall be moved continuously across the floor by the sludge collector mechanism to the central sludge well. From the sludge well the collected sludge shall be continuously pumped through a rectangular duct by an airlift pump which shall discharge RAS to Anoxic Zone #1 (as shown on plans). In addition, the sludge sump will discharge WAS into the piping system

which is directed to the digester. The RAS airlift pump shall have a capacity of 51 GPM, using not more than 15 CFM of air. The airlift shall have a 3 inch diameter steel riser pipe with a flow division box on top.

7. MLR (Nitrate Recycle) Airlift System

Mixed liquor is to be recycled from Anoxic Zone #1 to the Aeration Zone #1 as shown on plans. The MLR shall be continuously pumped through a rectangular duct by an airlift pump which shall discharge MLR to Aeration Zone #1 (as shown on plans). Each MLR airlift pump shall have a capacity of 101 GPM, using not more than 30 CFM of air. Two (2) MLR airlift pumps total. Each airlift shall have a 6 inch diameter steel riser pipe with a flow division box on top.

8. Carbon Feed

Provide and install two (2) peristaltic metering pumps for carbon feed (one duty and one standby pump). Pumps are to be Stenner Model S3V02AA302N. Capacity: 17 gpm. Control: Variable speed. Flow pace per Section 26 80 00 3.09 C.

D. AERATION BLOWERS

1. See spec section 43 11 00 Blower Equipment.

E. AIR PIPING

1. General

See Section 33 31 00, 2.01 D. Aeration Piping.

2. Low Pressure Air Test of Air Header

The low-pressure air test determines the rate at which air under pressure escapes from an isolated section of the pipe. The Contractor shall conduct the test prior to complete backfilling of the trenches as follows:

- i. Make sure that all the pipe fittings, T-pieces, elbows, etc. have been securely installed.
- ii. Make sure that an adequate amount of back fill has been tamped under and around the pipe making sure it is securely in place.
- iii. If required, have all concrete thrust blocks in place to immobilize the air header under pressure.
- iv. Pressurize the air main as shown below and record the time.
- v. i) Test Pressure: 15 psi
- vi. ii) Test Duration 60 minutes
- vii. Test Requirement: Test pressure must be held for a minimum of 15 minutes. Test pressure must not fall more than 5% during a one-hour time span.

F. SYSTEM CONTROL PANEL

General.

1. Treatment system manufacturer shall provide complete treatment system electrical and control system per drawings and specifications.
2. Treatment system control panel shall include all wiring and controls for operation of the complete treatment system. Features shall include but not be limited to:
  - a. Treatment system control panel shall accept 460V, three phase, 60 Hz input and shall include Main Circuit Breaker disconnect with rotary handle. Design specifies 30 amp main breaker, but manufacturer shall size main panel breaker based on Code requirements for the equipment supplied, and submit accordingly.
  - b. Treatment system control panel including all electrical devices and accessories shall be UL listed and labeled.
  - c. NEMA 4X Type 316 stainless steel enclosure, sized for the application. The panel will be installed within sight of the treatment system on an exterior wall. Panel shall include interior swing out panel for local switches and indicators. Include drip shield for outdoor panels.
  - d. NEMA style full voltage motor starters for both clarifier drive motor and two submersible mixers.
  - e. Seal fail and overtemp sensors for each submersible mixer motor. Include local pushbuttons and indicator lights in the control panel for status indication and reset capability.
  - f. 480-120v step down transformer for control circuits.
  - g. Hard wired relay logic control circuits for system control and protection.
  - h. Alarm light and horn with silence push button.
  - i. Indicator lights, push buttons, hand-off-auto switches for motor control.
  - j. Wiring terminals for field mounted devices including torque switches, limit switches, solenoids and any other required devices.
  - k. Dry relay contacts for customer connection including: run and fail for each motor, seal fail and overtemp for each mixer, alarm and shutdown for clarifier, and any other equipment status monitoring available.
  - l. Panel heater with fan. Heater shall be sized by the manufacturer to prevent buildup of condensation in panel.
  - m. 120V circuit for pole light and receptacle mounted on treatment cell.
  - n. Detailed wiring diagrams and schematics showing wire and terminal connections, panel layout, oneline diagram and other information required for installation by the Electrical Contractor.

G. SPARE PARTS

1. At a minimum, the following spare parts are to be supplied:
  - i. 1 – Additional Diffuser Assembly
  - ii. 3 – sets of fuses for all types and sizes
  - iii. 1 - torque wrench

## **PART 3. EXECUTION**

### **3.01 INSPECTION & STORAGE**

- A. The Contractor shall inspect and accept all equipment immediately upon delivery to the site to satisfy himself that complete and undamaged equipment package has been delivered for installation.

### **3.02 INSTALLATION**

- A. The Contractor shall install all equipment according to the drawings and specifications and in accordance with the installation instructions and drawings provided by the manufacturer to the Contractor. The bid document drawings are intended to show the Contractor the components of the proposed construction not the details of assembly and installation of the Treatment System equipment. The Contractor is responsible for all costs associated with installing the equipment. The Contractor is to contact the equipment MFR and coordinate responsibilities for field erection services, as needed, for the equipment.
- B. Contractor to replace defective diffusers and/or any defective equipment or components.
- C. If additional information concerning the Smith and Loveless Oxigest equipment is necessary then the Contractor shall contact Joe Buckman, APSCO (425) 822-3335 to obtain additional details on the assembly and installation of said equipment.

### **3.03 TREATMENT SYSTEM PROGRAMMING, STARTUP AND TESTING**

- A. The Treatment System manufacturer shall provide all configuration and functional testing for the control system, and place the complete system into operation.
- B. The Control System shall be configured and adjusted to operate according to the descriptions in this specification and features shown on the drawings.
- C. The Treatment System manufacturer shall provide all required coordination for a complete and functional control system. Field adjustments or additional features added during startup and commissioning shall be included in the bid price.
- D. The Treatment control system shall be put into operation by the Treatment System manufacturer with support of the Electrical Contractor.
- E. A witnessed Functional Acceptance Test shall be performed on the completed control system.
  - 1. The Treatment System manufacturer's standard test forms shall be submitted for review by the Engineer, including complete test procedure and forms.
  - 2. Each feature and function of the Treatment manufacturer's control system shall be documented on the test forms and shall be tested and demonstrated to the satisfaction of the Engineer. The Treatment System manufacturer shall make all revisions to the control system operation noted by the Engineer prior to final acceptance.
  - 3. The testing program shall be conducted in accordance with the prior approved procedures and shall be witnessed and signed off by both the Treatment System manufacturer and the Engineer upon satisfactory completion.

- F. All special testing materials and equipment required to demonstrate compliance with the specification shall be provided by under the scope of this Section. Where it is not practical to test with real process variables, provide suitable means of simulation. These simulation techniques shall be subject to the approval of the Engineer.
- G. Coordinate all testing with other associated suppliers and subcontractors.

**\*\*\*END OF SECTION\*\*\***

## **APPENDICES**

## **APPENDIX A – ANTICIPATED CONSTRUCTION SEQUENCE AND SCHEDULE**

See Section 00 31 13 – Preliminary Project Phases. Contractor's schedule is to incorporate all work deadlines shown in Section 00 31 13.



## **APPENDIX B – GROUNDWATER LEVEL ANALYSIS**

## Eastsound Sewer and Water District

### Well Monitoring Log

Date	Depth to Water (Feet)	Notes/Weather
8/17/2020	No Water	Sunny: 75°F
8/24/2020	13.75	Partly Cloudy: 61°F
9/28/2020	12.67	Sunny: 57°F-5days of rain prior
10/26/2020	7.20	Partly Cloudy: 35°F
11/23/2020	6.50	Raining: 40°F
12/28/2020	5.60	Very Rainy Period: 45°F
1/26/2021	5.20	Sunny: 45°F
2/19/2021	2.50	Snow Covered Sunny: 43°F
3/22/2021	4.10	Sunny: 50°F
4/7/2021	6.67	Sunny: 46°F

## **APPENDIX C – GEOTECHNICAL REPORT**

## **Geotechnical Engineering Services**

Eastsound Wastewater Treatment Plant  
Improvements  
Eastsound, Washington

*for*

**Wilson Engineering, LLC**

November 8, 2022



**GEOENGINEERS**   
Earth Science + Technology

## **Geotechnical Engineering Services**

Eastsound Wastewater Treatment Plant  
Improvements  
Eastsound, Washington

*for*

**Wilson Engineering, LLC**

November 8, 2022



554 West Bakerview Road  
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**Geotechnical Engineering Services**  
**Eastsound Wastewater Treatment Plant**  
**Improvements**  
**Eastsound, Washington**

**File No. 0407-002-00**

**November 8, 2022**

Prepared for:

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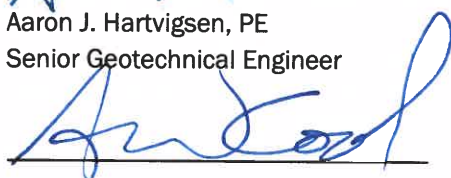
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## 1.0 INTRODUCTION

This revised report presents the results of GeoEngineers, Inc.'s (GeoEngineers) geotechnical engineering services for the proposed improvements to the Eastsound Sewer & Water District (District) Wastewater Treatment Plant (WWTP) located at the existing treatment plant facility at 143 Cessna Road in Eastsound, Washington located on Orcas Island. The site location is shown in the Vicinity Map, Figure 1. Existing site conditions and the location of the proposed structures are shown in the Site and Exploration Plan, Figure 2.

Our understanding of the project is based on information provided by Jeff Christner with Wilson Engineering, LLC (Wilson), conversations with the project team, and our experience on similar projects. We understand the District plans to construct several new below-grade concrete structures including a new 34-foot-diameter clarifier extending approximately 15 feet below grade; a chlorine contact chamber and concrete digester tank extending approximately 12.5 feet below grade; a new plant drain pump station extending 17.4 feet below grade, a new water pump station 14 feet deep, a new headworks flow splitter structure and screw press constructed at-grade; and miscellaneous piping and site improvements. The new infrastructure will be constructed within and adjacent to the existing active facility.

Our scope of services for this report included reviewing available geotechnical information at and near the site, completing three drilled subsurface explorations and installing one groundwater piezometer, laboratory testing on the samples obtained from the boring, and providing geotechnical conclusions and recommendations for design and construction of the proposed improvements. Our specific scope of services is described in our proposal for the project dated June 4, 2020 and was authorized via Task Order by Wilson on July 14, 2020.

## 2.0 SITE CONDITIONS

### 2.1. Surface Conditions

The project site is currently located on the existing WWTP property which supports the surrounding Eastsound community. The site is bounded by Cessna Road to the north and the Orcas Island Airport property to the east, south, and west. The site surface is generally paved around existing enclosed structures and is relatively level.

### 2.2. Geology

We reviewed a Washington State Department of Natural Resources (DNR) map for the project area, "Geologic Map of the Bellingham 1:100,000 Quadrangle, Washington" by Lapen (2000). This map indicates the site is underlain by undifferentiated glacial deposits. Undifferentiated glacial deposits consist of various material types and include granular outwash and unsorted, unstratified glacial drift. Outwash typically consists of sand with varying silt and gravel content. Glacial drift typically consists of silt and clay with varying amounts of sand, gravel, cobbles and occasional boulders. Glacial outwash soils can have a relatively high permeability and the glacial drift soils typically have a much lower permeability; however, because of the unstratified nature of this deposit, this glacial unit typically has a low effective permeability for the unit as a whole.

Although not mapped at the site, soil interpreted to be glacial till was encountered at depth. Glacial till typically consists of dense, non-sorted mixture of silt, sand and gravel deposited during the last glaciation.

## 2.3. Subsurface Exploration

Subsurface soil and groundwater conditions were evaluated by completing three borings (B-1 to B-3) on August 10, 2020 using an EC 95 track drill rig subcontracted to GeoEngineers. The borings were completed to depths of 20 to 26½ feet below ground surface (bgs). The locations of the borings are shown in Figure 2. Details of the field exploration program, laboratory testing, and boring logs are presented in Appendix A.

## 2.4. Subsurface Conditions

### 2.4.1. Soil Conditions

A general description of each of the soil units encountered at the project site is provided below. Our interpretation is based on soil conditions encountered during our geotechnical borings and our understanding of the local geologic conditions.

- **Asphalt Concrete** – Asphalt concrete surfacing was encountered in all borings. The asphalt thickness ranged from 2 to 3 inches thick.
- **Fill** – A layer of dense to stiff fill consisting of sand with variable silt and gravel content to silt with sand and gravel was encountered underlying the asphalt concrete in the borings. The fill layer generally extended to depths ranging from 2 to 4½ feet bgs in the explorations.
- **Undifferentiated Glacial Drift** – Native undifferentiated glacial drift was encountered underlying the fill layer in all three borings. The undifferentiated glacial drift encountered in the explorations generally consisted of medium stiff to very stiff gray clay with sand and occasional gravel. The undifferentiated glacial drift extended to depths of 19 to 24½ feet bgs in the borings.
- **Glacial Till** – Glacial till was encountered underlying the undifferentiated glacial drift in all three borings. Glacial till at this site consisted of very dense silty sand with occasional gravel. This till unit was not as dense or as hard as Vashon till common in the central Puget Sound region and had a higher clay/silt content. However, the glacial till observed at this site is significantly stiffer than the overlying undifferentiated glacial drift and is interpreted to be glacially consolidated. The borings all terminated in this unit at 20 feet to 26½ feet bgs.

### 2.4.2. Groundwater Conditions

Wet soils were observed during drilling at depths of 25 feet in B-1 and B-2 and 20 feet in B-3. A groundwater monitoring well was installed in B-3. The groundwater level was measured to be 13.75 feet bgs (approximately Elevation 9.45 feet [NAVD88]) on August 24, 2020 and will continue to be monitored by District staff. The undifferentiated glacial drift and glacial till units commonly have isolated saturated sandier zones or “pods” at variable depths and locations. Although not observed at the time of our explorations, perched groundwater conditions can develop within fill, topsoil, and undifferentiated glacial drift during the wetter portions of the year where underlying low permeability soil limits downward infiltration. The groundwater level is likely representative of the regional groundwater table. The groundwater conditions should be expected to vary as a function of season, precipitation and other factors.

## 3.0 CONCLUSIONS AND RECOMMENDATIONS

It is our opinion that the site is suitable for the proposed wastewater treatment plant improvements and other associated site improvements. The new structures can be supported on shallow spread footing or

mat foundations. A summary of the primary design and construction considerations for the project is provided below. This summary is presented for introductory purposes and should only be used in conjunction with the complete recommendations presented in this report.

- A seismic Site Class D is appropriate for design. The site soils are not considered liquefiable based on our explorations and local knowledge.
- The undisturbed native; unweathered, medium stiff to very stiff undifferentiated glacial drift; or new structural fill placed directly over these soils will provide adequate support for shallow spread footings designed using an allowable soil bearing pressure of 2,500 pounds per square foot (psf).
- We estimate postconstruction settlement of footings founded on medium stiff to very stiff native soils will be less than  $\frac{3}{4}$ -inch. Differential settlement between comparably loaded column footings or along a 50-foot section of continuous wall footing should be less than about  $\frac{1}{2}$ -inch.
- Standard slab-on-grade considerations are appropriate based on providing a minimum 6-inch-thick layer of granular capillary break/leveling material.
- The site soils are highly moisture sensitive and will not support rubber-tired or other heavy equipment during wet weather. Earthwork should be planned for the drier summer months to reduce costs.

### **3.1. Seismic Design Considerations**

#### **3.1.1. Seismicity**

The site is located within the Puget Sound region, which is seismically active. Seismicity in this region is attributed primarily to the interaction between the Pacific, Juan de Fuca, and North American plates. The Juan de Fuca plate is subducting beneath the North American plate. It is thought that the resulting deformation and breakup of the Juan de Fuca plate might account for the deep focus earthquakes in the region. Hundreds of earthquakes have been recorded in the Puget Sound area. In recent history, four of these earthquakes were large events: (1) in 1946, a Richter magnitude 7.2 earthquake occurred in the Vancouver Island, British Columbia area; (2) in 1949, a Richter magnitude 7.1 earthquake occurred in the Olympia area; (3) in 1965, a Richter magnitude 6.5 earthquake occurred between Seattle and Tacoma; and (4) in 2001, a Richter magnitude 6.8 earthquake occurred near Olympia.

