

ADDENDUM NO. 2
TO THE
CONTRACT DOCUMENTS
FOR
EASTSIDE TREATMENT PLANT UV REPLACEMENT
FOR
CITY OF BREMERTON

THIS ADDENDUM IS HEREBY MADE A PART OF THE CONTRACT DOCUMENTS TO THE SAME EXTENT AS THOUGH IT WERE ORIGINALLY INCLUDED THEREIN.

BIDDERS MUST ACKNOWLEDGE RECEIPT OF ALL ADDENDA ON THE BID PROPOSAL FORM. BID PROPOSALS THAT FAIL TO ACKNOWLEDGE ALL ADDENDA MAY BE CONSIDERED IRREGULAR AND MAY BE REJECTED.

ISSUED THIS 11TH DAY OF MARCH, 2026.

CONSOR ENGINEERS
600 University St., Suite 300
Seattle, WA 98101
(888) 451-6822

Addendum No. 2 consists of the following three (3) items:

SPECIFICATIONS

ITEM NO. 1 – Specifications, Section 40 05 13 – COMMON WORK RESULTS FOR PROCESS PIPING

- DELETE in its entirety paragraph 1.1.A.3. “3. Section 40 05 13.07, Hangers and Supports for Process Piping”.

ITEM NO. 2 – Specifications, Section 46 66 56 – OPEN-CHANNEL LP HI UV TREATMENT EQUIPMENT

- REVISE paragraph 1.2.A to the following:

“The installer shall have successfully completed the installation of at least three (3) UV Systems within the past ten (10) years in the Pacific Northwest region. Submit documentation demonstrating relevant project experience, including project locations, system types, installation dates, and client contacts for verification.”

ITEM NO. 3 – QUESTIONS & ANSWERS

The following are questions and answered received from prospective bidders:

- Q1. What is the load rating of the aluminum floor grates inside the building?
- A1. Contractor should consider not exceeding load rating for the existing floor plates in this room.**
- Q2. In Spec Section 05 52 13-2 and the drawings S-102 plan note 3, call for nonstandard alloys (Alloy 6105-T5) for the handrail pipe. Two (2) local suppliers state that neither is readily accessible and would likely require a special mill production run to supply them. Please advise if Alloy 6061-T6 or Alloy 6063-T6 are acceptable?
- A2. Alloy 6061-T6 and 6063-T6 are both acceptable for the railing pipe sections.**
- Q3. Specification section 05 52 13-2 calls for 1-1/2” Sch 80 post and 1-1/2” sch 40 rails with insert connection, Detail 1/S501 of the drawings is calling for 2” sch 80 post and rails, with weld connections. Please verify which requirement is preferred.
- A3. The railing posts should be 2” schedule 80 and the railing horizontal members should be 2” schedule 40, with welded connections.**
- Q4. Per Steel Cover Plate structural notes on drawing S-001, contractor is to supply “Algrip Slip-Resistant Floor Plate (5/8” thick)”. 5/8” Algrip floor plate is a custom item and not available in 5/8” thickness. It would require a special mill run subject to order minimums and suppliers are stating the mill will not make a run for 5/8” thick material. Suppliers are stating 1/2” Algrip floor plate is a standard stock item and is available but will not meet

the load requirements without additional structural support. Please advise on how to proceed.

- A4. *The Algrip floor plate with a 5/8" thickness meets the design criteria. Alternate equivalent slip-resistance floor plates by other manufactures will be approved if they meet the design criteria and if they have comparable quality.***
- Q5. Detail 1/S-103 is calling to remove roofing around upgraded strap connections and re-install as needed with same connection, typ. The roof appears to be a Varco Pruden standing seam roof system with a crimped vertical seam. Removal of the roof at the straps connection plates would require cutting the roof and splicing in new roof sheets (loosing integrity of the roof) or a complete roof removal and a new roof system installed. Please advise intent.
- A5. *The intent is to remove portions of the roof at the upgrade locations and re-install after the upgrades are completed. The integrity and weatherproofing will need to be maintained by whatever means necessary, which may include re-roofing. We understand that altering the existing roof will void the manufacturer's warranty.***
- Q6. Spec section 400513-1.1.A.3 indicates "Section 400513.07, Hangers and Supports for Process Piping" as a related section. The specifications do not currently include section 400513.07. Please provide spec section 400513.07, or provide the correct callout.
- A6. *The reference to Section 40 05 13.07 Hangers has been deleted, see Item No. 1. Section 40 05 13 provides specifications for pipe supports and hangers used in this project.***
- Q7. Spec section 330570-1.2.E indicates "Pumps shall be powered by a dedicated power generator." Spec section 330570-2.2.A.2 indicates that the recirculating pumps can be "Electric or diesel powered." Which prevails?
- A7. *The choice of power source and pump type is considered the Contractor's means and methods. The Owner does not have a preference, provided the Contractor's selected approach meets all performance requirements of Section 33 05 70 and maintains continuous, reliable operation of the recirculation system for the duration of work.***
- Q8. Addendum 1, response to Question 25 indicates "As-builts have been included as an attachment to this addendum." No as-builts, or links to as-builts, were included with Addendum 1. Please provide the as-builts of the existing UV building.
- A8. *As-builts were uploaded 3/9/2026.***
- Q9. Spec section 466656-1.2.A indicates "The installer shall have successfully completed the installation of five (5) Trojan UV Systems within the past five (5) years in the Pacific Northwest region." I am not aware of an installer whose only scope is installing Trojan UV Systems. If that were the case, I could easily see how this requirement could be met. In essence, this requirement would necessitate a contractor to work on five (5)