Research has concluded that historical large magnitude subduction-related earthquake activity has occurred along the Washington and Oregon coasts. Evidence suggests several large magnitude earthquakes (Richter magnitude 8 to 9) have occurred in the last 1,500 years, the most recent of which occurred about 300 years ago. No earthquakes of this magnitude have been documented during the recorded history of the Pacific Northwest. Local design practice in Puget Sound and local building codes consider these seismic conditions including known faults for the design of structures. An unnamed concealed thrust fault is mapped at the south end of the airport approximately 1,500 feet from the site. It is our opinion that the risk of surface rupture is low to moderate at the site.

#### **3.1.2. 2018 IBC Seismic Design Information**

The 2018 International Building Code (IBC) is the current building code. The 2018 IBC references the 2016 Minimum Design Loads for Buildings and Other Structures (American Society of Civil Engineers [ASCE] 7-16). We recommend that the site be classified as Site Class D – Stiff Soil Profile. Based on the site class and site mapped spectral acceleration, we anticipate the new structures will be designed

in accordance with Exception 2 of Section 11.4.8 in ASCE 7-16. For Site Class D with  $S_1$  greater than or equal to 0.2g, Exception 2 allows the structural designer to use ground motions based on the site class and mapped spectral acceleration rather than completing a site-specific response analysis. Our recommended seismic design parameters for Exception 2 are presented in Table 1 below. If requested, GeoEngineers can complete a site-specific seismic response analysis, which might provide reduced seismic demands from the parameters in Table 1.

**TABLE 1. MAPPED 2018 IBC SEISMIC DESIGN PARAMETERS**

Seismic Design Parameters	Recommended Value <sup>1, 2</sup>
Site Class	D
Mapped Spectral Response Acceleration at Short Period ( $S_s$ )	1.128g
Mapped Spectral Response Acceleration at 1 Second Period ( $S_1$ )	0.399g
Site Modified Peak Ground Acceleration ( $PGA_M$ )	0.539g
Site Amplification Factor at 0.2 second period ( $F_a$ )	1.049
Site Amplification Factor at 1.0 second period ( $F_v$ )	1.9
Design Spectral Acceleration at 0.2 second period ( $S_{DS}$ )	0.789g
Design Spectral Acceleration at 1.0 second period ( $S_{D1}$ )	0.505g

Notes:

<sup>1</sup> Parameters developed based on Latitude 48.707292° and Longitude -122.908679° using the ATC Hazards online tool.

<sup>2</sup> These values are only valid if the structural engineer utilizes Exception 2 of Section 11.4.8 (ASCE 7-16).

### 3.1.3. Liquefaction Potential

Liquefaction is a phenomenon where soils experience a rapid loss of internal strength as a consequence of strong ground shaking. Ground settlement, lateral spreading and/or sand boils may result from liquefaction. Structures supported on liquefied soils could suffer foundation settlement or lateral movement that could be severely damaging to the structure. Conditions favorable to liquefaction occur in loose to medium dense, clean to moderately silty sand that is below the groundwater level. Dense soils or soils that exhibit cohesion are less susceptible to liquefaction. The proposed building is underlain by generally cohesive and dense soils which are not considered susceptible to liquefaction.

## 3.2. Temporary Shoring

Construction of the new clarifier, chlorine contact chamber, and digester structures will require excavations on the order of 10 to 17½ feet below existing site grades. The new flow splitter and screw press structures will be approximately 5 feet or less in depth. The excavation will likely be completed with temporary slopes; however, the size, depth, and location of the structures may require temporary shoring where sufficient space is not available for open cuts adjacent to existing WWTP structures and utilities. For the planned excavation depth, it is likely that cantilevered soldier pile shoring will be sufficient. We anticipate that driven diaphragm type shoring, systems such as driven sheet pile walls, will not adequately penetrate the native soils without pre-drilling. GeoEngineers can provide additional recommendations for temporary shoring prior to final design if necessary. Additional recommendations for temporary cut slopes and excavations shored with trench boxes is provided in Section 3.8.2.

### 3.3. Shallow Foundation Design

We recommend that the new WWTP structures be supported on shallow spread footings or mat foundations that bear directly on undisturbed, undifferentiated glacial drift deposits, or on compacted structural fill placed directly over undisturbed undifferentiated glacial drift.

#### 3.3.1. Building Footing Subgrade Preparation

As currently planned, we anticipate that all existing non-structural fill will be removed during excavation for project foundation elements. Based on our explorations the medium stiff to very stiff clay encountered below the fill extends to 19½ to 25 feet bgs and is considered a suitable foundation bearing material when undisturbed. We do not anticipate any additional overexcavation will be required at the planned excavation depths; however, the clayey nature of the glacial drift may benefit from placement of a granular layer for protection of the subgrade, especially if construction occurs during periods of wet weather. Overexcavation may be required to reach the native layer for shallower foundation elements. We provide the following specific recommendations:

- We recommend the final excavations for the footings be accomplished with a smooth-bucket to reduce subgrade disturbance. We recommend that a GeoEngineers representative observe the footing subgrade to confirm suitable bearing conditions are present. Any specific overexcavation recommendations can be provided at that time.
- If necessary, any overexcavation of unsuitable or disturbed soils should extend a minimum of 1 foot beyond the edges of the footings or a minimum lateral distance equivalent to one-half the depth below the footings, whichever is greater. Overexcavated areas should be backfilled with structural fill as described later in this report and compacted to 95 percent of the maximum dry density (MDD) in accordance with ASTM International (ASTM) D 1557.
- The native subgrade soils will be susceptible to disturbance when wet. To minimize disturbance of the footing subgrade areas that consist of the native clay during wet weather, a layer of sand and gravel, crushed rock or a lean concrete “mud mat” is recommended. A minimum 12-inch-thick pad of 1½-inch minus clean crushed gravel with negligible sand or silt, as described in Section 3.8.1 will provide uniform support of the foundations and help protect the site subgrade soils from disturbance. Structural fill may be placed directly over the medium stiff to very stiff undisturbed undifferentiated glacial drift deposits in dry conditions. A geotextile fabric for separation place over the subgrade is recommended when the subgrade may become wet.

#### 3.3.2. Foundation Design

For shallow foundation support, we recommend minimum widths of 18 and 24 inches, respectively, for continuous wall and isolated column footings supporting the proposed building. Exterior footings should be founded a minimum of 18 inches below the lowest adjacent grade. Interior footings should be founded a minimum of 12 inches below top of slab.

Provided that footings are supported as recommended above, an allowable bearing pressure of 2,500 psf may be used for the design of footings supported on the native undifferentiated glacial drift deposits. The allowable bearing pressures applies to the total dead and long-term live loads and may be increased up to one-third for short-term live loads such as wind or seismic forces.

For foundations designed as a beam on an elastic foundation (structural mats or grade-beams), a modulus of subgrade reaction of 200 pounds per cubic inch (pci) may be used for foundations bearing on undifferentiated glacial drift soils. This modulus value is for a 1-foot by 1-foot square plate. The actual modulus for a foundation element varies based on the footing size according to the following equation:

$$k_s = k_{s1}[(B+1)/2B]^2$$

Where  $k_s$  is the actual footing modulus,  $k_{s1}$  is the modulus for 1-foot by 1-foot plate, and  $B$  is the width or lateral dimension of the footing.

### **3.3.3. Foundation Settlement**

Based on anticipated loads, we estimate that the postconstruction settlement of footings supported as recommended will be less than ¾-inch. Differential settlement along a 25-foot section of continuous wall footing should be about ½-inch or less. We expect settlement will occur rapidly as loads are applied. Loose or disturbed soils not removed from footing excavations prior to placing concrete will result in additional settlement.

### **3.3.4. Lateral Resistance**

Lateral loads can be resisted by passive resistance on the sides of the footings and by friction on the base of the footings. Passive resistance should be evaluated using an equivalent fluid density of 300 pounds per cubic foot (pcf) where footings are poured neat against native soil or are surrounded by structural fill compacted to at least 95 percent of MDD, as recommended. The value assumes that the soil in front of the foundation element is horizontal for a lateral distance equivalent to 2.5 times the depth of the element. Resistance to passive pressure should be calculated from the bottom of adjacent floor slabs and paving or below a depth of 1 foot where the adjacent area is unpaved, as appropriate. Frictional resistance can be evaluated using 0.35 for the coefficient of base friction against footings. The above values incorporate a factor of safety of about 1.5.

If soils adjacent to footings are disturbed during construction, the disturbed soils must be recompacted or replaced with compacted structural fill. Otherwise the lateral passive resistance value must be reduced.

## **3.4. Slab-On-Grade Support**

If conventional slab-on-grade will be used for the proposed structures, the native undifferentiated glacial drift will provide suitable support for the slab. Slabs-on-grade should be supported on a minimum 6-inch-thick capillary break/leveling layer of gravel or sand and gravel over suitably firm subgrade soils or on structural fill prepared in accordance with the site preparation recommendations. The capillary break/leveling material should consist of 1- or ¾-inch minus clean sand and gravel or crushed rock with less than 3 percent fines and should be uniformly compacted to a minimum of 95 percent of MDD. We do not recommend pea gravel or rounded drain rock for this purpose. A suitable Washington State Department of Transportation (WSDOT) 2020 Standard Specification (hereinafter referred to as WSDOT Standard Specifications) for this material is 9-03.1(4) C Grading No. 67.



### 3.5. Retaining Wall Considerations

#### 3.5.1. Below-Grade Building Wall Design

Lateral soil pressures acting on the below-grade retaining walls will depend on the nature and density of soil behind the wall, the amount of lateral wall movement which occurs as backfill is placed, the inclination of the backfill surface, surcharge, and seismic loading. For walls free to yield at the top at least one thousandth of the wall height (i.e., wall height times 0.001), soil pressures will be less (termed “active earth pressures”) than if wall movement is restrained (termed “at-rest earth pressures”) by such factors as wall stiffness or bracing. Structures with internal bracing at the time of backfill should be modeled with at-rest earth pressures. We recommend the following lateral earth pressures be considered for design:

- **Active earth pressure for level backfill** – Equivalent fluid pressure (triangular distribution) of 35 pcf for drained conditions and 18 pcf plus hydrostatic pressure for undrained conditions.
- **At-rest earth pressure for level backfill** – Equivalent fluid pressure of 55 pcf for drained conditions and 28 pcf plus hydrostatic pressure for undrained conditions.
- **Passive earth pressure** – Equivalent fluid pressure of 200 pcf for un-drained conditions and 300 pcf for drained conditions.
- **Traffic surcharge pressure** – Typical vehicle traffic surcharge may be modeled assuming an additional 2 feet of soil (approximately 250 psf surcharge), or a uniform (rectangular) lateral pressure of about 70 psf. Other temporary surcharge loading during construction resulting from equipment and soil stockpiles will depend on specific loading type and location and should be evaluated by the contractor.
- **Seismic earth pressure** – Earth pressures resulting from seismic conditions may be modeled as a uniform (rectangular) lateral pressure of  $8 \cdot H$  psf ( $H$  = height of wall) for the design level earthquake, with a corresponding reduction in the factors of safety to 1.1 or greater. Lateral pressure resulting from seismic surcharge loading is additive to lateral soil pressures computed as recommended above.

All pressures above assume structures are backfilled with granular structural fill and have relatively level grades behind the walls. In order to prevent overstressing the concrete retaining walls and causing bulging or rotation, we recommend that structural fill placed against the back of the wall be compacted with lighter weight hand-operated equipment and within the range of 90 to 92 percent of the MDD. Backfill should only be placed after the concrete has had sufficient time to cure and develop the necessary strength.

#### 3.5.2. Wall Drainage Considerations

Where noted above, the recommended lateral earth pressures assume a free-draining condition behind the wall. For backfilled walls (adjacent to temporary cut slopes) positive drainage should consist of placing a minimum 18-inch-wide zone of free draining gravel backfill immediately adjacent to the walls. Gravel backfill for walls should consist of well-graded sand and gravel with less than 5 percent fines. A suitable WSDOT Standard Specification is Section 9-03.12(2). A 4-inch minimum diameter perforated drainpipe should be embedded in the free-draining sand and gravel zone along the base of the building retaining walls as described in Section 3.7 “Site Drainage Considerations”, of this report. Because of the clayey site soils, granular wall backfill will have a potential “bathtub” effect is not drained. If a drainpipe cannot be provided at the base of below grade walls, hydrostatic buildup should be anticipated to the level of the drainpipe or the seasonal high water level elevation measured in the monitoring well installed, whichever is lower.

### 3.6. Pipe Design Considerations

Various piping and utility corridors will be required to connect the new and existing infrastructure. The contractor should anticipate, at a minimum, all utility excavations will require a trenchbox for sidewall support and sumps and pumps to control groundwater seepage as necessary, as described in Section 3.8 of this report.

The work areas should be cleared of all surface and subsurface deleterious matter, including debris, vegetation and root wads; and stripped of any organic soil, if present. The cleared/stripped material will not be suitable for use as structural fill, which includes trench backfill.

#### 3.6.1. Pipeline Support

Depending on the pipe depth and location on site, the soils expected to be encountered at the subgrade level for new piping will likely consist of undifferentiated glacial drift. In general, most of the undifferentiated glacial drift will provide adequate support for proposed piping throughout the site. Although not encountered in our explorations, if the pipe subgrade soils are very soft, organic, become disturbed, or are otherwise unsuitable, it may be necessary to over-excavate the unsuitable material and backfill with pipe bedding or crushed surfacing material. General recommendations for pipe bedding support are presented below:

- Pipe bedding material, placement, compaction, and shaping should be in accordance with the project specifications, the pipe manufacturer's recommendations, and Section 7-09 of the WSDOT Standard Specifications. At a minimum, the pipe bedding should meet the gradation requirements for Gravel Backfill for Pipe Zone Bedding Section 9-03.12(3) of the WSDOT Standard Specifications, unless otherwise stated by the project specifications.
- If the trench bottom encounters any soft or organic-rich subgrade soils, it may be necessary to overexcavate the unsuitable material and backfill with additional pipe bedding material. In wet conditions, 1½-inch minus granular fill meeting the gradation requirements for Crushed Surfacing Base Course (WSDOT 9-03.9[3]) or Permeable Ballast (WSDOT 9-03.9[2]) should be used to backfill the over-excavated portion of the trench.
- Pipe bedding material should be used as backfill up to at least the spring line of the pipe or in accordance with the manufacturer's specifications for the type of pipe chosen.
- Prior to the installation of the pipe, the bedding should be shaped to fit the lower part of the pipe exterior with reasonable closeness to provide continuous support along the pipe.
- Pipe bedding material and/or backfill around the pipe should be placed in layers and tamped around the pipe to obtain complete contact per the project plans. In areas where a trench box is used, the bedding material should be placed before the trench box is advanced.

#### 3.6.2. Structural and Trench Backfill

We recommend that trench backfill consist of structural fill as described in Section 3.8.3 of this report. The suitability of the on-site material as structural fill is discussed below. During placement of the initial lifts, the backfill material should not be bulldozed into the trench or dropped directly on the pipe. Furthermore, heavy vibratory equipment should not be permitted to operate directly over the pipe until a minimum of 2 feet of backfill has been placed. Backfill should be placed in lifts to achieve the required compaction



using the mechanical equipment chosen by the contractor. We recommend that the MDD be determined based on ASTM D 1557 or in accordance with WSDOT Standard Specification 2-03.3(14)D.

- In non-settlement sensitive areas, such as landscaping, we recommend that the trench backfill be compacted to at least 85 percent of the MDD.
- In settlement sensitive areas, such as existing or future roadways and driveways, backfill placed at depths greater than 2 feet below the ground surface should be compacted to at least 90 percent of the MDD. The upper 2 feet of backfill should be compacted to at least 95 percent of the MDD in existing/future pavement or yard areas. This is consistent with Method B of WSDOT Standard Specification 2-03.3(14)C.

### **3.6.3. Pipe Settlement**

The likely mechanisms for pipe settlement include poor bearing support immediately below the pipe. Provided pipe subgrade and backfill is completed as recommended above, we estimate that the increased weight of the structural backfill will be negligible and will not lead to significant settlement.

### **3.7. Site Drainage Considerations**

We recommend that final site grading direct water away from the structures to the extent practical. The site may experience seasonally perched groundwater conditions because of the relatively low permeability of undifferentiated glacial drift. Additionally, the excavation for the below-grade structures into the undifferentiated glacial drift and glacial till unit will create a “bathtub” that will retain water when backfilled with granular structural fill. Therefore, we recommend the structures be provided with a perimeter drainage system or be designed for hydrostatic pressures. The footing drains should be installed at the base of footings and retaining walls and sloped to drain. The drains should consist of rigid perforated pipe, a minimum of 4 inches in diameter, enveloped within a minimum thickness of 6 inches of 1-inch washed gravel. A non-woven geotextile fabric such as Mirafi 140N, or similar as approved by GeoEngineers, should be placed between the 1-inch washed gravel and the native soils to prevent movement of the soils into the drainage material. This drainage should be tightlined to the stormwater system. Consideration should be given to the use of clean-outs for drainpipe maintenance. A larger diameter pipe will facilitate maintenance of drainage systems. Additional drainage recommendations are provided below:

- Subsurface slabs and walls should be adequately waterproofed as appropriate for the intended use. As noted previously, some slight seepage was observed during site explorations and the below-grade excavation will create a “bathtub” in the fine-grained glacial drift that retains water if drainage provisions are not included.
- If earthwork will occur during the wet season, perimeter ditching or interceptor trenches may be required to manage surface water and perched groundwater entering the site and excavation.
- We recommend all downspouts be tightlined away from the foundation area to the storm drain system. Downspouts should not be connected to footing drains.

### **3.8. Earthwork**

The site soils within the excavation depths anticipated for the project generally consist of clay with variable sand and gravel content. These soils are very moisture sensitive and susceptible to disturbance by construction equipment during wet weather. These soils are very difficult or impossible to use as structural

fill except during dry weather and on dry subgrades. If practical, the excavation to design subgrades should be performed during extended periods of dry weather. Exposed subgrades should not be left exposed to inclement weather. Earthwork costs will be significantly greater if performed during wet weather.

### **3.8.1. Subgrade Preparation**

The exposed subgrade should be evaluated after the excavation and site grading is complete. GeoEngineers recommends that all subgrade surfaces be evaluated for suitability by a qualified geotechnical engineer or their representative. The structure subgrade should consist of undisturbed medium stiff to very stiff undifferentiated glacial drift. Proof-rolling with heavy, rubber-tired construction equipment should be used for this purpose during dry weather and if access for this equipment is practical. Probing should be used to evaluate the subgrade during periods of wet weather or if access is not feasible for construction equipment. Soft areas noted during proof-rolling or probing should be excavated and replaced with compacted structural fill.

A minimum 12-inch-thick working pad, consisting of 1½-inch minus clean crushed gravel with negligible sand or silt, may be necessary during wet weather construction to protect the site subgrade soils from disturbance. The working pad material should be placed in one lift over the subgrade and be compacted using a smooth-drum roller. The working pad may be left in-place to serve as base course material, provided it can be adequately compacted and does not become contaminated with fines during construction. We recommend keeping construction equipment off the exposed subgrades as much as possible during the wet season or when the subgrade is wet.

A 12-inch working pad will not provide suitable protection of the subgrade for access roads or areas of heavy equipment traffic. For these areas, we recommend a thicker gravel section and use of geotextile fabric placed over the subgrade to provide separation between the fine-grained subgrade and granular fill.

### **3.8.2. Excavation and Temporary Slopes**

Excavation for the proposed site improvements will extend primarily through medium stiff to very stiff undifferentiated glacial drift. Excavation of the site soils can be completed using conventional earthwork equipment. Larger horsepower excavators will be more efficient for excavating the stiffer soils, or if large cobbles and boulders are encountered in the deeper excavations.

Perched shallow groundwater and isolated deeper seepage pockets or conditions could develop and cause water to run into excavations and hamper earthwork. We expect that sumps and pumps should be adequate to handle any groundwater seepage.

#### **3.8.2.1. Temporary Cut Slopes**

Regardless of the soil type encountered in the excavation, either shoring, trench boxes or sloped sidewalls will be required for excavations deeper than 4 feet under Washington State Administrative Code (WAC) 296-155, Part N. We expect that the excavations will be made as open cuts in conjunction with the use of a trench box and/or sloped sidewalls for shielding workers. Based on our explorations, the fill soils at the site would be classified as “Type C” and require slopes not exceeding 1.5H:1V (horizontal to vertical). The medium stiff undifferentiated glacial drift encountered at depth in B-1 at the site would be classified as “Type B” and require slopes not exceeding 1H:1V. The stiff to very stiff undifferentiated glacial drift encountered at the site would be classified as “Type A” and require slopes not exceeding 0.75H:1V.

The above regulations assume that surface loads such as construction equipment and storage loads will be kept a sufficient distance away from the top of the cut so that the stability of the excavation is not affected. Flatter slopes and/or shoring will be necessary for those portions of the excavations which are subjected to significant seepage in order to maintain the stability of the cut. It should be expected that unsupported cut slopes will experience some sloughing and raveling if exposed to surface water. Berms, hay bales or other provisions should be installed along the top of the excavation to intercept surface runoff to reduce the potential for sloughing and erosion of cut slopes during wet weather.

In our opinion, the contractor will be in the best position to observe subsurface conditions continuously throughout the construction process and to respond to the soil and groundwater conditions. Construction site safety is generally the sole responsibility of the contractor, who also is solely responsible for the means, methods, and sequencing of the construction operations and choices regarding temporary excavations and shoring. We are providing this information only as a service to our client. Under no circumstances should the information provided below be interpreted to mean that GeoEngineers, Inc. is assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

#### **3.8.2.2. Temporary Shoring – Trench Boxes**

We recommend that a shoring system be used where excavations are located adjacent to existing utilities, roadways or structures where soil movement or ground loss could result in damage to these facilities. Generally, a trench box is not considered appropriate in areas where soil movement adjacent to the trench is unacceptable. Typically, a trench box is used to protect workers from injury should the sidewall collapse. If a sidewall collapses, a contractor typically will backfill the void space in the trench box to the extent practical. Upon completion of the work the contractor will then pull the trench box out and the sidewalls cave and surface distress or disruption occurs.

A trench box can be used where sidewall support is required provided that it is (1) designed for anticipated earth pressures and hydrostatic pressures if appropriate and (2) the installation, moving and backfilling can be accomplished in such a manner that significant yielding does not occur. Braced or unbraced shoring (several types of adjustable braced trench shoring systems are available) of various types could be used where protection of existing infrastructure is necessary.

The following should be implemented for the shoring systems for the project:

- At locations where settlement could be detrimental to adjacent structures, utilities, or pavements, the shoring system should be designed to prevent significant lateral movement of the existing soils.
- Precautions should be taken during removal of the shoring or sheeting materials to minimize disturbance of the pipe, underlying bedding materials, and natural soils.
- Trench boxes should be of sufficient size, both vertically and horizontally, to support the excavation without excessive deformation of the natural soils.
- The open excavations should be backfilled as soon as practical after the shoring has been removed.
- Heavy construction equipment, construction materials, and excavated soil should not be allowed within a distance, measured from the edge of the excavation, equal to half the depth of the excavation, unless the shoring system has been designed for the additional lateral pressure.

Because of the diversity of available shoring systems and construction techniques, the design of temporary shoring is most appropriately left up to the contractor proposing to complete the installation. We recommend that the shoring be designed by an engineer licensed in Washington, and the PE stamped shoring plans and calculations be submitted to the engineer prior to construction.

### 3.8.3. Temporary Soldier Pile Walls

We understand that a temporary cantilever soldier pile wall is anticipated between the proposed and existing clarifiers to support existing infrastructure during construction. Soldier pile walls consist of steel beams that are concreted into drilled vertical holes located along the wall alignment, typically spaced about 6 to 8 feet on center. Timber lagging is typically installed behind the flanges of the steel beams to retain the soil located between the soldier piles. Alternatively, this can be achieved using heavy-gauge steel sheets. Geotechnical design recommendations for each of these components of the soldier pile and tieback wall system are presented in the following sections.

We recommend that soldier pile walls be designed using the earth pressure diagram presented in Figure 3. A seismic pressure has not been included in Figure 3 because it is a temporary wall.

We recommend that the embedded portion of the soldier piles be at least 2 feet in diameter and extend a minimum depth of 10 feet below the base of the excavation to resist “kick-out.” The axial capacity of the soldier piles must resist vertical loads, as appropriate. We recommend using an allowable end bearing value of 2.5 ksf. The allowable end bearing value should be applied to the base area of the drilled hole into which the soldier pile is concreted. This value includes a factor of safety of about 2.5. The allowable end bearing value assumes that the shaft bottom is cleaned out immediately prior to concrete placement.

Additional building or construction surcharge loads should be applied to the wall based on applicable scenarios presented in Figure 4.

#### 3.8.3.1. Lagging

We recommend that the timber lagging be sized using the procedures outlined in the Federal Highway Administration’s Geotechnical Engineering Circular No. 4. The site retained soils are best described as competent soils. The following table presents recommend lagging thicknesses (roughcut) as a function of soldier pile clear span and depth.

**TABLE 2. LAGGING THICKNESS**

Depth (feet)	Recommended Lagging Thickness (roughcut) for Clear Spans					
	5 feet	6 feet	7 feet	8 feet	9 feet	10 feet
0 to 25	2 inches	3 inches	3 inches	3 inches	4 inches	4 inches

Lagging should be installed promptly after excavation, especially in areas where perched groundwater is present or where clean sand and gravel soils are present and caving soil conditions are likely. The workmanship associated with lagging installation is important for maintaining the integrity of the wall excavation.

The space behind the lagging should be filled with soil as soon as practicable. Material used as backfill in voids located behind the lagging should not cause buildup of hydrostatic pressure behind the wall. A suitable material would be select import fill as described below in section 3.8.4.2.

#### **3.8.4. Structural Fill**

Structural fill materials should be free of debris, organic contaminants and rocks or rock fragments larger than 6 inches or half the lift thickness, whichever is smaller. All fill placed beneath future structures or pavement should be placed as structural fill. Structural fill should be placed in horizontal lifts and uniformly compacted. The appropriate lift thickness will depend on the material and the compaction equipment being used. Loose lift thicknesses of 8 to 10 inches are typical when using heavy self-propelled vibratory equipment. All excavations should be wide enough to accommodate the appropriate compaction equipment for the thickness of the fill.

##### **3.8.4.1. Suitability of On-site Soil**

The onsite soils contain a significant fines content that will make them difficult to compact to specified densities during dry weather and unsuitable during wet weather. For planning purposes we recommend that on-site soils not be considered suitable as structural fill under pavement or structure areas and imported fill, conforming to the recommendations in Section 3.8.3.2 below, should be used as structural fill in these areas.

##### **3.8.4.2. Select Import Fill**

We recommend using a select import fill for earthwork on this project site. Unless other specific materials are recommended in this report, the select import should consist of well-graded sand and gravel, with at least 30 percent retained on the No. 4 sieve and less than 5 percent passing the U.S. No. 200 sieve. The percentage passing the No. 200 sieve should be based on that fraction passing the 3/4-inch sieve. Requiring use of this type of material below structures would significantly aid quality control and reduce compaction effort during earthwork procedures.

##### **3.8.4.3. Fill Placement and Compaction Criteria**

Structural fill should be mechanically compacted to a firm, non-yielding condition. Structural fill should be placed in lifts not exceeding 10 inches in loose thickness or that necessary to attain the specified compaction. Each lift should be conditioned to the proper moisture content and compacted to the specified density before placing subsequent lifts. Structural fill should be compacted to the following criteria:

- Structural fill placed in structure areas (supporting foundations or slab on grade floors) should be compacted to at least 95 percent of the MDD estimated in accordance with ASTM D-1557.
- Structural fill placed in pavement and hardscape areas should be compacted to at least 90 percent MDD where 2 feet below the pavement subgrade, and 95 percent MDD in the top 2 feet.
- Structural fill placed against retaining walls should be compacted to between 90 and 92 percent MDD. Care should be taken when compacting fill against subsurface walls to avoid over-compaction and overstressing the walls.
- Fill in non-structural areas should be compacted to at least 85 percent MDD to limit excessive postconstruction settlement.

Sufficient earthwork monitoring and a sufficient number of in-place density tests should be performed to evaluate fill placement and compaction operations and to confirm that the required compaction is being achieved.

### **3.8.5. Weather Considerations**

During wet weather, the undifferentiated glacial drift will become muddy and trafficability may become very difficult with rubber tired equipment. We provide the following wet weather considerations:

- Construction activities should be scheduled so that the length of time that soils are left exposed to moisture is reduced to the extent practical and limit the size of areas that are stripped of topsoil or gravel surfacing and left exposed.
- The ground surface in and around the work area should be sloped so that surface water is directed to a sump or discharge location. The ground surface should be graded such that areas of ponded water do not develop.
- Slopes with exposed soils should be covered with plastic sheeting or similar means.
- Providing up-gradient perimeter ditches or low earthen berms and using temporary sumps to collect runoff and prevent water from ponding and damaging exposed subgrades.
- The site soils should not be left uncompacted and exposed to moisture. Sealing the surficial soils by rolling with a smooth-drum roller prior to periods of precipitation will reduce the extent to which these soils become wet or unstable.
- Limiting construction traffic over unprotected soil and by limiting the size and type of construction equipment used.
- Providing gravel “working mats” over areas of prepared subgrade.

### **3.9. Recommended Additional Geotechnical Services**

GeoEngineers should be retained to review the project plans and specifications when complete to confirm that our design recommendations have been implemented as intended. During construction, GeoEngineers should, at minimum, evaluate the suitability of the foundation and slab-on-grade subgrades. The purposes of GeoEngineers construction phase services are to confirm that the subsurface conditions are consistent with those observed in the explorations and other reasons described in Appendix B, Report Limitations and Guidelines for Use.

## **4.0 LIMITATIONS**

We have prepared this report for the exclusive use by Eastsound Sewer & Water District, Wilson Engineering, LLC, and their authorized agents for the proposed Eastsound Wastewater Treatment Plant Improvements project in Eastsound, Washington.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

Please refer to Appendix B titled Report Limitations and Guidelines for Use for additional information pertaining to use of this report.

## **5.0 REFERENCES**

International Code Council. 2015. "International Building Code."

Lapen, T. J. 2000. Geologic Map of the Bellingham 1:100,000 Quadrangle, Washington. Washington Division of Geology and Earth Resources Open File Report 2000-5, 36 p., 2 pl.