wastewater treatment plants within 5 years. Typically, wastewater treatment plant projects are multi-year projects. To allow for a larger bidder pool of qualified contractors, we respectfully request that the number of installations be changed to three (3) and the time range be increased to within the past ten (10) to fifteen (15) years.

A9. *The requirement has been revised to change the number of installations and time range, as well as removing the specific requirement that the previous UV installations be Trojan systems, see Item No. 2.*

Q10. The existing roof on the UV Building is a mechanically crimped metal roofing system. This system cannot be cut to perform the structural repairs as shown and then patched back in. Once a crimp is cut, the panel is no longer structurally or watertight-sound, and because the panels are interconnected through the crimping process, compromising one panel affects the adjacent panels as well. As detailed, the only way to execute the work as shown would be to rely on sealants to achieve a waterproof condition rather than maintaining a true mechanically crimped system. This approach would not meet typical manufacturer requirements for watertight integrity or for maintaining a valid roof warranty. To comply with these requirements, the affected portion of the existing roof would need to be removed and replaced with new roofing materials.

Please advise how you would prefer us to proceed with bidding:

- We can bid the work as currently detailed and submit a change order for the necessary roof replacement, or
- You may direct us to include the roof replacement in our base bid.

If you are able to provide details demonstrating how the existing crimped roof system can be cut, reinstalled, and warrantied as part of the design intent, we would be glad to price the work accordingly in our bid.

A10. *The intent is to remove portions of the roof at the upgrade locations and re-install after the upgrades are completed. The integrity and weatherproofing will need to be maintained by whatever means necessary, which may include re-roofing. It is understood that altering the existing roof will void the manufacturer's warranty. Owner and Engineer's preference is to have a bid for the alterations in the base bid, with the understanding that a roof replacement would be a change order, if alterations are not possible.*

Q11. Is the intent for the 50% total free area requirement across the wall envelope applicable to the fixed louver area only or the entire wall area (to include the OH door, man doors, misc openings, etc)?

A11. *The required free area across the wall envelope applies only to the fixed louver area. To declassify the enclosed space, a minimum of 50% free area must be provided for ventilation. Doors or other openings are not included in this calculation, as they would need to remain open at all times to meet the declassification requirement.*

END OF ADDENDUM NO. 2

SECTION 40 05 13 - COMMON WORK RESULTS FOR PROCESS PIPING

PART 1 GENERAL

1.1 SUMMARY

This Section applies to the furnishing and installation of piping inside a building and structure.

A. Related Sections:

1. Section 05 50 00, Metal Fabrications
2. Section 10 14 00, Signage

1.2 REFERENCE STANDARDS

A. American Society of Mechanical Engineers (ASME):

1. ASME A13.1 - Scheme for the Identification of Piping Systems.
2. ASME B31.3 - Process Piping.
3. ASME B31.9 - Building Services Piping.

B. ASTM International (ASTM):

1. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
2. ASTM D792 - Test Methods for Specific Gravity and Density of Plastics by Displacement.
3. ASTM D1248 - Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.
4. ASTM D1784 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
5. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
6. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
7. ASTM D2467 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
8. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
9. ASTM D2846 - Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems.
10. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.

11. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
 12. ASTM F439 - Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
 13. ASTM F441/F441M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80.
 14. ASTM F493 - Standard Specification for Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.
 15. ASTM F656 - Standard Specification for Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
- C. Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry:
1. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation.

1.3 COORDINATION

- A. Coordinate installation of specified items with installation of valves and equipment.

1.4 SUBMITTALS

- A. As specified in Section 01 33 00, Submittal Procedures.
- B. Product Data:
1. Submit Manufacturer catalog information for each product specified.
- C. Shop Drawings:
1. Identification:
 - a. Submit list of wording, symbols, letter size, and color coding for pipe identification, as specified in Section 10 14 00, Signage.
 - b. Comply with ASME A13.1.
 2. Provide all necessary dimensions and details on pipe joints, restraints, fittings, fitting specials, valves, appurtenances, design calculations, and material lists.
 3. Provide detailed layout, spool, or fabrication drawings which show all pipe spools, spacers, adapters, connectors, fittings, couplings, and pipe supports necessary to accommodate the equipment and valves provided in a complete and functional system.
- D. Manufacturer's Statement: Certifying pipe fabrication and products meet or exceed specified requirements.
- E. Source Quality-Control Submittals: Indicate results of shop tests and inspections.

F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

1.5 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of piping appurtenances, connections, and centerline elevations.

B. Identify and describe unexpected variations to pipe routing or discovery of uncharted utilities.

1.6 QUALITY ASSURANCE

A. Drawings:

1. Piping layouts shown in the Drawings are intended to define the general layout, configuration, routing, method of support, pipe size, and pipe type. The mechanical drawings are not pipe construction or fabrication drawings. It is the Contractor's responsibility to develop the details necessary to construct all mechanical piping systems, to accommodate the specific equipment provided, and to provide and install all spools, spacers, adapters, connectors, etc., for a complete and functional system.

B. Inspection:

1. All pipe shall be subject to inspection at the place of manufacture.
2. During the manufacture of the pipe, the Engineer shall be given access to all areas where manufacturing is in progress and shall be permitted to make all inspections necessary to confirm compliance with the Specifications.

C. Tests: Except where otherwise specified, all materials used in the manufacture of the pipe shall be tested in accordance with the applicable Specifications and Standards. Welds shall be tested as specified. The Contractor shall perform all tests at no additional cost to the Owner.

1.7 MATERIAL DELIVERY, STORAGE, AND INSPECTION

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Inspection:

1. Accept materials on Site in Manufacturer's original packaging and inspect for damage.
2. All piping materials, fittings, valves, and accessories shall be delivered in a clean and undamaged condition.

C. Storage:

1. Store materials according to Manufacturer instructions.
2. Store materials off the ground, to provide protection against oxidation caused by ground contact

- D. Protection:
 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 2. Furnish temporary end caps and closures on piping and fittings and maintain in place until installation.
 3. Provide additional protection according to Manufacturer instructions.
- E. All defective or damaged materials shall be replaced with new materials.

1.8 EXISTING CONDITIONS

- A. Field Measurements:
 1. Verify field measurements prior to fabrication.
 2. Indicate field measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 GENERAL

- A. Unless specified otherwise or indicated differently in the Drawings, all piping systems and process piping materials shall be as listed in the table below or as shown on the Drawings:

Service	Material
Utility Water	CPVC Schedule 80
Spray Nozzle	PVC Schedule 80

- 2.2 DUCTILE IRON PIPE AND FITTINGS - NOT USED.
- 2.3 STEEL PIPE AND FITTINGS - NOT USED.
- 2.4 COPPER PIPE AND FITTINGS - NOT USED.
- 2.5 BRASS PIPE AND FITTINGS - NOT USED.
- 2.6 POLYVINYL CHLORIDE (PVC) WATER PIPE AND FITTINGS

- A. PVC Pipe and Fittings:
 1. Four-inch diameter and smaller:
 - a. Pipe: ASTM D1785, Schedule 80.
 - b. Fittings:
 - 1) ASTM D2467, Schedule 80.
 - 2) ASTM D2464, threaded

- c. Joints:
 - 1) Socket, solvent-welded, ASTM D2855.
 - 2) Threaded
- d. Materials:
 - 1) Comply with ASTM D1784
 - 2) Minimum cell classification 12545-C.

2.7 CHLORINATED POLYVINYL CHLORIDE (CPVC) WATER PIPE AND FITTINGS

A. CPVC Pipe and Fittings:

- 1. Four-inch diameter and smaller:
 - a. Pipe: ASTM F441/F441M, Schedule 80.
 - b. Fittings:
 - 1) ASTM F439, Schedule 80.
 - c. Joints: Socket, solvent-welded, ASTM F493.
 - d. Materials:
 - 1) Comply with ASTM D1784
 - 2) Minimum cell classification 23447.

2.8 FLEXIBLE TUBING - NOT USED.

2.9 GALVANIZED STEEL PIPE AND FITTINGS - NOT USED.

2.10 STAINLESS STEEL TUBING AND FITTINGS - NOT USED.

2.11 STAINLESS STEEL PIPE AND FITTINGS - NOT USED.

2.12 FLEXIBLE COUPLINGS - NOT USED.

2.13 RESTRAINED FLANGE ADAPTERS FOR DUCTILE IRON PIPE - NOT USED.

2.14 FLANGED INSULATING JOINTS - NOT USED.

2.15 INSULATING UNION - NOT USED.

2.16 BACKFLOW PREVENTERS - NOT USED.

2.17 DISMANTLING JOINT - NOT USED.

2.18 PIPE SUPPORTS

A. Wall Support for Pipe:

- 1. Pipe Sizes ½ to 1-1/2 inches (13 to 38 mm):

- a. Material: Stainless Steel, Type 304 or 316.
- b. Configuration: One Hole Clamp.