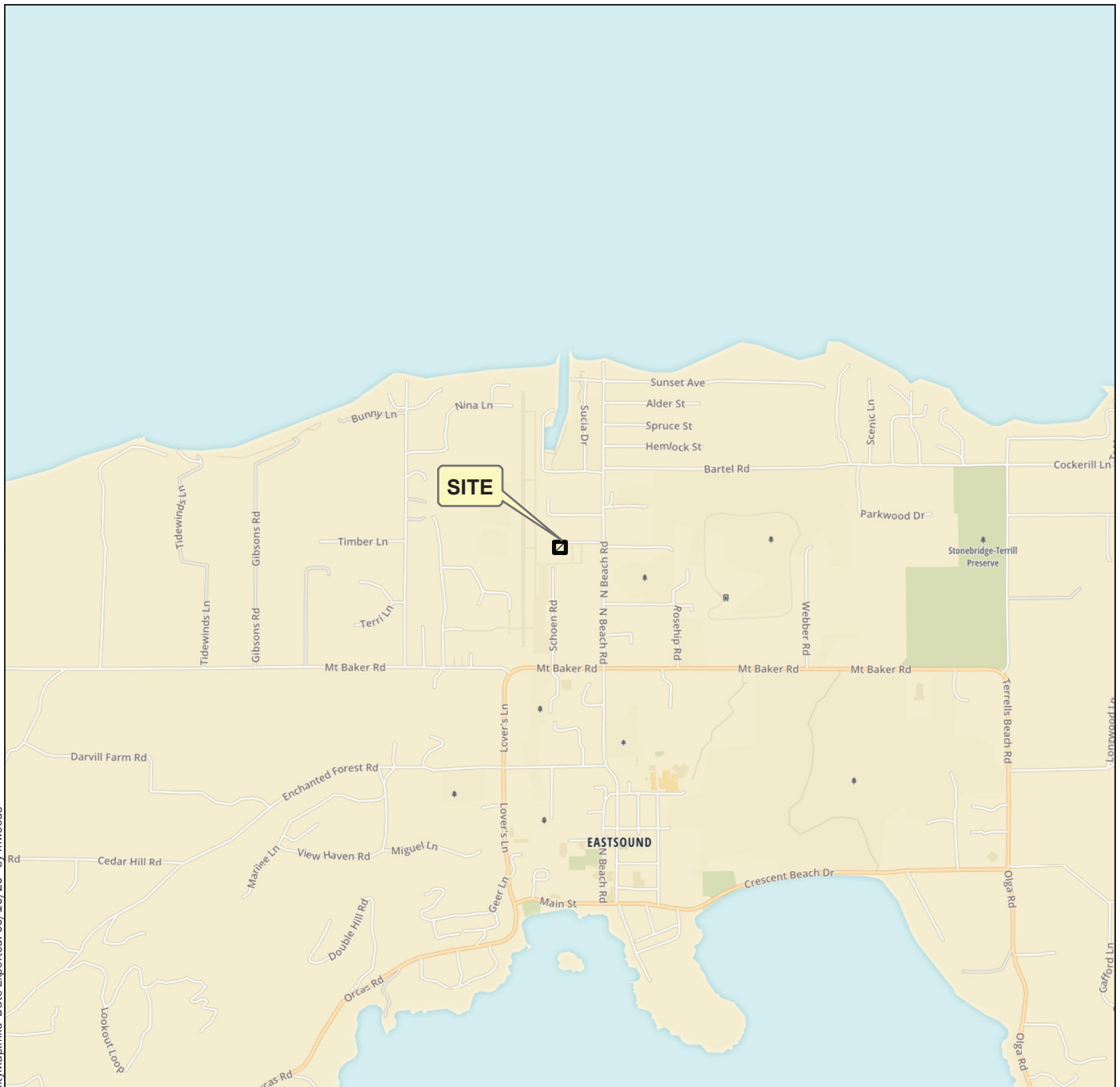
Washington State Department of Natural Resources. 2020. Washington Interactive Geologic Map, <https://fortress.wa.gov/dnr/protectiongis/geology/>. Accessed September.

Washington State Department of Transportation. 2020. "Standard Specifications for Road, Bridge and Municipal Construction," M 41-10.





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### Vicinity Map

Eastsound Wastewater Treatment Plant Improvements  
Eastsound, Washington



Figure 1

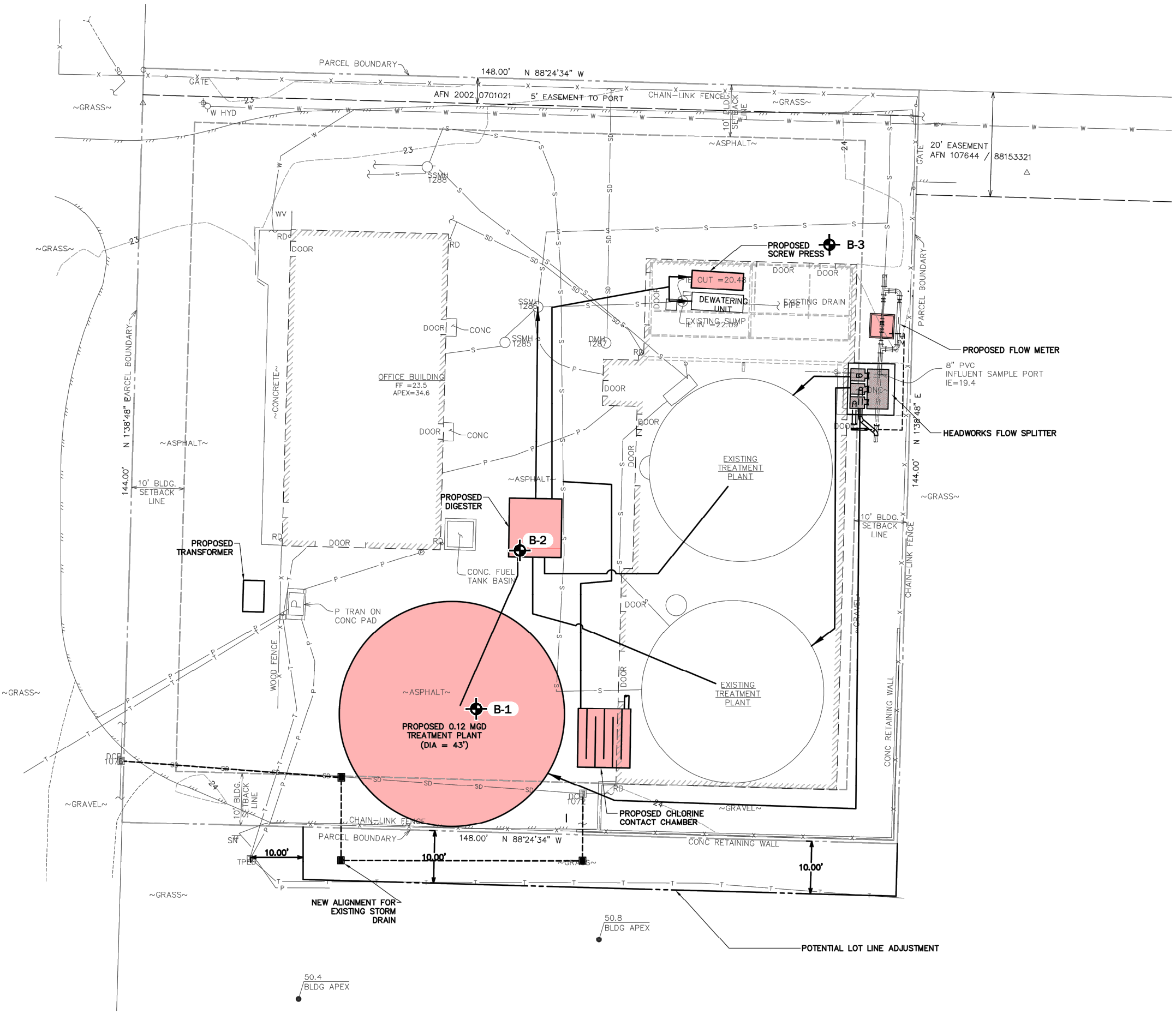
#### Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Mapbox Open Street Map, 2016

Projection: NAD 1983 UTM Zone 10N

P:\0407002\CAD\00\Geotech\040700200\_F02\_Site Plan.dwg TAB:F02 Date Exported: 09/22/20 - 10:40 by csticket



**Legend**

GEI-1  Boring by GeoEngineers, Inc., 2020

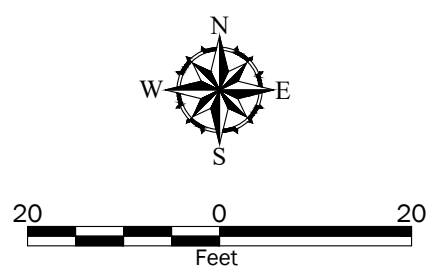
 Proposed Design Features


**Notes:**

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

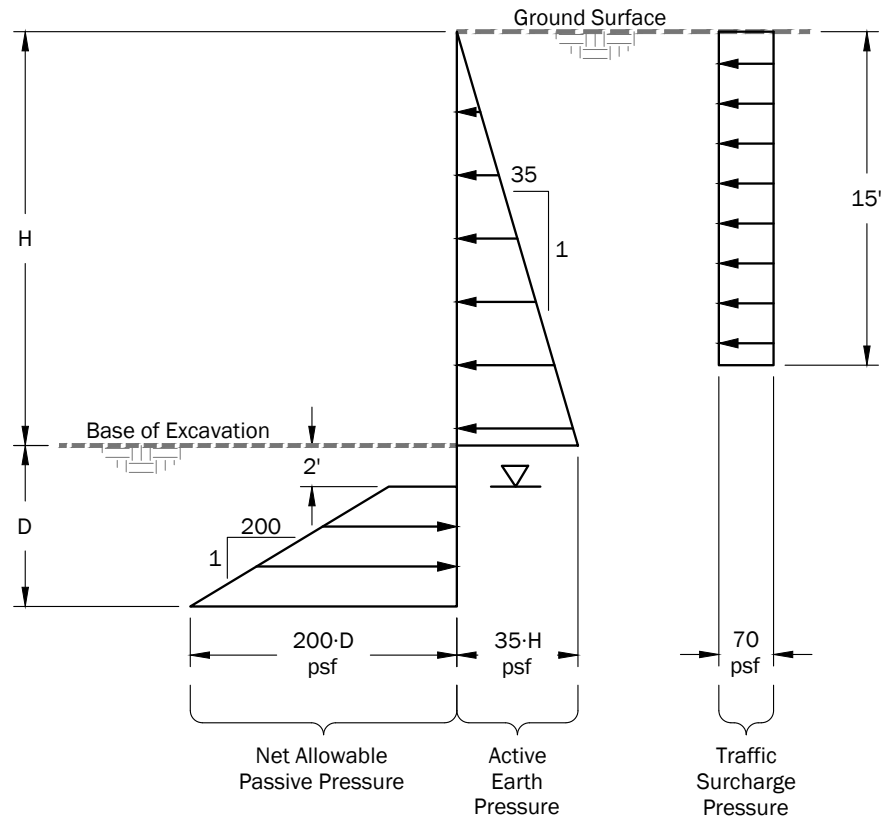
Data Source: Background from Wilson Engineering dated 7/14/2020.

Projection: NAD83 Washington State Planes, North Zone, US Foot



<b>Site Plan</b>	
Eastsound Wastewater Treatment Plant Improvements Eastsound, Washington	
	<b>Figure 2</b>

## Cantilever Soldier Pile



### Legend

H = Height of Excavation, Feet

D = Vertical Embedment Depth, Feet

▽ Design Groundwater Elevation for Drained Walls/ Passive Resistance Design

Not To Scale

### Notes:

1. Apparent earth pressure and traffic surcharge pressure act over the pile spacing above the base of the excavation.
2. Passive earth pressure acts over 2.5 times the concreted diameter of the soldier pile, or the soldier pile spacing, whichever is less.
3. Passive pressure includes a factor of safety of 1.5
4. Additional surcharge from footings of adjacent buildings should be included in accordance with recommendations provided on Figure 4.
5. This pressure diagram is appropriate for temporary cantilever soldier pile walls. If additional surcharge loading (such as from soil stockpiles, excavators, dumptrucks, cranes, or concrete trucks) is anticipated, GeoEngineers should be consulted to provide revised surcharge pressures.

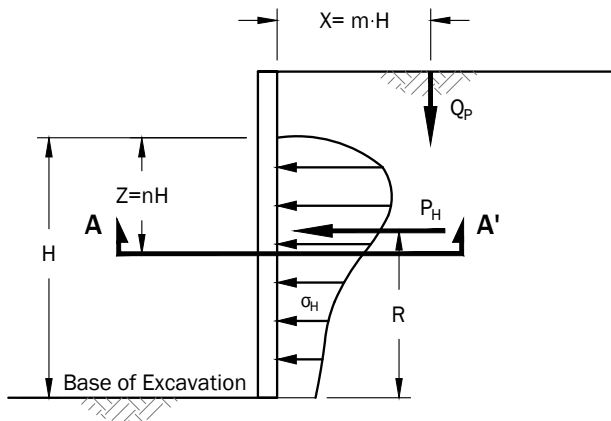
### Earth Pressure Diagram Temporary Cantilever Soldier Pile Wall

Eastsound Wastewater Treatment Plant Improvements  
Eastsound, Washington

**GEOENGINEERS** 

Figure 3

Lateral Earth Pressure from Point Load,  $Q_p$   
(Spread Footing)

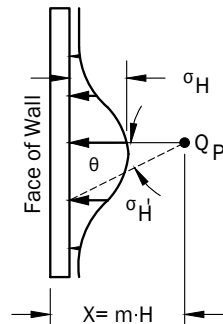


$$\text{For } m \leq 0.4 \\ \sigma_H = \frac{0.28Q_p n^2}{H^2(0.16+n^2)^3}$$

$$\text{For } m > 0.4 \\ \sigma_H = \frac{1.77Q_p m^2 n^2}{H^2(m^2+n^2)^3}$$

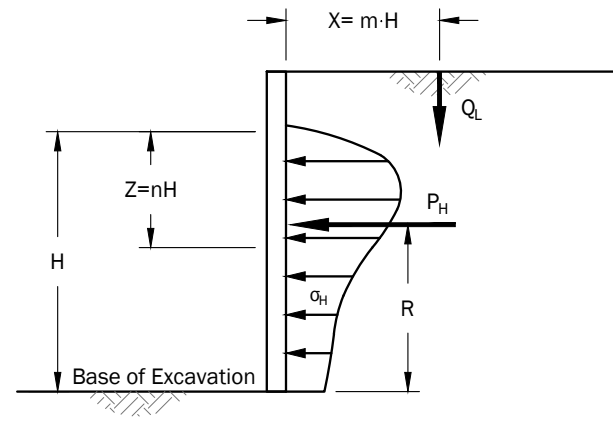
$$\sigma'_H = \sigma \cos^2(1.1\theta)$$

m	$P_H \left( \frac{H}{Q_p} \right)$	R
0.2	0.78	0.59H
0.4	0.78	0.59H
0.6	0.45	0.48H



Section A-A'  
Pressures from Point Load  $Q_p$

Lateral Earth Pressure from Line Load,  $Q_L$   
(Continuous Wall Footing)



$$\text{For } m \leq 0.4$$

$$\sigma_H = \frac{0.2n \cdot Q_L}{H(0.16+n^2)^2}$$

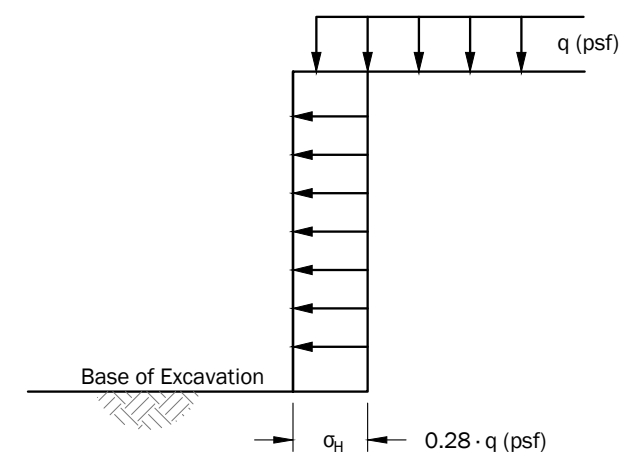
$$\text{For } m > 0.4$$

$$\sigma_H = \frac{1.28m^2 n Q_L}{H(m^2+n^2)^2}$$

$$\text{Resultant } P_H = \frac{0.64Q_L}{(m^2+1)}$$

m	R
0.1	0.60H
0.3	0.60H
0.5	0.56H
0.7	0.48H

Uniform Surcharges,  $q$  (Floor Loads, Large Foundation Elements or Traffic Loads)



$\sigma_H$  = Lateral Surcharge Pressure from Uniform Surcharge

Definitions:

- $Q_p$  = Point load in pounds  
 $Q_L$  = Line load in pounds/foot  
 $H$  = Excavation height below footing, feet  
 $\sigma_H$  = Lateral earth pressure from surcharge, psf  
 $q$  = Surcharge pressure in psf  
 $\theta$  = Radians  
 $\sigma'_H$  = Distribution of  $\sigma_H$  in plan view  
 $P_H$  = Resultant lateral force acting on wall, pounds  
 $R$  = Distance from base of excavation to resultant lateral force, feet  
 $X$  = Resultant lateral force acting on wall, pounds  
 $Z$  = Depth of  $\sigma_H$  to be evaluated below the bottom of  $Q_p$  or  $Q_L$   
 $m$  = Ratio of  $X$  to  $H$   
 $n$  = Ratio of  $Z$  to  $H$

Notes:

- Procedures for estimating surcharge pressures shown above are based on Manual 7.02 Naval Facilities Engineering Command, September 1986 (NAVFAC DM 7.02).
- Lateral earth pressures from surcharge should be added to earth pressures presented on Figure 3.
- See report text for where surcharge pressures are appropriate.