2.19 PIPE PENETRATIONS - NOT USED.

2.20 PIPE COATINGS - NOT USED.

2.21 PIPE INSULATION

- A. Provide EPDM closed-cell elastomeric pipe insulation cover on all exposed CPVC piping installed in the UV channel.
- B. Insulation shall be continuous and sized to fit pipe, unless otherwise specified.
- C. Minimum insulation thickness: 3/8 inches for piping ≤ 2 inches diameter; 1.5 inches for piping > 2 inches diameter.
- D. Insulation shall comply with ASTM C534, Standard Specification for Performed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Foam.

PART 3 EXECUTION

3.1 GENERAL

- A. Furnish and install all piping systems shown and specified, in accordance with the requirements of the Contract Documents. Each system shall be complete with all necessary fittings, hangers, supports, anchors, expansion joints, flexible connectors, valves, accessories, heat tracing, insulation, lining and coating, testing, disinfection, excavation, backfill, and encasement, to provide a functional installation.
- B. Pipe shall be installed in accordance with good trade practice. The methods employed in handling and placing of pipe, fittings, and equipment shall be such as to insure that after installation and testing they are in good condition. Should damage occur to the pipe, fitting or equipment, repairs satisfactory to the Engineer shall be made.

3.2 INSTALLATION

- A. Buried Piping Systems: NOT USED.
- B. Interior Piping Systems:
 - 1. Install water piping according to ASME B31.9.
 - 2. Run piping straight along alignment as indicated in the Drawings, with minimum number of joints.
 - 3. Provide expansion loop to compensate for pipe expansion due to temperature differences.
 - 4. Field Cuts: According to Pipe Manufacturer instructions
- C. Backflow Preventer Assemblies: NOT USED.

D. Pipe Supports and Hangers

1. Install pipe supports according to MSS SP-58 and ASME B31.10.
2. All pipe shall be secured in place by use of blocking, hangers, brackets, clamps or other approved methods, and the weight thereof shall be carried independently of pump casings or equipment.
3. Special hangers and supports are shown on the Drawings.
4. The Contractor shall be responsible for determining the location of and providing all additional supports.
5. Hanger supports shall be as noted below with at least one support adjacent to the joint for each length of pipe, at each change in direction and at each branch connection. Sufficient hangers shall be provided to maintain proper slope without sagging. Support spacing shall not exceed Manufacturer's recommendations, nor as listed below.

<u>Pipe</u>	<u>Maximum Support Spacing (Feet)</u>
CPVC Pipe	
1 inch and Smaller	3
1-1/4 inches and Larger	4

6. Spacing of clamps for support of vertical piping shall be close enough to keep the pipe in alignment as well as to support the weight of the piping and contents unless other vertical support is shown, but in no case shall be more than 12 feet.
7. Provide adjustable hangers for all pipes, complete with adjusters, swivels, rods, etc. Size hangers to clear insulation and guide where required, as well as support piping. All rigid hangers shall provide a means of vertical adjustment after erection. Hanger rods shall be machine threaded. Continuous threaded rods will not be allowed.
8. Clevis or band-type hangers (B-Line FIG B3100) or equal shall be provided as required. Strap hangers not permitted.
9. Provide floor stands, wall bracing, concrete piers, etc., for all lines running near the floors or near walls and which cannot be properly supported or suspended by the walls or floors. Pipelines near concrete or masonry walls may also be hung by hangers carried from wall brackets at a higher level than pipe. Hanging of any pipe from another is prohibited.
10. Equipment shall be positioned and aligned so that no strain shall be induced within the equipment during or subsequent to the installation of pipework.
11. When temporary supports are used, they shall be sufficiently rigid to prevent any shifting or distortion of the piping or related work.

E. Pipe Penetrations: NOT USED.

3.3 FIELD CONTROL

A. Inspection:

1. Inspect for piping defects that may be detrimental as determined by the Engineer.
2. Repair damaged piping, or provide new, undamaged pipe.
3. After installation, inspect for proper supports and interferences.

3.4 CLEANING

- A. Keep pipe interior clean as installation progresses.
- B. Clean pipe interior of soil, grit, shavings, and other debris after pipe installation.

3.5 TESTING

- A. Perform pressure test on utility water piping according to ASTM D2846.