Not To Scale

Recommended Surcharge Pressure

Eastsound Wastewater Treatment Plant Improvements  
Eastsound, Washington



Figure 4



## **APPENDIX A**

### **Field Explorations and Laboratory Testing**

## **APPENDIX A**

### **FIELD EXPLORATIONS AND LABORATORY TESTING**

#### **Field Explorations**

Subsurface conditions at the site were explored by completing two geotechnical borings on August 10, 2020. The borings were completed to depths of 20 to 26½ feet below existing ground surface (bgs) using a track-mounted drill rig subcontracted to GeoEngineers. The approximate locations of the explorations are shown in the Site and Exploration Plan, Figure 2. The locations of the borings were determined using recreational grade global positioning system (GPS) and my measuring from existing site features; therefore, the locations shown in Figure 2 should be considered approximate.

Disturbed soil samples were obtained using Standard Penetration Test (SPT) methodology with the standard split-spoon sampler. The samples were obtained by driving the sampler 18 inches into the soil with a 140-pound hammer free-falling 30 inches using a rope and cathead. The number of blows required for each 6 inches of penetration was recorded. The blow count (“N-value”) of the soil was calculated as the number of blows required for the final 12 inches of penetration. This resistance, or N-value, provides a measure of the relative density of granular soils and the relative consistency of cohesive soils. The samples were placed in plastic bags to maintain the moisture content and transported back to our laboratory for analysis and testing.

The borings were continuously monitored by a geologist from our firm who examined and classified the soils encountered, obtained representative soil samples, observed groundwater conditions and prepared a detailed log of each exploration. Soils encountered were classified visually in general accordance with ASTM International (ASTM) D-2488-90, which is described in Figure A-1. An explanation of our boring log symbols is also shown on Figure A-1.

The logs of the borings are presented in Figures A-2 through A-4. The exploration logs are based on our interpretation of the field and laboratory data and indicate the various types of soils encountered. It also indicates the depths at which these soils or their characteristics change, although the change might actually be gradual. If the change occurred between samples in the boring, it was interpreted.

Observations of groundwater conditions were made during exploration. The groundwater conditions observed are presented in the logs. Groundwater conditions observed during exploration represent a short-term condition and may or may not be representative of the long-term groundwater conditions at the site. A groundwater piezometer well was installed in B-3. A description of the well is shown on the log of B-3.

#### **Laboratory Test Results**

Soil samples obtained from the explorations were transported to our laboratory and examined to confirm or modify field classifications, as well as to evaluate index properties of the soil samples. Representative samples were selected for laboratory testing consisting of the determination of the moisture content, and sieve analysis. The tests were performed in general accordance with test methods of ASTM or other applicable procedures.

### **Moisture Content Testing**

The natural moisture contents of selected soil samples obtained from the exploratory borings were determined in general accordance with ASTM D 2216 test procedures. The results from the moisture content determinations are displayed shown on the exploration logs in Appendix A in the column labeled “Moisture Content %” adjacent to the corresponding samples.

### **Percent Passing U.S. No. 200 Sieve**

Selected samples were “washed” through the U.S. No. 200 mesh sieve to determine the relative percentages of coarse- and fine-grained particles in the soil. The percent passing value represents the percentage by weight of the sample finer than the U.S. No. 200 sieve. These tests were conducted to verify field descriptions and to determine the fines content for analysis purposes. The tests were conducted in general accordance with ASTM D 1140, and the results are shown on the exploration logs in Appendix A in the column labeled “Fines Content %” adjacent to the corresponding samples.

### **Atterberg Limits Testing**

Atterberg limits test was performed on a selected fine-grained soil sample. The test was used to classify the soils as well as to evaluate index properties. The liquid limit and the plastic limit were estimated through a procedure performed in general accordance with ASTM D 4318. The results of the Atterberg limits test is summarized in Figure A-5.



## SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS  (LITTLE OR NO FINES)		<b>GW</b>	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES  (APPRECIABLE AMOUNT OF FINES)		<b>GP</b>	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				<b>GM</b>	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
			<b>GC</b>	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES	
	SAND AND SANDY SOILS	CLEAN SANDS  (LITTLE OR NO FINES)		<b>SW</b>	WELL-GRADED SANDS, GRAVELLY SANDS
		SANDS WITH FINES  (APPRECIABLE AMOUNT OF FINES)		<b>SP</b>	POORLY-GRADED SANDS, GRAVELLY SAND
FINE GRAINED SOILS	SILTS AND CLAYS		LIQUID LIMIT LESS THAN 50		<b>SM</b>
				<b>SC</b>	CLAYEY SANDS, SAND - CLAY MIXTURES
				<b>ML</b>	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		<b>CL</b>	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				<b>OL</b>	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
				<b>MH</b>	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
HIGHLY ORGANIC SOILS				<b>CH</b>	INORGANIC CLAYS OF HIGH PLASTICITY
				<b>OH</b>	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
				<b>PT</b>	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

### Sampler Symbol Descriptions

	2.4-inch I.D. split barrel
	Standard Penetration Test (SPT)
	Shelby tube
	Piston
	Direct-Push
	Bulk or grab
	Continuous Coring

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

"P" indicates sampler pushed using the weight of the drill rig.

"WOH" indicates sampler pushed using the weight of the hammer.

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

## ADDITIONAL MATERIAL SYMBOLS

SYMBOLS		TYPICAL DESCRIPTIONS
GRAPH	LETTER	
	<b>AC</b>	Asphalt Concrete
	<b>CC</b>	Cement Concrete
	<b>CR</b>	Crushed Rock/Quarry Spalls
	<b>SOD</b>	Sod/Forest Duff
	<b>TS</b>	Topsoil

### Groundwater Contact



Measured groundwater level in exploration, well, or piezometer



Measured free product in well or piezometer

### Graphic Log Contact



Distinct contact between soil strata



Approximate contact between soil strata

### Material Description Contact



Contact between geologic units



Contact between soil of the same geologic unit

### Laboratory / Field Tests

%F	Percent fines
%G	Percent gravel
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DD	Dry density
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
Mohs	Mohs hardness scale
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PL	Point load test
PP	Pocket penetrometer
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

### Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen

## Key to Exploration Logs



Figure A-1

Drilled	Start 8/10/2020	End 8/10/2020	Total Depth (ft)	26.5	Logged By Checked By	NBD AJH	Driller	Borettec1, Inc.	Drilling Method	Hollow-stem Auger
Surface Elevation (ft) Vertical Datum	23 NAVD88				Hammer Data	Rope & Cathead 140 (lbs) / 30 (in) Drop			Drilling Equipment	EC Track 95
Easting (X) Northing (Y)	1139351 629505				System Datum	WA State Plane North NAD83			See "Remarks" section for groundwater observed	
Notes:										

Elevation (feet)	FIELD DATA				Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample						
0						AC	Approximately 2 inches of asphalt concrete pavement	4	14	
						SP-SM	Brown fine to medium sand with silt and occasional gravel (dense, moist) (fill)			
						ML	Brown sandy silt with occasional gravel (stiff, moist)	18		
						CL	Gray clay with trace sand and occasional gravel (stiff, moist) (undifferentiated glacial drift)	19		
5		18	13	2a MC 2b MC				18		Wood fiber at 5½ feet below ground surface
		18	15	3 MC				18		
10		18	26	4 MC			Becomes very stiff	21		
15		18	6	5 AL		CL	Gray clay (medium stiff, moist)	26		AL (LL = 40, PI = 20)
20		18	6	6 MC				25		
25		16	50/5"	7 %F		SM	Gray silty fine to medium sand with gravel (very dense, moist to wet) (glacial till)	10	25	Groundwater observed at approximately 25 feet during drilling

Note: See Figure A-1 for explanation of symbols.

Coordinates Data Source: Horizontal approximated based on Topographic Survey. Vertical approximated based on Topographic Survey.

## Log of Boring B-1



Project: Eastsound Wastewater Treatment Plant Improvements  
Project Location: Eastsound, Washington  
Project Number: 0407-002-00

Figure A-2  
Sheet 1 of 1

Drilled	Start 8/10/2020	End 8/10/2020	Total Depth (ft)	26.5	Logged By Checked By	NBD AJH	Driller	Borettec1, Inc.	Drilling Method	Hollow-stem Auger
Surface Elevation (ft) Vertical Datum	23 NAVD88				Hammer Data	Rope & Cathead 140 (lbs) / 30 (in) Drop			Drilling Equipment	EC Track 95
Easting (X) Northing (Y)	1139360 629537				System Datum	WA State Plane North NAD83			See "Remarks" section for groundwater observed	
Notes:										

Elevation (feet)	FIELD DATA				Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample						
0						AC	Approximately 3 inches of asphalt concrete pavement			
						SM	Light brown silty fine to medium sand with gravel (dense, moist) (fill)	2	18	
5		3	16			GP	Gray gravel with silt and sand (dense, moist)			
10		18	14			CL	Gray clay with trace sand and occasional gravel (stiff, moist) (undifferentiated glacial drift)	19		
15		18	15					19		
20		18	9					21		AL (LL = 37, PI = 17)
25		18	12					26		
30		18	12			CL	Gray clay with fine sand and occasional gravel (stiff, moist to wet)	17		
35		0	73			SM	Gray silty fine to medium sand with occasional gravel (very dense, wet) (glacial till)	12	39	Groundwater observed at approximately 25 feet during drilling

Note: See Figure A-1 for explanation of symbols.

Coordinates Data Source: Horizontal approximated based on Topographic Survey. Vertical approximated based on Topographic Survey.

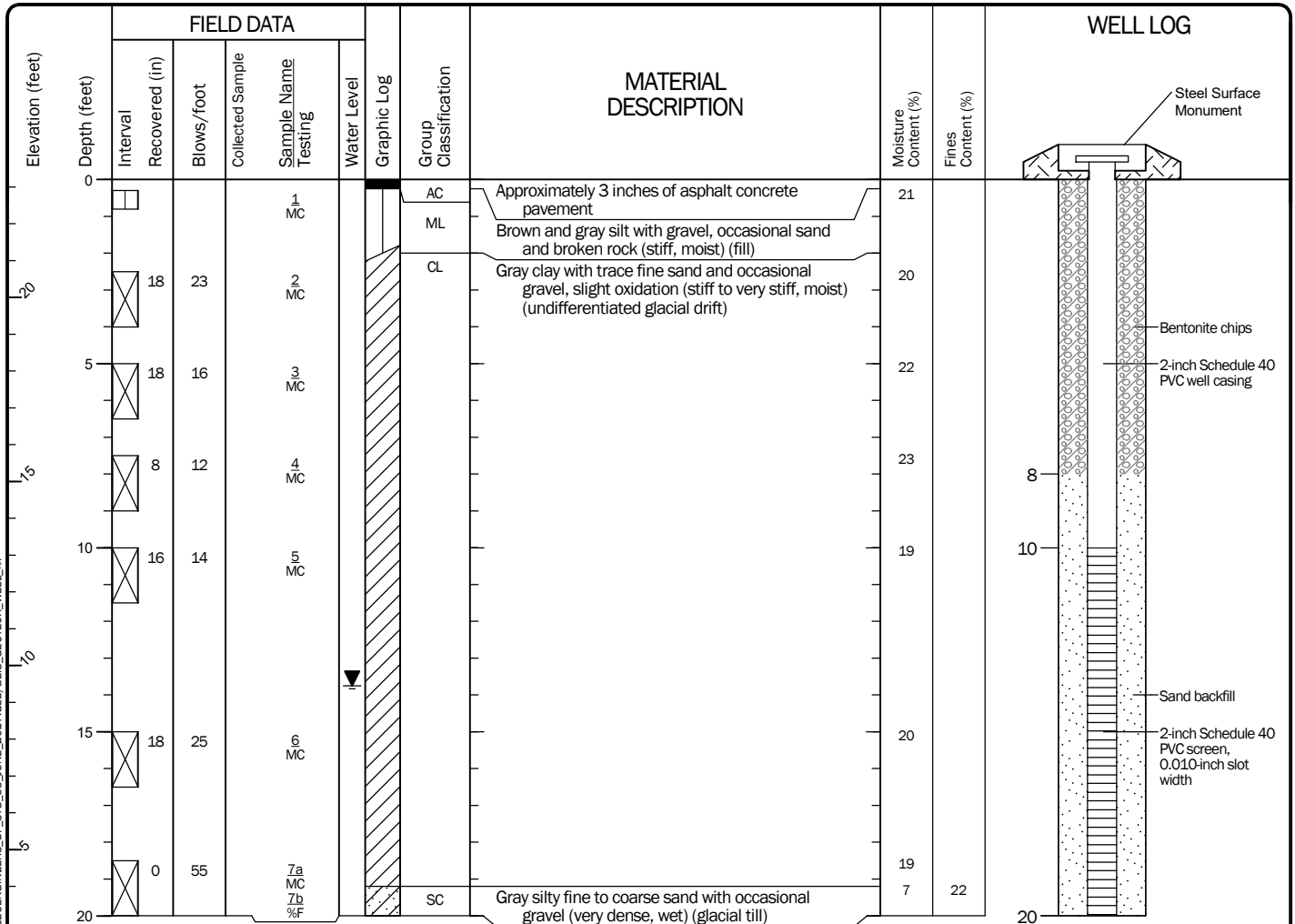
### Log of Boring B-2



Project: Eastsound Wastewater Treatment Plant Improvements  
Project Location: Eastsound, Washington  
Project Number: 0407-002-00

Figure A-3  
Sheet 1 of 1

Drilled	Start 8/10/2020	End 8/10/2020	Total Depth (ft)	20	Logged By Checked By	NBD AJH	Driller	Borettec1, Inc.			Drilling Method	Hollow-stem Auger	
Hammer Data	Rope & Cathead 140 (lbs) / 30 (in) Drop				Drilling Equipment	EC Track 95			DOE Well I.D.: BKH 369 A 2-in well was installed on 8/10/2020 to a depth of 20 ft.				
Surface Elevation (ft) Vertical Datum	23.2 NAVD88				Top of Casing Elevation (ft)	22.67			<u>Groundwater</u> <u>Date Measured</u> 8/24/2020				
Easting (X) Northing (Y)	1139419 629595				Horizontal Datum	WA State Plane North NAD83			<u>Depth to Water (ft)</u> 13.75				
												<u>Elevation (ft)</u> 9.45	
Notes:													



Note: See Figure A-1 for explanation of symbols.  
Coordinates Data Source: Horizontal approximated based on Topographic Survey. Vertical approximated based on Topographic Survey.