END OF SECTION

SECTION 46 66 56 - OPEN-CHANNEL LOW-PRESSURE/HIGH-INTENSITY UV TREATMENT EQUIPMENT

PART 1 GENERAL

1.1 SCOPE OF WORK

- A. The work described under this section covers the Ultraviolet (UV) system pre-purchased by the Owner and to be installed by the Contractor. The system is an open-channel, gravity flow, and low-pressure high-intensity ultraviolet lamp (UV) disinfection system with an automatic chemical/mechanical cleaning system and variable output lamp drivers. **The Owner will pre-purchase the UV system, including delivery and startup support services, directly from the Manufacturer under a separate pre-purchase contract prior to construction bidding. See the Scope of Supply in the Appendix A for additional details about the equipment and installation and testing services provided by the Manufacturer.**
- B. The pre-purchased UV disinfection system is designed to meet the performance and functional requirements of this Section. The Manufacturer shall be responsible for supply and delivery, and providing assistance to the Contractor including installation support, training, field testing and startup. The Manufacturer shall be responsible for all mechanical, electrical and instrumentation and controls to all termination points as described in this Section and as shown on the Drawings.
- C. The Contractor shall be responsible for furnishing all labor, materials, equipment and appurtenances required to provide an open channel, gravity flow, low pressure lamp, high-intensity ultraviolet (UV) disinfection system complete and operational with all control equipment and accessories as shown. This permanent system will be capable of disinfecting effluent to meet the water quality standards listed in this section. Contractor shall provide and coordinate the construction of structures, equipment, electrical and instrumentation work, and appurtenances to achieve installation and operation of the system. The Contractor shall be responsible for field testing and startup and training. The Contractor shall be responsible for installation of Owner pre-procured equipment including the following:
 - 1. Ultraviolet (UV) banks and modules
 - 2. Power Distribution Center
 - 3. UV Channel Control Panel
 - 4. Accessories
- D. Contractor shall procure and install all related mechanical, electrical, and instrumentation and controls interconnections between the Owner pre-procured UV disinfection systems and as described in this Section and as shown on the Drawings.
- E. The following items are part of this section and shall be installed by the Contractor to ensure a properly designed and integrated UV system:

Tag Number	Quantity	Description
UV Bank -1	1	Each bank contains 20 lamps, 1 UV Intensity Sensor, lamp drivers and other appurtenance
UV Bank -2	1	
UV Bank -3	1	
PDC-1	1	Power Distribution Center (PDC)

Tag Number	Quantity	Description
HSC	1	Hydraulic System Controller (HSC)
SCC	1	System Control Center (SCC)
-	1	Level Control Weir
-	1	Low Level Sensor/Transmitter
-	1	UVT Sensor/Transmitter

F. Related Sections

1. Section 01 12 16 Work Sequence
2. Section 01 33 00 Submittal Procedures
3. Section 01 45 00 Quality Control
4. Section 01 78 23 Operation and Maintenance Data
5. Section 01 75 16 Demonstration and Training
6. Section 05 05 23 – Metal Fastenings.
7. Section 33 05 70 Temporary Pumping

G. Performance and Design Criteria

1. The installed UV System as pre-procured by the Owner, and installed by the Contractor shall meet the following design criteria:

Current Peak Treatment Flow	15 MGD (US)
Future Peak Treatment Flow	20 MGD (US)
Average Flow	10 MGD (US)
Minimum Flow	1.5 MGD (US)
Reduction Equivalent Dose (RED)	30 mJ/cm ² MS2
Total Suspended Solids	15 mg/L, 30 Day Average grab samples
Effluent Temperature Range	33 to 85 °F (1 to 30 °C)
Ultraviolet Transmittance @ 253.7 nm	50%, minimum
Effluent standards to be achieved	400 Fecal Coliform per 100 ml based on a one (1) day Maximum of daily samples for the effluent standard as specified in a) through f). Effluent standards will be guaranteed regardless of influent count to UV system.

2. The UV system is to be installed in 1 open channel having the following dimensions (not including the water level controller):

Length	46 ft
Width	4.7 ft (Existing is 5')
Depth	10.83 ft
Max. Headloss in channel through new UV system under future peak capacity condition*	4.32 ft
*Provided by Manufacturer	

1.2 INSTALLER QUALITY ASSURANCE

- A. The installer shall have successfully completed the installation of at least three (3) Trojan UV Systems within the past ten (10) years in the Pacific Northwest region. Submit documentation demonstrating relevant project experience, including project locations, system types, installation dates, and client contacts for verification.

1.3 SUBMITTALS

- A. As specified in Section 01 33 00, Submittal Procedures.
- B. Submittals shall include the following:
 - 1. Installation experience.
 - 2. Equipment list identifying all equipment, instruments, and ancillary components to be supplied by the UV system Manufacturer.
 - 3. UV Absorbing Chemical Safety Data Sheet.
 - 4. PLC I/O list, program list, logic diagram, wiring diagram, network communication diagram demonstrating that all equipment supplied under this Section can be operated properly and in accordance with the performance requirements of this Section.
 - 5. Functional Testing Plan as specified herein.
 - 6. Performance Testing Plan as specified herein.
 - 7. Closeout Submittals:
 - a. Three (3) hard copies and an electronic copy of the Installation, Operation and Maintenance Manuals including:
 - 1) Complete manufacturer's installation instructions with detailed installation drawings.
 - 2) Complete manufacturer's operational instructions.
 - 3) Complete manufacturer's maintenance instructions with complete catalog information, parts list, recommended spare parts list and instructions for cleaning and maintenance.
 - b. Maintenance Material Submittals
 - 1) Spare Parts
 - a) Completely Assembled Lamp Module: 2 ea.
 - b) Quartz Lamp Sleeves and Seals: 1 ea.
 - c) Electronic Ballasts: 1 ea.
 - d) Lamp Socket Connectors: 1 ea.
 - e) UV-Blocking Face Shields: 1 ea.

f) Operator's kit with UV-Blocking Face Shield, gloves, and Cleaning Solution: 1 ea.