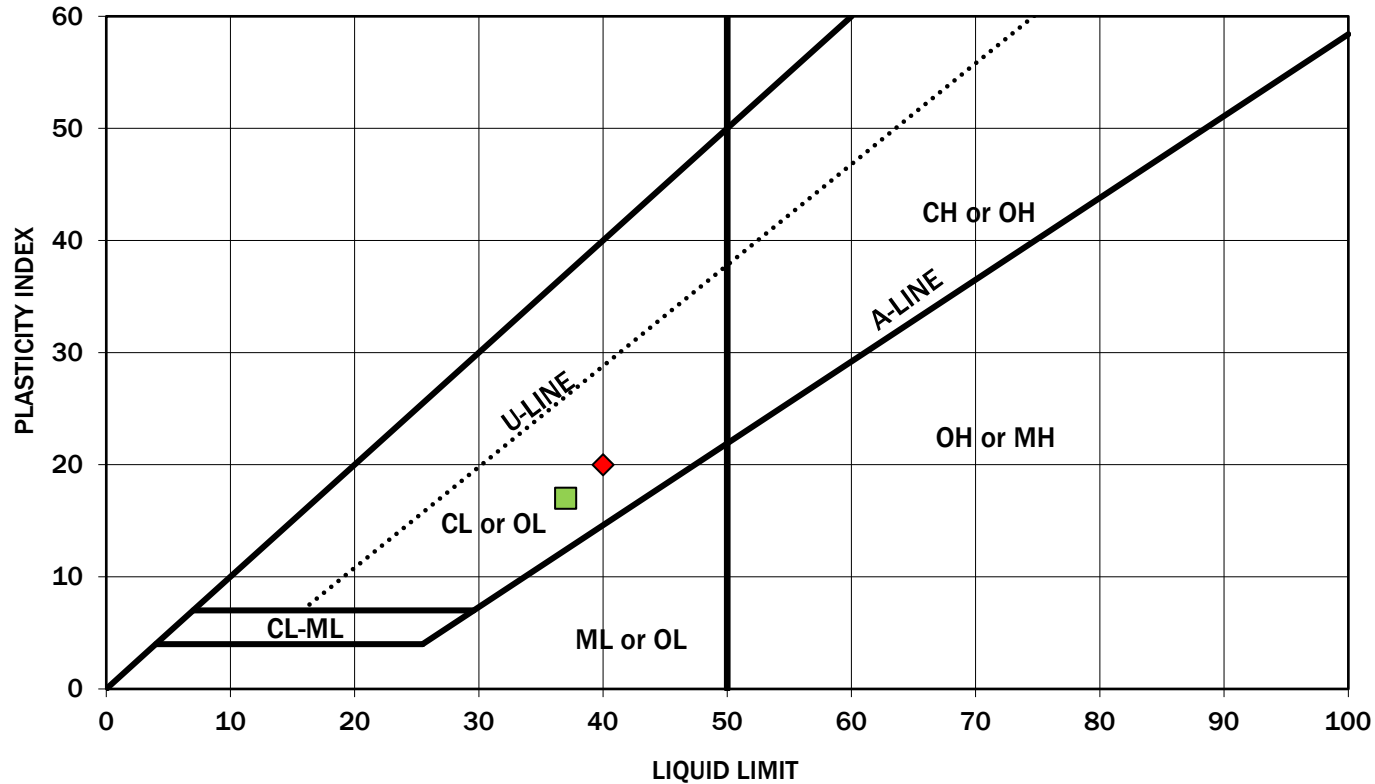
### Log of Boring with Monitoring Well B-3



Project: Eastsound Wastewater Treatment Plant Improvements  
Project Location: Eastsound, Washington  
Project Number: 0407-002-00

Figure A-4  
Sheet 1 of 1

# PLASTICITY CHART



Symbol	Boring Number	Depth (feet)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Soil Description
◆	B-1	15	26	40	20	Gray clay (CL)
■	B-2	10	21	37	17	Gray clay (CL)

Note: This report may not be reproduced, except in full, without written approval of GeoEngineers, Inc. Test results are applicable only to the specific sample on which they were performed, and should not be interpreted as representative of any other samples obtained at other times, depths or locations, or generated by separate operations or processes. The liquid limit and plasticity index were obtained in general accordance with ASTM D 4318. GeoEngineers 17425 NE Union Hill Road Ste 250, Redmond, WA 98052

## Atterberg Limits Test Results

Eastsound WWTP Improvements  
Eastsound, Washington



Figure A-5

## **APPENDIX B**

### **Report Limitations and Guidelines for Use**

## **APPENDIX B**

### **REPORT LIMITATIONS AND GUIDELINES FOR USE<sup>1</sup>**

This appendix provides information to help you manage your risks with respect to the use of this report.

#### **Geotechnical Services are Performed for Specific Purposes, Persons and Projects**

This report has been prepared for the exclusive use of the Eastsound Water & Sewer District, Wilson Engineering, LLC., and their authorized agents. This report may be made available to other members of the design team. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, a geotechnical or geologic study conducted for a civil engineer or architect may not fulfill the needs of a construction contractor or even another civil engineer or architect that are involved in the same project. Because each geotechnical or geologic study is unique, each geotechnical engineering or geologic report is unique, prepared solely for the specific client and project site. Our report is prepared for the exclusive use of our Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted geotechnical practices in this area at the time this report was prepared. This report should not be applied for any purpose or project except the one originally contemplated.

#### **A Geotechnical Engineering or Geologic Report is Based on a Unique Set of Project-specific Factors**

This report has been prepared for the proposed Eastsound Wastewater Treatment Plant Improvements project in Eastsound, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- Not prepared for you,
- Not prepared for your project,
- Not prepared for the specific site explored, or
- Completed before important project changes were made.

For example, changes that can affect the applicability of this report include those that affect:

- The function of the proposed structure;
- Elevation, configuration, location, orientation or weight of the proposed structure;
- Composition of the design team; or
- Project ownership.

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<sup>1</sup> Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; [www.asfe.org](http://www.asfe.org).

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

### **Subsurface Conditions Can Change**

This geotechnical or geologic report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying a report to determine if it remains applicable.

### **Most Geotechnical and Geologic Findings are Professional Opinions**

Our interpretations of subsurface conditions are based on field observations from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

### **Geotechnical Engineering Report Recommendations are Not Final**

Do not over-rely on the preliminary construction recommendations included in this report. These recommendations are not final, because they were developed principally from GeoEngineers' professional judgment and opinion. GeoEngineers' recommendations can be finalized only by observing actual subsurface conditions revealed during construction. GeoEngineers cannot assume responsibility or liability for this report's recommendations if we do not perform construction observation.

Sufficient monitoring, testing and consultation by GeoEngineers should be provided during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether or not earthwork activities are completed in accordance with our recommendations. Retaining GeoEngineers for construction observation for this project is the most effective method of managing the risks associated with unanticipated conditions.

### **A Geotechnical Engineering or Geologic Report Could be Subject to Misinterpretation**

Misinterpretation of this report by other design team members can result in costly problems. You could lower that risk by having GeoEngineers confer with appropriate members of the design team after submitting the report. Also retain GeoEngineers to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering or geologic report. Reduce that risk by having GeoEngineers participate in pre-bid and preconstruction conferences, and by providing construction observation.

### **Do Not Redraw the Exploration Logs**

Geotechnical engineers and geologists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering or geologic report should never be redrawn for inclusion in architectural or other design



drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

### **Give Contractors a Complete Report and Guidance**

Some owners and design professionals believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering or geologic report, but preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with GeoEngineers and/or to conduct additional study to obtain the specific types of information they need or prefer. A pre-bid conference can also be valuable. Be sure contractors have sufficient time to perform additional study. Only then might an owner be in a position to give contractors the best information available, while requiring them to at least share the financial responsibilities stemming from unanticipated conditions. Further, a contingency for unanticipated conditions should be included in your project budget and schedule.

### **Contractors are Responsible for Site Safety on Their Own Construction Projects**

Our geotechnical recommendations are not intended to direct the contractor's procedures, methods, schedule or management of the work site. The contractor is solely responsible for job site safety and for managing construction operations to minimize risks to on-site personnel and to adjacent properties.

### **Read These Provisions Closely**

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering or geology) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

### **Geotechnical, Geologic and Environmental Reports Should Not be Interchanged**

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

### **Topsoil**

For the purposes of this report, we consider topsoil to consist of generally fine-grained soil with an appreciable amount of organic matter based on visual examination, and to be unsuitable for direct support of the proposed improvements. However, the organic content and other mineralogical and gradational characteristics used to evaluate the suitability of soil for use in landscaping and agricultural purposes was not determined, nor considered in our analyses. Therefore, the information and recommendations in this report, and our logs and descriptions should not be used as a basis for estimating the volume of topsoil available for such purposes.

## **Biological Pollutants**

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention or assessment of the presence of biological pollutants. Accordingly, this report does not include any interpretations, recommendations, findings, or conclusions regarding the detecting, assessing, preventing or abating of biological pollutants and no conclusions or inferences should be drawn regarding biological pollutants, as they may relate to this project. The term "biological pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

If Client desires these specialized services, they should be obtained from a consultant who offers services in this specialized field.



December 16, 2022

Wilson Engineering, LLC  
805 Dupont Street, Suite 7  
Bellingham, Washington 98225

Attention: Jeff Christner, PE

Subject: Report Addendum  
Geotechnical Engineering Services  
Eastsound Wastewater Treatment Plant  
Eastsound, Washington  
File No. 0407-002-00

## INTRODUCTION

GeoEngineers, Inc. (GeoEngineers) presents this report addendum to our “Geotechnical Engineering Services, Eastsound Wastewater Treatment Plan Improvements, Eastsound, Washington” report dated November 8, 2022. We understand that some of the pavement areas are being replaced. The purpose of the addendum is to provide pavement thickness and subgrade preparation recommendations.

### Pavement Recommendations

We do not have specific design parameters (traffic data) to develop pavement sections. The owner can choose the pavement section based on the available capital budget for the project and desired pavement performance. We recommend that any site grading be accomplished with gravel base. The existing gravel base or exposed subgrade should be proofrolled, and any unsuitable or yielding soils should be removed or remediated prior to placing gravel base. We recommend that the pavement section consist of gravel base (existing sand and gravel fill, minus organics, or clean import meets this purpose), a layer of crushed rock, and hot mix asphalt (HMA) pavement. The pavement materials should be in conformance with the most recent version of the Washington State Department of Transportation (WSDOT) Standard Specifications for Bridge and Municipal Construction (hereinafter referred to as the WSDOT Standard Specifications). We suggest the following typical pavement sections for commercial sites:

### Automobile Parking Areas

- 2½ to 3 inches of HMA, Class ½-inch, PG 58H-22 per the WSDOT Standard Specifications 5-04 and 9-03.8
- 3 to 4 inches of crushed surfacing base course (CSBC) WSDOT Standard Specifications 9-03.9(3)
- 8 to 12 inches of gravel base, as needed based on thickness and/or proof roll of existing fill



### Access Roads, Truck Routes, and Loading Areas

- 3 to 4 inches of HMA
- 4 to 6 inches of CSBC
- 12 to 18 inches of gravel base, as needed based on thickness and/or proof roll of existing fill

### LIMITATIONS

This report addendum is subject to the same limitations provided in our "Geotechnical Engineering Services, Eastsound Wastewater Treatment Plan Improvements, Eastsound, Washington" report dated November 8, 2022.

Please contact Sean Cool or Aaron Hartvigsen at 360.647.1510 if you have any questions or need to discuss the contents of this report addendum.

Sincerely,  
GeoEngineers, Inc.



Aaron J. Hartvigsen, PE  
Senior Geotechnical Engineer

AJH:SWC:leh

One copy submitted

Disclaimer: Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.



Sean W. Cool, PE  
Associate

## **APPENDIX D – WASHINGTON STATE PREVAILING WAGE RATES**

The State of Washington prevailing wage rates applicable for this public works project, which is located in San Juan County, may be found at the following website address of the Department of Labor and Industries:

<https://secure.lni.wa.gov/wagelookup/>

Based on the bid submittal deadline for this project the applicable effective date for prevailing wages for this project is March 5, 2025. Copies of the applicable prevailing wage rates are also available for viewing at the office of the Owner, located at:

Eastsound Sewer and Water District  
143 Cessna Road, Eastsound, WA 98245

Upon request, the Owner will mail a hard copy of the applicable prevailing wages for this project.

## **APPENDIX E – FEDERAL PREVAILING WAGE RATES**

Superseded General Decision Number: WA20240057

State: Washington

Construction Type: Heavy  
including water and sewer line construction

County: San Juan County in Washington.

HEAVY CONSTRUCTION PROJECTS (including sewer/water construction).

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	<ul style="list-style-type: none"><li>. Executive Order 14026 generally applies to the contract.</li><li>. The contractor must pay all covered workers at least \$17.75 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2025.</li></ul>
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	<ul style="list-style-type: none"><li>. Executive Order 13658 generally applies to the contract.</li><li>. The contractor must pay all covered workers at least \$13.30 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2025.</li></ul>

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.



	Rates	Fringes
CARPENTER.....	\$ 49.18	19.01

(HOURLY ZONE PAY: WESTERN AND CENTRAL WASHINGTON - ALL CLASSIFICATIONS EXCEPT MILLWRIGHTS AND PILEDRIVERS

Hourly Zone Pay shall be paid on jobs located outside of the free zone computed from the city center of the following listed cities:

Seattle	Olympia	Bellingham
Auburn	Bremerton	Anacortes
Renton	Shelton	Yakima
Aberdeen-Hoquiam	Tacoma	Wenatchee
Ellensburg	Everett	Port Angeles
Centralia	Mount Vernon	Sunnyside
Chelan	Pt. Townsend	

Zone Pay:

0 -25 radius miles	Free
26-35 radius miles	\$1.00/hour
36-45 radius miles	\$1.15/hour
46-55 radius miles	\$1.35/hour
Over 55 radius miles	\$1.55/hour

(HOURLY ZONE PAY: WESTERN AND CENTRAL WASHINGTON - MILLWRIGHT AND PILEDRIVER ONLY)

Hourly Zone Pay shall be computed from Seattle Union Hall, Tacoma City center, and Everett City center

Zone Pay:

0 -25 radius miles	Free
26-45 radius miles	\$ .70/hour
Over 45 radius miles	\$1.50/hour

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ELEC0191-013 06/01/2022

	Rates	Fringes
ELECTRICIAN		
DOUGLAS, CHELAN, and OKANOGAN Counties.....	\$ 46.15	26.10
ISLAND, SAN JUAN, SKAGIT, SNOHOMISH and WHATCOM Counties.....	\$ 53.20	27.51

-----  
ENGI0302-001 06/01/2023

	Rates	Fringes
Power equipment operators:		
Group 1A.....	\$ 54.93	25.57
Group 1AA.....	\$ 55.75	25.57
Group 1AAA.....	\$ 56.54	25.57
Group 1.....	\$ 54.13	25.57
Group 2.....	\$ 53.42	25.57
Group 3.....	\$ 52.83	25.57
Group 4.....	\$ 49.40	25.57

Zone Differential (Add to Zone 1 rates):

Zone 2 (26-45 radius miles) - \$1.00

Zone 3 (Over 45 radius miles) - \$1.30

BASEPOINTS: Aberdeen, Bellingham, Bremerton, Everett, Kent,  
Mount Vernon, Port Angeles, Port Townsend, Seattle,  
Shelton, Wenatchee, Yakima

#### POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1AAA - Cranes-over 300 tons, or 300 ft of boom  
(including jib with attachments)

GROUP 1AA - Cranes 200 to 300 tons, or 250 ft of boom  
(including jib with attachments); Tower crane over 175 ft  
in height, base to boom; Excavator/Trackhoe, Backhoes: Over  
90 metric tons

GROUP 1A - Cranes, 100 tons thru 199 tons, or 150 ft of boom  
(including jib with attachments); Crane-overhead, bridge  
type, 100 tons and over; Tower crane up to 175 ft in height  
base to boom; Loaders-overhead, 8 yards and over;  
excavator/Trackhoe, backhoes: over 50 metric tons to 90  
metric tons

GROUP 1 - Cranes 45 tons thru 99 tons, under 150 ft of boom  
(including jib with attachments); Crane-overhead, bridge  
type, 45 tons thru 99 tons; Derricks on building work;;  
Excavator/Trackhoe, backhoes: over 30 metric tons to 50  
metric tons; Loader- overhead 6 yards to, but not including  
8 yards; Dozer D-10

GROUP 2 - Cranes, 20 tons thru 44 tons with attachments;  
Crane-overhead, bridge type-20 tons through 44 tons;;  
Excavator/Trackhoe, backhoe: 15 to 30 metric tons;  
Loaders-overhead under 6 yards; Mechanic; Drilling Machine;  
Grader (finishing)

GROUP 3 - Cranes-thru 19 tons with attachments; A-frame crane  
over 10 tons;; Dozers-D-9 and under; Roller-Plant Mix;  
Excavator/Trackhoe, backhoe: under 15 metric tons;  
Forklift: 3000 lbs and over with attachments; Oiler; Grader  
(non-finishing);Boom Truck over 10 tons

GROUP 4 - Cranes-A frame-10 tons and under; Roller-other than  
plant mix; Forklift: under 3000 lbs with attachments; Boom  
Truck 10 tons and under

-----  
IRON0086-012 01/01/2024

	Rates	Fringes
Ironworker (REINFORCING & STRUCTURAL).....	\$ 53.45	34.02

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LAB00292-001 06/01/2022

#### ZONE 1:

	Rates	Fringes
Laborers:		
GROUP 2.....	\$ 34.20	13.80
GROUP 3.....	\$ 42.86	13.80

GROUP 4.....	\$ 43.90	13.80
GROUP 5.....	\$ 44.62	13.80

ZONE DIFFERENTIAL (ADD TO ZONE 1 RATES):

ZONE 2 - \$1.00

ZONE 3 - \$1.30

BASE POINTS: BELLINGHAM, MT. VERNON, EVERETT, SEATTLE, KENT,  
TACOMA, OLYMPIA, CENTRALIA, ABERDEEN, SHELTON, PT.  
TOWNSEND, PT. ANGELES, AND BREMERTON

ZONE 1 - Projects within 25 radius miles of the respective  
city hall

ZONE 2 - More than 25 but less than 45 radius miles from the  
respective city hall

ZONE 3 - More than 45 radius miles from the respective city  
hall

LABORERS CLASSIFICATIONS

GROUP 2: Flagger

GROUP 3: General or Common Laborer; Chipping Guns (Under 30  
lbs)

GROUP 4: Pipe Layer; Chipping Guns (Over 30 lbs); Groutmen

GROUP 5: Mason Tender-Brick; Mason Tender-Cement/Concrete;  
Grade Checker

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PAIN0005-008 07/01/2024

	Rates	Fringes
PAINTER (Brush, Roller and Spray).....	\$ 34.44	10.66

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PLAS0528-004 06/01/2023

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 52.10	20.27

-----  
TEAM0174-002 06/01/2024

	Rates	Fringes
Truck drivers:		
ZONE A:		
GROUP 1:.....	\$ 52.88	26.52
GROUP 2:.....	\$ 52.04	26.52

ZONE B (25-45 miles from center of listed cities\*): Add \$.70  
per hour to Zone A rates.

ZONE C (over 45 miles from centr of listed cities\*): Add  
\$1.00 per hour to Zone A rates.

\*Zone pay will be calculated from the city center of the  
following listed cities:

BELLINGHAM	CENTRALIA	RAYMOND	OLYMPIA
EVERETT	SHELTON	ANACORTES	BELLEVUE
SEATTLE	PORT ANGELES	MT. VERNON	KENT
TACOMA	PORT TOWNSEND	ABERDEEN	BREMERTON

## TRUCK DRIVERS CLASSIFICATIONS

GROUP 1 - Dump Trucks, side, end and bottom dump, including semi-trucks and trains or combinations thereof with 16 yards to 30 yards capacity: Over 30 yards \$.15 per hour additional for each 10 yard increment.

GROUP 2 - Dump trucks, side, end and bottom dump, including semi-trucks and trains or combinations thereof with less than 16 yards capacity.

## HAZMAT PROJECTS

Anyone working on a HAZMAT job, where HAZMAT certification is required, shall be compensated as a premium, in addition to the classification working in as follows:

LEVEL C: +\$.25 per hour - This level uses an air purifying respirator or additional protective clothing.

LEVEL B: +\$.50 per hour - Uses same respirator protection as Level A. Supplied air line is provided in conjunction with a chemical "splash suit."

LEVEL A: +\$.75 per hour - This level utilizes a fully-encapsulated suit with a self-contained breathing apparatus or a supplied air line.

-----  
SUWA2009-048 08/07/2009

	Rates	Fringes
LABORER: Landscape.....	\$ 14.67 **	0.00
PIPEFITTER.....	\$ 30.00	8.35
TRUCK DRIVER: Water Truck.....	\$ 24.36	8.30
TRUCK DRIVER: 10 Yard Truck.....	\$ 24.61	8.34

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WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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\*\* Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 (\$17.75) or 13658 (\$13.30). Please see the Note at the top of the wage determination for more information. Please also note that the minimum wage requirements of Executive Order 14026 are not currently being enforced as to any contract or subcontract to which the states of Texas, Louisiana, or Mississippi, including their agencies, are a party.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other

health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

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The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

#### Union Rate Identifiers

A four-letter identifier beginning with characters other than ""SU"", ""UAVG"", ?SA?, or ?SC? denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

#### Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

#### Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this

classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

?SU? wage rates typically remain in effect until a new survey is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

#### State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the ?SA? identifier took effect under state law in the state from which the rates were adopted.

-----

#### WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

- a) a survey underlying a wage determination
- b) an existing published wage determination
- c) an initial WHD letter setting forth a position on a wage determination matter
- d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to [davisbaconinfo@dol.gov](mailto:davisbaconinfo@dol.gov) or by mail to:

Branch of Wage Surveys  
Wage and Hour Division  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to [BCWD-Office@dol.gov](mailto:BCWD-Office@dol.gov) or by mail to:

Branch of Construction Wage Determinations

Wage and Hour Division  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to [dba.reconsideration@dol.gov](mailto:dba.reconsideration@dol.gov) or by mail to:

Wage and Hour Administrator  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210.

=====  
END OF GENERAL DECISION"

## **APPENDIX F – PLAN OF INTERIM OPERATION**



# **PLAN OF INTERIM OPERATION**

**FOR THE**

## **EASTSOUND SEWER AND WATER DISTRICT WASTEWATER TREATMENT PLANT UPGRADES PROJECT – PHASE 2**

Prepared for:

EASTSOUND SEWER AND WATER DISTRICT

By:

WILSON ENGINEERING, LLC

January 27, 2025

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## **1.0 INTRODUCTION**

The purpose of this plan for interim operation is to identify and describe, in chronological order, the key operational milestones and actions from beginning of construction to the end of start-up necessary to integrate the improvements into the existing system for the Eastsound Sewer and Water District (District) Wastewater Treatment Plant (WWTP) Improvements project. It is to be used for guidance by the District and their representatives responsible for quality assurance during this project.

### **1.1 Scope**

This Plan:

- Identifies Key Construction-Related Dates
- Plan for staffing during construction
- Plan for Maintaining Interim Operation During Construction
- Startup Plan
- Training Plan for Startup

### **1.2 Reference Documents**

This plan is not part of the construction Contract Documents for the project. However, the Contract Documents issued for construction are referenced extensively by this plan. Additionally, several other documents may be referenced for information pertaining to the project and the system/facilities. A list of available reference documents is provided below.

- ***Construction Contract Documents (plans and specifications)***, Eastsound Sewer and Water District WWTP Upgrade – Phase II, Wilson Engineering:
  - Specifications: Jan. 2025
  - Plans: Jan. 2025

A copy of these references will be kept in the ESWD's onsite office.

## **2.0 SCOPE OF CONSTRUCTION**

This project involves civil, structural, electrical, and mechanical construction aspects for the improvements detailed within the construction Contract Documents (plans and specifications) for the Eastsound Sewer and Water District WWTP Upgrades.

Phase 2 includes the following scope:

- 1) Removal of the existing structure over treatment train 1 and 2 while maintaining facility operation and protecting existing equipment.
- 2) Sawcut and remove the existing concrete foundation around trains 1 and 2, leaving a portion north of train 1 for the future dewatering building.
- 3) Removal of existing treatment trains 1 and 2 and constructing two new bullseye style treatment trains within the footprints. The new trains will incorporate a 4-stage Bardenpho treatment process with anoxic basins, aeration basins, and a new clarifier.
- 4) Construction of a new metal-frame, insulated, and heated dewatering building.
- 5) Construction of a new concrete slab and installation of a new sludge storage container, level loader, support frame, crane system, and conveyor.
- 6) Installation of new drainage infrastructure.
- 7) Installation of new air piping.
- 8) Installation of new sanitary sewer piping.
- 9) Construction of a new concrete slab around the new trains 1 and 2 and the existing UV chamber and digester.
- 10) Construction of new concrete pads for a new removable davit crane and for effluent sampling station.
- 11) Retrofitting the dewatering sump pump station with new pump, piping, and electrical.
- 12) Install new influent pump station discharge pipe with camlock connection.
- 13) Sawcut and remove the existing asphalt parking area and sidewalk. Pour new asphalt, a new 5'-wide concrete sidewalk, and paint new parking stall striping.
- 14) Install new chain-link fencing and ingress/egress gates.
- 15) Install new PVC piping into existing septage storage tanks with camlock connections.
- 16) Relocation and construction of a shelter for the 2W bladder tanks and alkalinity tote.
- 17) Installation of new prefabricated covered storage shelters for carbon feed stations.
- 18) Renovation of the lab room, including the removal of old equipment and installation of new equipment.

Contract Documents issued for construction of this project were prepared by Wilson Engineering. These documents detail work associated with the improvements, the Contractor's responsibilities, the Engineer's authority and the Owner's requirements.

### **3.0 PRELIMINARY CONSTRUCTION SCHEDULE**

A preliminary construction schedule for the Eastsound Sewer and Water District WWTP Improvements project is illustrated in Figure 3-1.

A critical path method (CPM) construction schedule reflecting detailed activities, sequencing and project duration is required by Section 01 31 00 of the Specifications. The Contractor will provide a construction schedule within 10 days of Contract Award. A copy of the CPM schedule will be kept on file in the Contractor's field office.

CPM schedule shall be updated monthly, with each pay request. No monthly progress payments will be made to the Contractor until an updated schedule is received. A copy of each updated CPM schedule will be kept in the Contractor's field office.

**Table 3-1 – Construction Schedule**

Pre-Bid Meeting	February 12, 2025
Bid Opening	March 5, 2025
Bid Award	April 8, 2025
Agreement Executed	April 22, 2025
Notice to Proceed	April 30, 2025
Begin Stage 1	May, 2025
Dewatering Building Completion	November 2025
Begin Stage 2	December 2025
Train 1 Start-Up	September 2026
Begin Stage 3	October 2026
Train 2 Start Up	July 2027
Substantial Completion	August 2027
Final Completion	October 2027

## **4.0 STAFFING**

On-site construction observation will be performed by Eastsound Sewer and Water District and Wilson Engineering personnel. Duties of on-site personnel will primarily involve observation and documentation of construction activities, verification of conformance with Contract Documents, performance and coordination of CQA activities, as well as communication with the office engineering staff, Owner, Contractor, and others.

Neither the District nor Wilson Engineering plan to change staffing from the existing staffing plan during construction, during startup, or after construction is completed.

### District Contacts:

Jason Bradshaw, General Manager  
620-441-4006  
[JasonB@eswd.org](mailto:JasonB@eswd.org)

Michael Hidalgo, Treatment Operator I  
360-376-2720  
[mikeh@eswd.org](mailto:mikeh@eswd.org)

### Wilson Contacts:

Jeff Christner, P.E.  
360-312-3145 (office)  
[jgc@wilsonengineering.com](mailto:jgc@wilsonengineering.com)

Kenna Wurden-Foster, P.E.  
360-312-3148 (office)  
253-670-0162 (mobile)  
[kwurdenfoster@wilsonengineering.com](mailto:kwurdenfoster@wilsonengineering.com)

Steve Elliott  
360-270-5267 (mobile)  
[selliott@wilsonengineering.com](mailto:selliott@wilsonengineering.com)

## **5.0 PLAN FOR MAINTAINING INTERIM OPERATION DURING CONSTRUCTION**

### **5.1 General**

The construction of the WWTP Upgrades will take place while maintaining continuous treatment through the plant with minimal disruption. During construction of each train, flow to that train will be shut off upstream. Two trains are expected to remain online at all time.

During construction of the new dewatering building, the dewatering screw press should be turned off. The screw press and the three sludge pumps must be protected from damage during construction. During this time, the contractor must liquid haul up to 10,000 gallons of waste sludge from the digester per week. The contractor is responsible for securing a facility to dispose of the waste. A list of potential haulers and recipients is below:

#### Potential Liquid Haulers

A1 Septic on Lopez  
6382 Fisherman Bay Rd  
Lopez Island, WA 98261  
Phone: (360) 622-6354

Vac-Tank Western Services, Inc.  
PO Box 341  
Lynden, WA 98264  
Phone: (360) 354-4339

#### Potential Recipients

Tjoelker Farms, LLC  
8746 Glendale Road  
Custer, WA 98240  
Phone: (360) 354-5198

Town of LaConner Wastewater Services  
12154 Chilberg Road  
La Conner, WA 98257  
Phone: (360) 466-4314

The Contractor is to carefully plan and coordinate work, as needed, to minimize disruptions for:

- Removal of existing structure over trains 1 and 2.
- Installation of influent discharge quick-connect port.
- Installation of sludge storage container and conveyor system.
- Construction of new dewatering building.

The District intends to work with the Contractor to coordinate the work that requires disruption in treatment during periods of low flow. All work that requires disruption shall be coordinated with the plant to occur at low flow periods and as quickly as possible.

A detailed description of the proposed construction sequence plan, including strategies for maintaining plant operation, can be found on sheet C0.9. The Contractor is responsible for clearing out sediment from the treatment trains when emptying.

Figure 5-1 shows the project construction organization chart.

See Operation Plan on sheet G0.3 for emergency contact information. In addition, the Contractor will be required to prepare and maintain a Safety Plan which will be at the jobsite and available for all Construction Staff to view.

O&M Manual will be complete by the time the plant is brought online. Start-up planning meetings will be scheduled when the plant reaches 60% completion.

## **5.2 Coordination**

Installation of the new facilities and conversion from the existing systems to the newly constructed facilities will require coordination and clear communication. The Contractor must coordinate their efforts so that construction activities do not adversely affect existing systems and utilities. Clear communication will facilitate the coordination process.

The Contractor is required to coordinate with the Owner for scheduling various components of the WWTP improvements that impact the treatment process.

### ***5.3.1 Coordination with Owner's Facilities***

It is the responsibility of the Contractor to coordinate his work so that impacts to the Owner's facilities are minimized. The District must continue to provide uninterrupted wastewater treatment throughout the duration of the construction contracts.

The Contractor will be responsible for coordinating with the Owner prior to any demolition of existing facilities.