2) Tools: Furnish special tools, supports and other devices required for Owner to maintain equipment.

1.4 DELIVERY, STORAGE AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Store materials according to manufacturer instructions.

C. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.

2. Provide additional protection according to manufacturer instructions.

D. EXISTING CONDITIONS

1. Field Measurements:

a. Verify field measurements prior to fabrication.

b. Indicate field measurements on Shop Drawings.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. TrojanUVSigna™, as manufactured by Trojan Technologies, London, Ontario, Canada.

2.2 DESIGN, CONSTRUCTION AND MATERIALS

A. See the Scope of Supply in the Appendix A.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that facilities are ready to receive the new UV system.

3.2 TRANSPORT, STORAGE AND HANDLING

A. The Manufacturer will ship the UV system components directly to the Wastewater Treatment Plant (WWTP) at 2500 Stephenson Avenue, Bremerton WA. The City will off-load and secure the components at the site. The Contractor shall coordinate with the City to gain access to the components when ready for installation, transport all items to the job site, and store and handle all items in accordance with Section 01 60 00, Product Requirements. For scheduling

pickup, the Contractor shall make arrangements with the project manager, David Powell at (360)473-5268 at least five days prior to need.

3.3 INSTALLATION OF EQUIPMENT

- A. Installation of equipment is to be done by Contractor, as required and instructed by the Manufacturer, in accordance with Contract Drawings, Manufacturer's shop drawings, instructions and installation checklist. Checklist to be completed and returned at least two (2) weeks prior to date requested for commissioning. Photographs illustrating site readiness are required. The Contractor shall be responsible for the installation readiness of the UV system. All labor, materials and test apparatus necessary for completing the installation shall be furnished by the Contractor. Ancillary equipment required for installation (to include miscellaneous metals, anchor bolts, and hardware) shall be provided and installed by Contractor.
- B. The Manufacturer shall perform all terminations of cables and conductors within electrical panels supplied as part of the System.
- C. Contractor shall provide all conductors, cables, conduits, and/or cable trays, or raceways to power UVT and level instrumentation provided by the Manufacturer. Contractor shall provide a 20-amp circuit to the SCC and 120-volt power to the UV Interface Panel.

3.4 FIELD TESTING AND STARTUP

- A. Field services shall conform to Section 01 75 16, Testing, Training and System Startup.
- B. The Manufacturer shall provide the services of a trained representative to provide installation consultation, testing/startup services, and operation and maintenance training for the Owner's personnel. See Scope of Supply in the Appendix A.
- C. Following the Manufacturer's calibration of instruments, the Contractor shall perform Functional Testing and Performance Testing on the System. It will be the responsibility of the Contractor to integrate testing and startup activities within the overall construction schedule.
- D. Manufacturer shall provide a qualified representative of the manufacturer to be present during the startup. Manufacturer shall provide oversight of UV system, guidance of operational set-points, troubleshooting of issues that arise, and on-going hands-on training to Owner's operation and maintenance staff. Contractor shall coordinate directly with the Manufacturer to schedule equipment startup and testing.
- E. Functional Testing: Prior to Performance Testing and Startup, the Manufacturer's representative shall inspect the installed System for proper alignment, proper connection, and satisfactory function of all components. The Manufacturer's representative shall approve the installation and provide a Certification of Proper Installation that the system components have been installed correctly and are ready for operation. Performance testing and Startup shall not commence until the certificate of proper installation and component testing report has been submitted and accepted by Owner and Engineer.
 - 1. Proposed functional testing procedure shall be developed by the Contractor with input from Engineer. The Contractor shall submit a proposed Functional Testing Plan to the

Engineer for review and approval before scheduling and conducting the test. The Functional Testing shall include:

- a. Automatic START/STOP and flow control of channels using the SCC.
 - b. Automatic channel shutdown and startup in response to changes in flow rate and simulated water quality.
 - c. Automatic channel shutdown in response to alarms.
 - d. Automatic shutoff and alarm for various failure modes.
 - e. Operation of lamps with proper dose pacing in the channel for a period of 4 continuous hours. During this period, a minimal cooling water supply as specified by the Manufacturer will be circulated. Cleaning system operation frequency will initially be set during the functional testing.
 - f. Monitoring and recovery of operating data.
 - g. Monitoring from the SCADA system.
 - h. All control functions, both at local system and remote workstation.
 - i. Operation of all monitoring instruments.
 - j. The Contractor shall conduct functional tests until each individual component item or system has achieved satisfactory functionality and must demonstrate all functional features and controls during this period while in automatic modes.
2. Functional testing shall include proving the interface between the SCC and the SCADA system. The Contractor and Manufacturer's representative shall coordinate with the plant control system, and instrumentation and control (I&C) integrator during the interface test.
 3. Functional testing to be conducted using utility water.
 4. Functional testing will be witnessed by Owner and shall demonstrate that the system and related control system operate in accordance with the specifications, including all operating, monitoring, and shutdown functions.
 5. If, in the opinion of the Owner, the System meets the requirements specified herein, a Certificate of Proper Installation will be signed by the Manufacturer and Owner and the System will be able to be Performance Tested. If, in the opinion of Owner, the functional test results do not meet the requirements specified herein, the System will be classed as nonconforming.
 6. In the case of a nonconforming system, advancement to performance testing will not commence until the Contractor has made, such adjustments, changes, and/or additions as are necessary to correct the System and demonstrated this by a satisfactory functional test as specified above.

F. Performance Testing:

1. The performance testing shall be conducted by the Contractor to demonstrate that the guaranteed performance requirements listed in Article Guaranteed Performance Requirements are satisfied.
2. The Contractor shall submit a proposed Performance Testing Plan before scheduling and conducting the tests described in this section. Testing shall not start until the Certificate of Proper Installation and an approved Performance Testing Plan are accepted by Owner.
3. During the performance testing, the Contractor shall start up and operate the System continuously for a minimum of 2 days. The performance testing shall be done to verify that the System meets the guaranteed performance requirements of this Specification. The Contractor shall be responsible for retaining the analytical laboratory for sample analysis and costs.
 - a. The duration of the performance test is subject to continuation based on the system and/or system component failures as defined herein:
 - 1) Minor Alarms/Faults: Alarms and faults designated as minor shall not suspend or extend the performance testing unless continuous minor alarms impact the ability of the System to operate in full automation.
 - 2) Major Failure: A major failure of the control systems is any event that requires operator intervention to restart or to re-establish normal system operation beyond that described above. The performance test will restart from the beginning of the testing period, once the major failure has been corrected.
 - 3) Wiper Faults/Failures: More than one wiper failure per bank shall result in suspension of the performance testing until the appropriate corrective action has been taken by the Manufacturer. The performance test will restart from the beginning of the testing period, once the problem has been corrected.
 - 4) Disinfection Failures: If the UVT in any effluent sample taken during the performance test is lower than 50%, the performance test will restart from the beginning of the testing period.
4. The submitted Performance Testing Plan shall include descriptions of the following tests, including step-by-step testing procedures, lists of parts and pieces to facilitate temporary test systems, approximate duration of tests, and sketches and product information for Contractor's proposed design and location of temporary pumping, piping, UVT metering, and chemical injection systems.
 - a. Control System: Verify that the PLC, SCC, SCADA System and network communications systems operate as intended. Verify that automatic transfer to redundant or backup banks, modules or channel is functional and that operator intervention to restart or to re-establish normal operation is required only during weekdays (between 7:00 a.m. and 3:30 p.m.). Any other manual intervention to restart or to re-establish normal operation of the control system is considered a major system failure. Coordinate with the City of Bremerton's programmer as needed.

- b. UVT: The purpose of UVT sampling is to confirm that effluent quality meets the design requirements under actual operating conditions. The test medium shall be utility water with additive (UV Absorbing Chemical) as defined below.
- 1) Reduce UVT of influent test water to target levels of 35%, 40%, 45%.
 - 2) UV Absorbing Chemical Additive Safety Data Sheet:
 - a) Product: Super Hume
 - b) Component Ingredients: Leonardite Shale
 - c) Specific Gravity: 1.06 – 1.07
 - d) Health Hazard: 1 (Irritation or minor reversible injury possible)
 - e) Flammability: 0 (Materials that will not burn)
 - f) Reactivity: 0 (Materials that are normally stable, even under fire conditions, and will not react with water, polymerize, decompose, condense, or self-react. Non-Explosives.)
 - g) Personal Protection: B (Safety Glasses + Gloves)
 - h) Contractor shall submit the safety data sheet of chemical for Engineer's review.
 - i) Contractor shall deliver, store, and handle the chemical in accordance with the safety data sheet.
 - 3) Provide Chemical Usage Determination:
 - a) Prepare a stock solution of chemical and utility water and calculate parts per million (ppm) of stock solution
 - b) Prepare at least six (6) test utility water samples with various diluted chemical concentrations.
 - c) Measure UV absorbance of each sample using a spectrophotometer at a wavelength of 254 nm using 1 cm cuvette.
 - d) Record absorbance values corresponding to each concentration and plot a graph of UV absorbance vs chemical concentration in ppm.
 - e) Measure the absorbance of test water and use the graph to determine how much chemical is needed to achieve the desired UVT in test water.
 - f) Contractor shall confirm the laboratory procedure and test result with the Manufacturer.
 - 4) Additives passing through the reactor shall be well mixed prior to the UV channel influent sampling. Mixing shall be verified as described in the dosing procedure

below. Chemical injection and mixing shall be accomplished using one of the following methods:

- a) Existing Parshall Flume.
- b) Static mixer on temporary recirculation pump system discharge.
- c) Or approved equal.