### ***5.3.2 Coordination with Utilities***

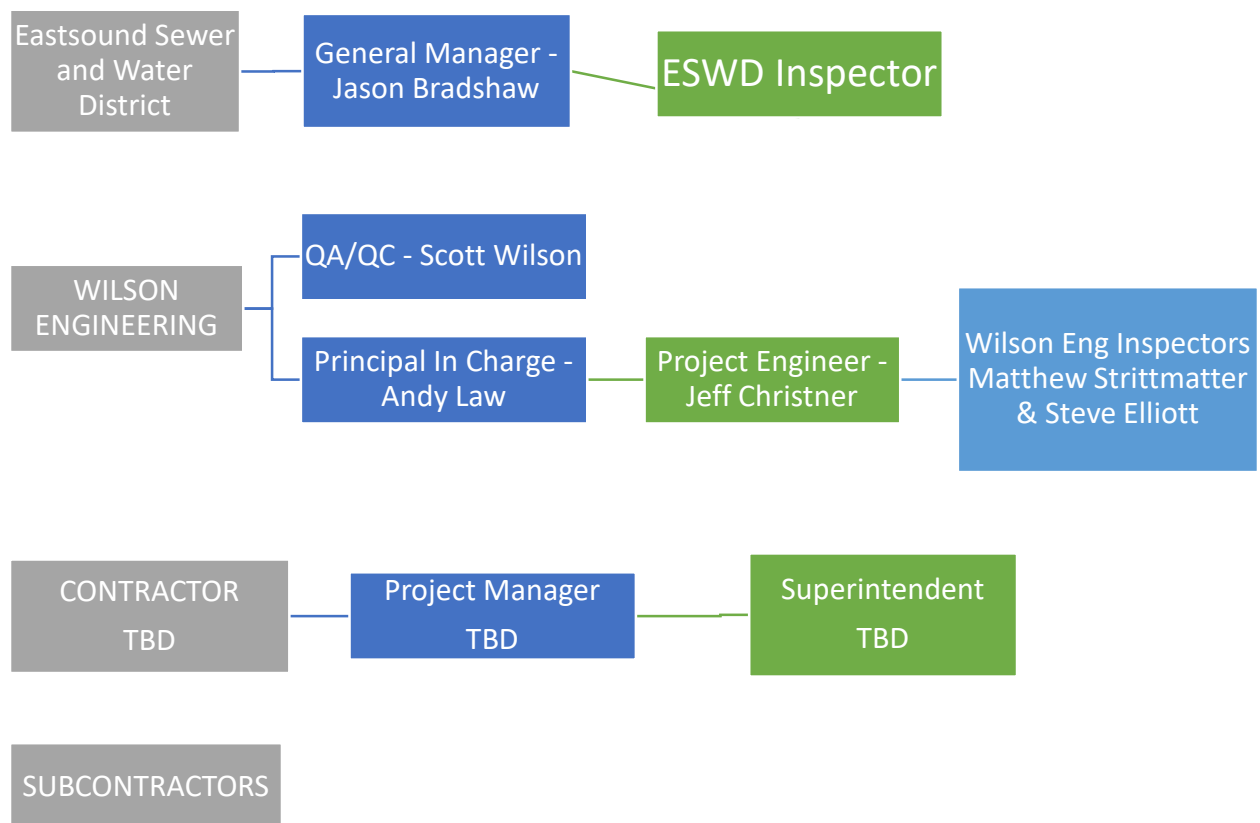
Several existing utilities, including water service, power, and fiber optic telephone service utilities are located within the project areas. It is the responsibility of the Contractor to coordinate his construction activities so that interruptions in service are minimized. The Contractor may address correspondence directly to the affected utility; however, the Engineer must receive copies to verify that the intent of the design is maintained and that the interests of the Owner are not adversely affected.



## 6.0 START-UP

New concrete basins will be subject to clean water leakage testing, and equipment installed will be subject to operational testing as part of the start-up procedures. Testing requirements are specified in Section 01 45 00 of the Specifications, as well as in each specified equipment specification section. Start-up and testing shall be performed by the Contractor and equipment manufacturers as required, in the presence of the Engineer, prior to acceptance of the work. Per the project Specifications, the Contractor and equipment manufacturers will provide startup training to the District WWTP staff.

**Figure 5-1 – Organization Chart**



## **APPENDIX G – INADVERTENT DISCOVERY PLAN**

## **PLAN AND PROCEDURES FOR THE UNANTICIPATED DISCOVERY OF CULTURAL RESOURCES AND HUMAN SKELETAL REMAINS<sup>1</sup>**

PROJECT TITLE: Eastsound Sewer and Water District Wastewater Treatment Plant Upgrades Project

COUNTY WASHINGTON: San Juan County

Section, Township, Range: 11, 37N, 2W

### **1. INTRODUCTION**

The following Inadvertent Discovery Plan (IDP) outlines procedures to perform in the event of discovering archaeological materials or human remains, in accordance with state and federal laws.

### **2. RECOGNIZING CULTURAL RESOURCES**

A cultural resource discovery could be prehistoric or historic. Examples include:

- a. An accumulation of shell, burned rocks, or other food related materials.
- b. Bones or small pieces of bone.
- c. An area of charcoal or very dark stained soil with artifacts.
- d. Stone tools or waste flakes (i.e. an arrowhead. or stone chips).
- e. Clusters of tin cans or bottles, logging or agricultural equipment that appears to be older than 50 years.
- f. Buried railroad tracks, decking, or other industrial materials.

When in doubt, assume the material is a cultural resource.

### **3. ON-SITE RESPONSIBILITIES**

**STEP 1: Stop Work.** If any employee, contractor or subcontractor believes that he or she has uncovered a cultural resource at any point in the project, all work must stop immediately. Notify the appropriate party(s). Leave the surrounding area untouched, and provide a demarcation adequate to provide the total security, protection, and integrity of the discovery. The discovery location must be secured at all times by a temporary fence or other onsite security.

**STEP 2: Notify Archaeological Monitor or Licensed Archaeologist.** If there is an Archaeological Monitor for the project, notify that person. This would be Garth Baldwin,

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<sup>1</sup> If you need this document in a format for the visually impaired, call Water Quality Reception at Ecology, (360) 407-6600. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

Drayton Archaeology at 360-739-3921. If there is a monitoring plan in place, the monitor will follow the outlined procedure.

STEP 3: *Notify the Project Manager* of this project and contact the Ecology Staff Project Manager, or other applicable contacts:

Project Manager: Name: Jason Bradshaw Phone: 360-376-2720 Email: jasonb@eswd.org	Ecology Staff Project Manager Name: Ken Ziebart Phone: 206-594-0163 Email: kenneth.ziebart@ecy.wa.gov
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**Assigned Alternates:**

Assigned Project Manager Alternate: Name: Susie Chapman Phone: 360-376-2720 Email: susiec@eswd.org	Ecology Cultural Resource Specialist (Alternate): Name: Liz Ellis Phone: 360-407-6429 email: lell461@ECY.WA.GOV
---	---

The Project Manager or applicable staff will make all calls and necessary notifications.

**If human remains are encountered**, treat them with dignity and respect at all times.

Cover the remains with a tarp or other materials (not soil or rocks) for temporary protection and to shield them from being photographed. **Do not call 911 or speak with the media. Do not take pictures unless directed to do so by DAHP. See Section 5.**

## 4. FURTHER CONTACTS AND CONSULTATION

### A. Project Manager's Responsibilities:

- *Protect Find:* The Project Manager is responsible for taking appropriate steps to protect the discovery site. All work will stop immediately in a surrounding area adequate to provide for the complete security of location, protection, and integrity of the resource. Vehicles, equipment, and unauthorized personnel will not be permitted to traverse the discovery site. Work in the immediate area will not resume until treatment of the discovery has been completed following provisions for treating archaeological/cultural material as set forth in this document.
- *Direct Construction Elsewhere on-Site:* The Project Manager may direct construction away from cultural resources to work in other areas prior to contacting the concerned parties.
- *Contact Senior Staff:* If the Senior Staff person has not yet been contacted, the Project Manager must do so.

### B. Senior Staff Responsibilities:

- *Identify Find:* The Senior Staff (or a delegated Cultural Resource Specialist), will ensure that a qualified professional archaeologist examines the area to determine if there is an archaeological find.
  - If it is determined not to be of archaeological, historical, or human remains, work may proceed with no further delay.
  - If it is determined to be an archaeological find, the Senior Staff or Cultural Resource Specialist will continue with all notifications.
  - If the find may be human remains or funerary objects, the Senior Staff or Cultural Resource Specialist will ensure that a qualified physical anthropologist examines the find. **If it is determined to be human remains, the procedure described in Section 5 will be followed.**
- *Notify DAHP:* The Senior Staff (or a delegated Cultural Resource Specialist) will contact the involved federal agencies (if any) and the Washington Department of Archaeology and Historic Preservation (DAHP).
- *Notify Tribes:* If the discovery may be of interest to Native American Tribes, the DAHP and Ecology Supervisor or Coordinator will coordinate with the interested and/or affected tribes.

## General Contacts

### Federal Agencies:

Agency: Name Title Number Email
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### State Agencies:

Agency: Name Title Number Email
---

### Department of Archaeology and Historic Preservation:

Dr. Allyson Brooks State Historic Preservation Officer 360-586-3066 Assigned Alternate:	Rob Whitlam, Ph.D. Staff Archaeologist 360-586-3050 Assigned Alternate:
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The DAHP or appropriate Ecology Staff will contact the interested and affected Tribes for a specific project.

### Tribes consulted on this project are:

Tribe:	Tribe
Name:	Name

Title:	Title
Phone:	Phone
Email:	Email

### **Further Activities**

- Archaeological discoveries will be documented as described in Section 6.
- Construction in the discovery area may resume as described in Section 7.

## **5. SPECIAL PROCEDURES FOR THE DISCOVERY OF HUMAN SKELETAL MATERIAL**

Any human skeletal remains, regardless of antiquity or ethnic origin, will at all times be treated with dignity and respect. Do not take photographs by any means, unless you are pre-approved to do so.

*If the project occurs on federal lands or receives federal funding (e.g., national forest or park, military reservation) the provisions of the Native American Graves Protection and Repatriation Act of 1990 apply, and the responsible federal agency will follow its provisions. Note that state highways that cross federal lands are on an easement and are not owned by the state.*

If the project occurs on non-federal lands, the Project Manager will comply with applicable state and federal laws, and the following procedure:

### **A. In all cases you must notify a law enforcement agency or Medical Examiner/Coroner's Office:**

In addition to the actions described in Sections 3 and 4, the Project Manager will immediately notify the local law enforcement agency or medical examiner/coroner's office.

The Medical Examiner/Coroner (with assistance of law enforcement personnel) will determine if the remains are human, whether the discovery site constitutes a crime scene, and will then notify DAHP.

Enter contact information below:

San Juan County Sheriff's Office  
360-378-4151 (non-emergency number)

### **B. Participate in Consultation:**

Per RCW 27.44.055, RCW 68.50, and RCW 68.60, DAHP will have jurisdiction over non-forensic human remains. Ecology staff will participate in consultation.

### **C. Further Activities:**

- Documentation of human skeletal remains and funerary objects will be agreed upon through the consultation process described in RCW 27.44.055, RCW 68.50, and RCW 68.60.

- When consultation and documentation activities are complete, construction in the discovery area may resume as described in Section 7.

## **6. DOCUMENTATION OF ARCHAEOLOGICAL MATERIALS**

Archaeological deposits discovered during construction will be assumed eligible for inclusion in the National Register of Historic Places under Criterion D until a formal Determination of Eligibility is made.

Project staff will ensure the proper documentation and field assessment will be made of any discovered cultural resources in cooperation with all parties: the federal agencies (if any), DAHP, Ecology, affected tribes, and a contracted consultant (if any).

All prehistoric and historic cultural material discovered during project construction will be recorded by a professional archaeologist on a cultural resource site or isolate form using standard and approved techniques. Site overviews, features, and artifacts will be photographed; stratigraphic profiles and soil/sediment descriptions will be prepared for minimal subsurface exposures. Discovery locations will be documented on scaled site plans and site location maps.

Cultural features, horizons and artifacts detected in buried sediments may require further evaluation using hand-dug test units. Units may be dug in controlled fashion to expose features, collect samples from undisturbed contexts, or to interpret complex stratigraphy. A test excavation unit or small trench might also be used to determine if an intact occupation surface is present. Test units will be used only when necessary to gather information on the nature, extent, and integrity of subsurface cultural deposits to evaluate the site's significance. Excavations will be conducted using state-of-the-art techniques for controlling provenience, and the chronology of ownership, custody and location recorded with precision.

Spatial information, depth of excavation levels, natural and cultural stratigraphy, presence or absence of cultural material, and depth to sterile soil, regolith, or bedrock will be recorded for each probe on a standard form. Test excavation units will be recorded on unit-level forms, which include plan maps for each excavated level, and material type, number, and vertical provenience (depth below surface and stratum association where applicable) for all artifacts recovered from the level. A stratigraphic profile will be drawn for at least one wall of each test excavation unit.

Sediments excavated for purposes of cultural resources investigation will be screened through 1/8-inch mesh, unless soil conditions warrant 1/4-inch mesh.

All prehistoric and historic artifacts collected from the surface and from probes and excavation units will be analyzed, catalogued, and temporarily curated. Ultimate disposition of cultural materials will be determined in consultation with the federal agencies (if any), DAHP, Ecology and the affected tribes.

Within 90 days of concluding fieldwork, a technical report describing any and all monitoring and resultant archaeological excavations will be provided to the Project Manager, who will forward the report for review and delivery to Ecology, the federal agencies (if any), DAHP, and the affected tribe(s).

*If assessment activity exposes human remains (burials, isolated teeth, or bones), the process described in Section 5 will be followed.*

## **7. PROCEEDING WITH WORK**

Work outside the discovery location may continue while documentation and assessment of the cultural resources proceed. A professional archaeologist must determine the boundaries of the discovery location. In consultation with Ecology, DAHP and any affected tribes, the Project Manager will determine the appropriate level of documentation and treatment of the resource. If there is a federal nexus, Section 106 consultation and associated federal laws will make the final determinations about treatment and documentation.

Work may continue at the discovery location only after the process outlined in this plan is followed and the Project Manager, DAHP, any affected tribes, Ecology (and the federal agencies, if any) determine that compliance with state and federal law is complete.

## **8. RECIPIENT/PROJECT PARTNER RESPONSIBILITY**

The Project Recipient/Project Partner is responsible for developing an IDP. The IDP must be immediately available onsite, be implemented to address any discovery, and be available by request by any party. The Project Manager and staff will review the IDP during a project kickoff or pre-construction meeting.

*We recommend that you print images in color for accuracy.*



# Implement the IDP / UDP if ...

You see chipped stone artifacts.

- Glass-like material
- Angular
- “Unusual” material for area
- “Unusual” shape
- Regularity of flaking
- Variability of size



# Implement the IDP / UDP if ...

You see ground or pecked stone artifacts.



- Striations or scratching
- Unusual or unnatural shapes
- Unusual stone
- Etching
- Perforations
- Pecking
- Regularity in modifications
- Variability of size, function, and complexity



# Implement the IDP / UDP if ...

You see bone or shell artifacts.



- Often smooth
- Unusual shape
- Carved
- Often pointed if used as a tool
- Often wedge shaped like a “shoehorn”





# Implement the IDP / UDP if ...

You see bone or shell artifacts.



- Often smooth
- Unusual shape
- Perforated
- Variability of size





# Implement the IDP / UDP if ...

You see fiber or wood artifacts.



- Wet environments needed for preservation
- Variability of size, function, and complexity
- Rare





# Implement the IDP / UDP if ...

You see historic period artifacts.

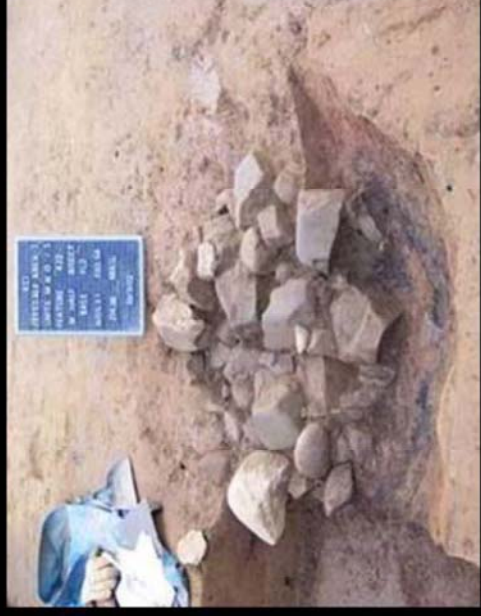




# Implement the IDP / UDP if ...

## You see strange, different or interesting looking dirt, rocks, or

- Human activities leave traces in the ground that may or may not have artifacts associated with them
- “Unusual” accumulations of rock (especially fire-cracked rock)
- “Unusual” shaped accumulations of rock (e.g., similar to a fire ring)
- Charcoal or charcoal-stained soils
- Oxidized or burnt-looking soils
- Accumulations of shell
- Accumulations of bones or artifacts
- Look for the “unusual” or out of place (e.g., rock piles or accumulations in areas with few rock)





## Implement the IDP / UDP if ...

You see strange, different or interesting looking dirt, rocks, or



- “Unusual” accumulations of rock (especially fire-cracked rock)
- “Unusual” shaped accumulations of rock (e.g., similar to a fire ring)
- Look for the “unusual” or out of place (e.g., rock piles or accumulations in areas with few rock)



# Implement the IDP / UDP if ...

You see strange, different or interesting looking dirt, rocks, or

- Often have a layered or “layer cake” appearance
- Often associated with black or blackish soil
- Often have very crushed and compacted shells



Layers of shell  
midden



Historic Debris



## Implement the IDP / UDP if ...

You see historic foundations or buried structures.