5) Chemical Dosing Procedure:

- a) Begin with the UV system turned off and adjust the test water to the target UVT values by adding chemical. Steady-state (i.e., mixed condition) is confirmed when the measured UVT of three water samples taken one minute apart at the inlet of UV channel are within 0.3 percent of the target value. If the replicate UVT samples measured are not within 0.3 percent of the target UVT, the chemical dosing rate shall be readjusted until the UVT is within the acceptable tolerance after the testing is repeated.
 - b) Once steady-state is achieved, turn on the UV system and start the test.
 - c. During the performance testing, the test medium will continuously recirculate throughout the plant at a flow rate of 1.5 MGD (1,045 gpm). The treated test water shall be pumped from downstream of UV channel to the existing 100,000-gallon storage basin. The Contractor shall provide all labor, service, and equipment to perform temporary pumping, metering, chemical dosing, and UVT monitoring. See Section 33 05 70 for Pumping Requirements.
 - d. Conduct two tests for each influent UVT level: 35%, 40%, and 45%. Each test shall be conducted for minimum four hours. The UVT at the inlet of the UV system shall be continuously online monitored using the included UVT sensor.
 - e. Contractor shall collect a minimum of two sets of two grab samples per test at the inlet and outlet of the UV system (4 grab samples minimum total per test) to verify inlet sensor readings and confirm an increased outlet UVT to minimum 50%. Samples shall be collected at intervals no shorter than one hour. During this performance test period the Contractor shall provide all labor, equipment, sampling containers, and analytical services required.
- 1) UVT field measurements described in this specification shall be achieved using a portable ultraviolet transmittance meter. Meter shall be RealTech Real UV254 P200 or equal and submitted to Engineer for review prior to procurement.
 - a) Portable UVT meter shall be calibrated and certified before beginning testing.
 - b) Contractor may alternately choose to complete UVT field measurements by grab sample and transfer to an accredited wastewater lab for UVT analysis. Grab samples for UVT must be provided to lab within 30 minutes of collection. Contractor shall submit proposed lab as part of the Performance Testing Plan.
 - c) Coordinate with Owner for use of existing lab services and/or field equipment, if available. Owner is under no obligation to provide use of existing equipment or lab services to accomplish testing.

f. Contractor shall record the reading on the included inlet UVT sensor at the time each set of grab samples are pulled. This recorded value will be compared to lab results or portable meter results at the inlet.

g. Example sampling schedule is as follows:

Influent UVT = 35%

1) Begin Test #1:

- a) Grab sample at UV inlet
- b) Grab sample at UV outlet
- c) Record UVT inlet measurement

2) Read and record grab sample UVTs, or transfer samples to lab for UVT analysis within 30 minutes of collection.

3) Wait minimum 1 hour.

4) Begin Test #2:

- a) Grab sample at UV inlet
- b) Grab sample at UV outlet
- c) Record UVT inlet measurement

5) Read and record grab sample UVTs, or transfer samples to lab for UVT analysis within 30 minutes of collection.

5. The Contractor shall submit the grab sample UVT measurement results to Engineer as part of the Performance Test Plan.

a. The Manufacturer shall perform the following schedule of tests:

Test	Sample Location	Frequency	Procedure
UV Transmittance	System Inlet and Outlet	2 times/test	Standard Methods (Method 5910)

6. Head loss Test: Head loss through each channel shall be measured and plotted on a curve showing flow rate on the horizontal axis and head loss in inches of water on the vertical axis. The level at the exit of the inlet channel gate and upstream of the effluent control weir shall be used to determine the guaranteed performance requirements head losses.

7. A qualified representative of the Manufacturer shall supervise the performance testing, analyze data, and certify the System by furnishing a Certificate of Proper Performance. Tests shall be documented during continuous operation of the System, and the Manufacturer shall submit to Engineer three copies of a complete Performance Test Report containing all original test data, calculations, and a description of the performance testing procedures and results.

8. Once the performance test is completed and a Certification of Proper Performance is furnished by the Manufacturer, the tested water shall be discharged. The following discharge requirements shall be met:
 - a. The Contractor shall submit a Testing Water Disposal Plan to the Owner and Engineer for review and approval. The Disposal Plan shall specify the composition of treated water, any required treatment processes, transportation methods, discharge locations, relevant permit applications, potential containment solutions, and the discharge schedule.
 - b. The treated water shall NOT be discharged through the Outfall to the Puget Sound.
 - c. The treated water may be discharged to the following:
 - 1) Sanitary sewer manhole with approval from the City of Bremerton.
 - 2) A qualified liquid waste removal service.
 - 3) Or submitted and approved alternate location.

3.5 MANUFACTURER'S FIELD SERVICES

- A. Per Manufacturer's scope of supply, qualified representative(s) shall be present at the jobsite for three (3) days and in one (1) trip for the installation assistance, field tests, and training. Any additional trips or man-days required shall be the Contractor's responsibility. Contractor shall refer to the daily rate schedule provided by the Manufacturer. Contractor shall coordinate with the Manufacturer and schedule the trips at least ten (10) working days in advance.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK